

HI-FI CHOICE

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

74 CD PLAYERS SUMMARISED

INTERVIEW – AT HOME WITH
TIM PAGE

10 CD PERSONALS – ON TEST

41 TURNTABLES AND 24
TONEARMS – SUMMARISED

124 LOUDSPEAKERS
– SUMMARISED

143 AMPLIFIERS
– SUMMARISED

PERSPECTIVES – THE ART OF
SPEAKER DESIGN

72 CASSETTE DECKS –
SUMMARISED

CD OFFER – SAVE £5 ON DMP
JAZZ CDs

114 CARTRIDGES
– SUMMARISED

30 LOUDSPEAKERS UNDER REVIEW

TEST SUMMARIES ON OVER 800 HI-FI PRODUCTS



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?

The result was the Infinity Servo Statik I, immediately acclaimed by leading audio critics as the State of the Art in the reproduction of music.

In the ensuing years, this absolute obsession with music, this passion for perfection has continued to drive us. And to please equally fanatic music lovers and audiophiles throughout the world.

Today the benchmark 7½ foot tall £45,000 Infinity Reference Standard V is the embodiment of Infinity's obsession. It is also the source of much of the state-of-the-art technology used throughout the entire Infinity product line.

Every Infinity speaker at every price point—our IRS V, our IRS Beta, Gamma and Delta, our Kappa Series, our RS Series, our Studio



Infinity Reference Standard V IRS Beta

Monitor Series and Kappa Automotive Series—shares a 20-year tradition of technological innovation.

This Infinity dedication to developing some of the most demanding and expensive high-end products has enabled us to offer the audiophile speakers of unprecedented value and musicality.

The rich velvet timbre of a French horn with all its overtones; the crisp, gutty attack of a Fender bass; the clean, delicate swish of a brush on a Ziljian cymbal; nowhere but through an Infinity speaker will you hear them with such warmth and lifelike presence.

Unless you're at the live concert. Which, as we've been saying all along, is what it's all about.



Kappa 9



Kappa 6
(optional pedestal)



RS 4000A System
Car Components
RS 62k 2-way driver
RS 693k 3-way driver
CS-1 component system



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

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

HI-FI CHOICE

ISSUE NUMBER 66: JANUARY 1989



Cover photograph of *The Infinity 6 Kappa* (page 73) by Chris Richardson.

THE FRONT END

7

UPDATE

Reporting on the latest products and developments in the audio industry.

12

EXCLUSIVE CD OFFER

Take advantage of our special offer of £5 off the superb quality DMP-Jazz CDs.

14

CHOICE SESSIONS

Subjective armchair comment from Alvin Gold, who took Sony's portable TV-and-Video-8 recorder on holiday; John Bamford discusses the Philips RC775 intelligent handset, and more . . .

19

READERS WRITE/CHOICE ANSWERS

Has your hi-fi got itchy feet? Audio agony aunt Jason Kennedy answers those personal problems . . . plus feedback on November's cable reviews.

ASPIRATIONS



24

BESPOKE SOUNDS

Banking Knight Sir David Scholey shows Dan Houston his tailor-made sound system and home.

PERSPECTIVES



32

MOVING AIR

Richard Black on the electrostatic, horn, and other shapes and sizes of loudspeakers.

40

INTERVIEW

Dan Houston visits Vietnam photographer Tim Page who states a novel case for using CD.

LOUDSPEAKERS

46

MARKET RESPONSE

Reporting from the marketplace: UK specialist dealers tell Dan Houston about reliability and buying trends in the loudspeaker market.

50

CHOOSING AND USING LOUDSPEAKERS

Paul Messenger guides you through the maze of loudspeaker purchasing.

51

LOUDSPEAKER REVIEWS

Paul Messenger, with the help of a listening panel, comments on the best boxes.

95

TECH TALK

A more complex look at the technology and background to how we test the loudspeakers featured in this issue.

96

CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Who made the grade? The best models from this and previous loudspeaker tests.

PERSONAL CDs



101

CHOOSING AND USING PERSONAL CD PLAYERS

So you want to annoy on public transport? Jason Kennedy on the possibilities and pitfalls of these dinky gizmos.

103

CD PERSONAL REVIEWS

Jason dons cans to skip and search through ten machines before commenting on the best from this test.

THE DIRECTORY

122

SELECTED DEALER DIRECTORY
Regional dealer listing for the best hi-fi in your area.

130

THE CHOICE DIRECTORY
Nutshell comment and buyer's guide packed with information on the equipment we've reviewed.

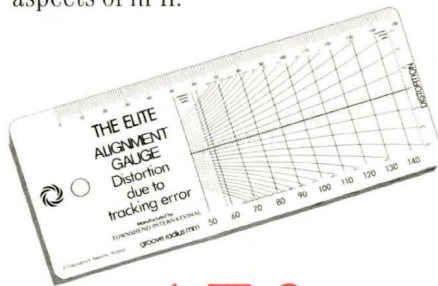
MODEL	PRICE	LAB SOUND	COMMENTS
Yamaha AX500	£200	Very Good	Superbly finished French audiophile separates, with very good
FBA 2 pro 6 pm	£1395/£1695	Good++	V Good/Excellent softened bass. Needs extra transformer (E300) for MC cartridge
Acoustic Energy AE1	£220	Good	To the author's knowledge, the most awesomely dynamic ever made
		Very Good	Spacious and informative sound quality with bass well

CHOICE MATTERS

31

COMING UP

Next month Alvin Gold reviews turntables and tonearms, Paul Miller gets in the groove with 20 cartridges, and your copy of *Choice* comes with a free Elite alignment gauge. Also Dan Houston visits Radio One DJ Gary Davies at home, plus lots more on all aspects of hi-fi.



176

PERSONAL MESSAGES

Paul Messenger rounds up with his thoughts on hi-fi.

MENU

W

e've said it before, and no doubt we'll say it again; choosing loudspeakers for your hi-fi system is like choosing a pair of shoes.

A loudspeaker can only reproduce the signal fed to it by the rest of the system of course, so in theory a good speaker should impart very little 'character' to the sound. If it's doing its job correctly the speaker should reproduce faithfully the sound of the music source, allowing you to hear through to the original recording.

However, no loudspeaker is so perfect that one can proclaim confidently that it is adding no coloration whatsoever to the sound of a system. Change the amplifier in a system, for example, and you'll observe a difference in the sound; but change the loudspeakers, and the sound of the system will change *dramatically* in character. Consequently it's important to choose speakers with which you're comfortable, because whatever else you do to your system the speakers will always have the final say.

We've tested 30 models this month, the majority of which fall into the 'affordable' category. In addition, JK has had some fun impressing fellow commuters while road-testing (train-testing?) ten CD-playing personal stereos.

Next month we're turning our attentions unashamedly towards analogue front ends. There's plenty of life yet in the vinyl LP record - and many specialist turntable and tonearm manufacturers continue to show faith by producing new models. In addition to the latest offerings in arms and decks, we're also testing 20 new cartridges.

Setting up a turntable correctly, and ensuring that your cartridge is perfectly aligned, is essential if you want to get the best sound from your records. Consequently - he says, saving the big news until last - I'm delighted to be able to announce that next month's issue of *Choice* will include a free Elite Alignment Gauge. We'll be publishing full instructions on how to use the Alignment Gauge, which helps ensure that tracing distortion is kept to a minimum, allowing you to hear crystal clear sound from your record-playing equipment.

John Bamford

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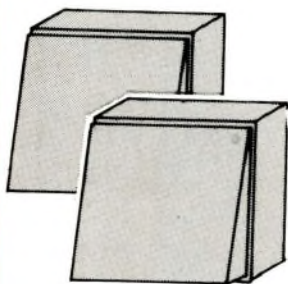
RICHER Sounds

STRAIGHT FROM THE

It's that time of year again. Time to deck the halls, fatten the goose and hire a second TV set to avert domestic strife. Time too to ponder this marvellous seasonal hamper of audio gift buys from Richer's sack. Our unique 'Buy The Best In Bulk' policy, our cheery, friendly experts and our bright 'n' breezy stores all add up to fantastic bargains and top audio names whether you're buying an accessory for a fiver or a system for two hundred. This Christmas there's no better place to pick up your seasonal sounds than Richer Sounds. Great buys for winter nights - nationwide!

The Original

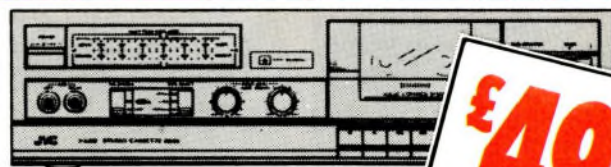
All the very best in End-of-line, scoop purchase and mega deals at prices we're known worldwide for



FISHER STEM77 ● Bookshelf or extension speakers ● 35 watts power handling ● Black finish ● Spkr wire supplied
● W170 x H190 x D190



£9
Per pair



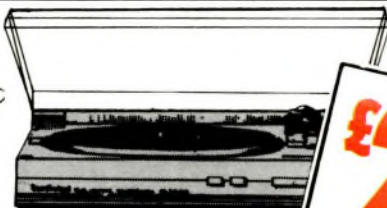
JVC TDX102 Cassette Deck ● Dolby B NR ● S/N 58dB ● Crosstalk (1kHz) 60dB ● Freq resp 40Hz-15KHz ● Black finish ● Metal ● 435 x 115 x 237 (Also TDX202 £89.95)

£49



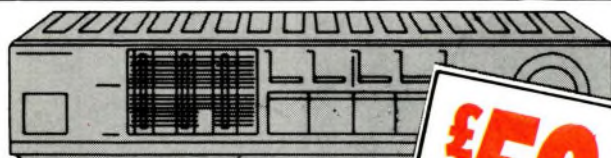
KENWOOD KD37R Turntable ● Belt drive ● DC servo motor ● straight tonearm ● Auto return ● Black finish ● 420 x 100 x 331 ● Cart £5 extra.

£49



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

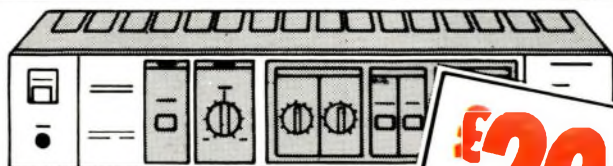
£29



MARANTZ PM26 Amplifier ● 30 watts per channel ● S/N 86dB ● Low impedance drive ● Black finish ● 420 x 100 x 260

£59

FACTORY REPACK



SANYO JA220 Amplifier ● 20 watts per channel ● THD 0.9% ● Freq resp 20Hz-20,000Hz ● Silver/black finish ● 420 x 80 x 220

£29



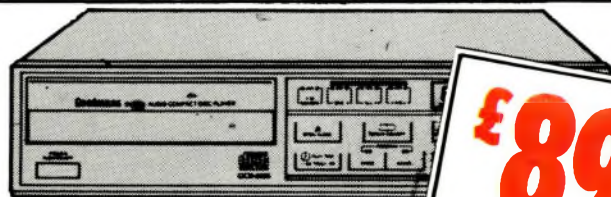
TEAC V210C Cassette Deck ● Dolby B&C NR ● S/N 70dB ● W&F 0.095% ● Freq resp 30Hz-16KHz ● Black finish ● Metal facility ● 435 x 120 x 215

£69



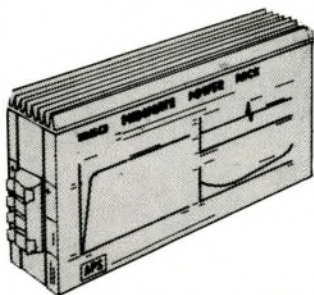
GOODMANS GSQ5200 equaliser ● 12 bands ● 12dB cut/boost range ● LED illuminated controls ● Black finish ● 345 x 65 x 278.

£39



GOODMANS GCD500S Compact Disc ● LED digital display ● Music search ● Fast forward/rev ● Black finish ● Repeat/memory function ● 350 x 80 x 310

£89



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



£39



MARANTZ CD45 Compact Disc ● 4 x oversampling ● 20 track memory with repeat ● Digital display ● Forward/backward search with sound ● Index entry ● Black finish ● 320 x 90 x 300.

£99

FACTORY REPACK

Don't forget: If you see our hi-fi cheaper anywhere else in stock within 75 miles of your local branch, we'll beat it by £5. That's right. The only way to get it.

REINDEER'S MOUTH

RICHER Sounds

Xmas Eve Sat 24th 9-5pm; Xmas Day Sun 25th Closed; Boxing day Mon 26th 10-4pm; Bank Hol. Tues 27th 10-4pm; Weds 28th London & Bristol 10-7pm, Rest 9-6pm; Thurs 29th London & Bristol 10-7pm, Rest 9-6pm; Frid 30th London & Bristol 10-7pm, Rest 9-6pm; New Years Eve Sat 31st all 9-5pm; New Years Day Sun 1st Closed; Bank Hol. Mon 2nd 12-4pm (excl. Edinburgh & Glasgow closed); Tues 3rd Edinburgh & Glasgow 12-4pm, Rest as normal.

The New Look

A handpicked selection of the magazines recommendations, independent reviews and our considerable experience of value for money, quality product, at typical Richer prices...

TURNTABLES

Carts, all £5 extra

KENWOOD KD37R

£49.95

KENWOOD

NAD 5120

£89.95

Free Cart.

NAD

DUAL CS503 I

£109.95

Dual

DUAL CS505 III

£134.95

Dual

ARISTON 'Q'

£144.95

ARISTON

CASSETTE DECKS

SONY TCFX150

£89.95

SONY

AIWA ADF270

£99.95

AIWA

DUAL CC8010

£109.95

Dual

ONKYO TA2120

£119.95

ONKYO

YAMAHA KX200

£119.95

YAMAHA

NAD 6220

£149.95

NAD

KENWOOD KX660HX

£169.95

KENWOOD

MARANTZ SD45 II

£199.95

MARANTZ

COMPACT DISCS

YAMAHA CD29

£169.95

YAMAHA

DUAL CD1030RC

£169.95

Dual

ROTEL RCD820B

£209.95

ROTEL

KENWOOD DP880

£249.95

KENWOOD

MARANTZ CD65 II

£249.95

MARANTZ

MARANTZ CD65 II SE

£299.95

MARANTZ

TUNERS

KENWOOD KT660L

£129.95

KENWOOD

NAD 4225

£139.95

NAD

ROTEL RT850AL

£159.95

ROTEL

AMPLIFIERS

ROTEL RA810A

£99.95

ROTEL

YAMAHA AX300

£99.95

YAMAHA

ROTEL RA820BX2

£109.95

ROTEL

NAD 3020E

£119.95

NAD

KENWOOD KA550D

£129.95

KENWOOD

ACOUSTIC RESEARCH A05

£169.95

AR

SPEAKERS

GOODMANS MAXIM II

Walnut

£69.95

Goodmans

VIDEOTONE MINIMAX II

£79.95

VIDEOTONE

FREE: XMAS GIFT

To all our customers!
Decca Record Cleaning Arm worth £7.99 with this coupon

ROTEL RL810

£99.95

ROTEL

ROTEL RL850 II

£129.95

ROTEL

TANNOY MERCURY 'S'

£159.95

TANNOY

TANNOY M20 GOLD II

£199.95

TANNOY

MISCELLANEOUS

BEYER headphones

£4.99

Beyer

AUDIO TECHNICA AT95E cartridge

£9.99

audio-technica

ORTOFON OMP10 cartridge

£9.99

ortofon

GOLDRING EPIC cartridge

£12.95

GOLDRING

SENNHEISER HD420SL II headphones

£39.95

SENNHEISER

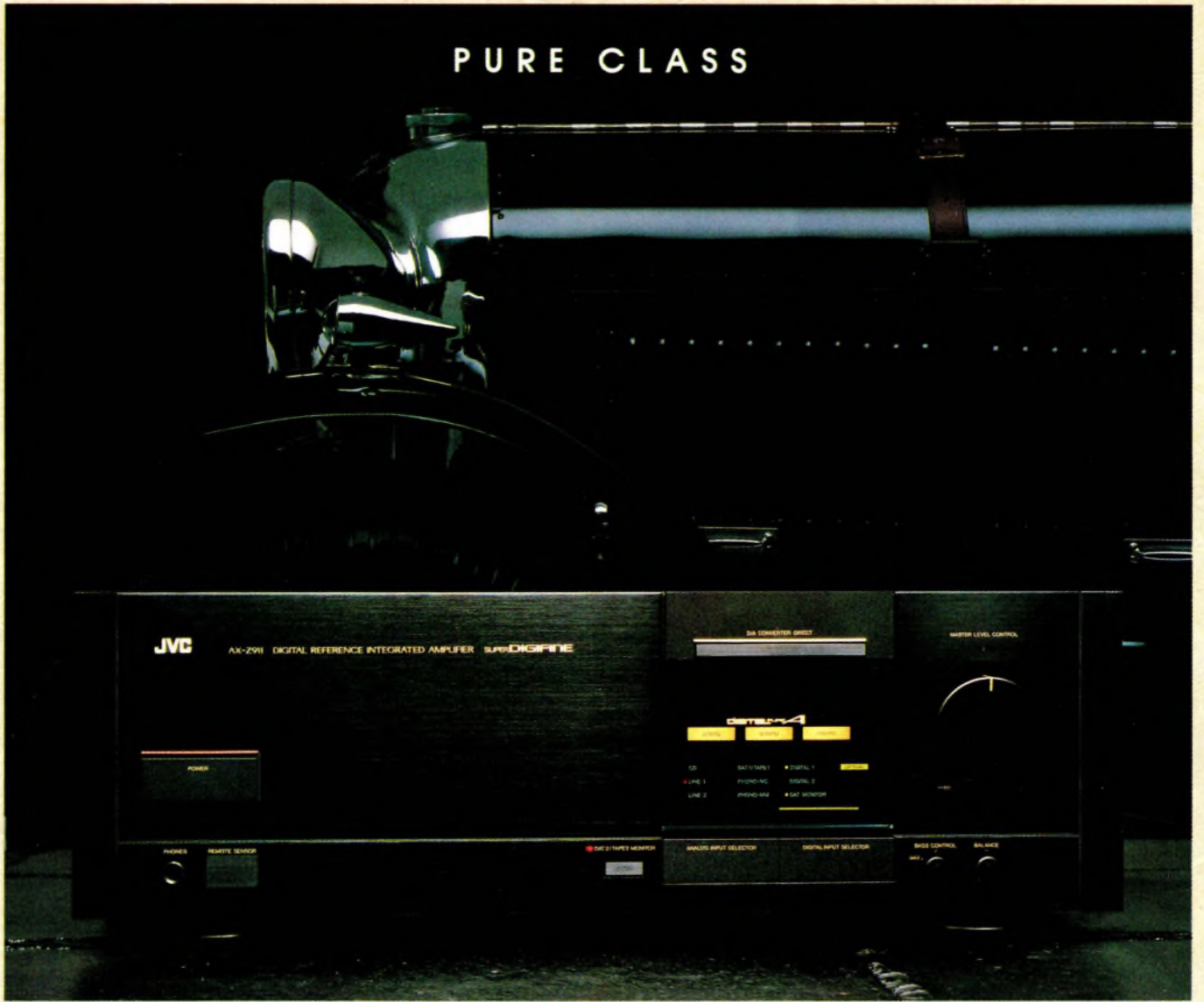
These hi-fi prices are slightly cheaper than our in-store prices to HFC callers only so bring this ad!

BIRMINGHAM: 10 Smallbrook Queensway, B5 4EN. Tel: 021 643 1516 in front of the Albany Hotel on main ring road. Open 9-6pm Mon-Sat., Late night Thurs til 7pm.
BRISTOL: 20 Cotham Hill, BS6 6LF Tel: 0272 734397 50 yards Clifton Down Shopping Centre. Opposite 'Crockers' Pub. Open 10-7pm Mon-Frid, 9-6pm Sats.
CARDIFF: 5 Central Square, CF1 1EP Tel: 0222383311 Near the Train and Bus Station. Open 9-6pm Mon-Sats., Late night Thurs til 7pm.
EDINBURGH: 1b Chambers Street, EH1 1HR Tel: 031 226 3544 Near the Royal Scottish Museum. Open 10-6pm Mon-Frid, 9-5pm Sats., Late night Thurs til 7pm., 12-4pm Suns. 11th & 18th Dec.
GLASGOW: 24 Gordon Street, G1 3PU Tel: 041 221 9147 Near the Central Station. Open 9-6pm Mon-Frid, 10-6pm Sats., Late night Thurs til 7pm., 12-4pm Suns. 11th & 18th Dec.
LEEDS: 55 The Headrow, LS1 6LR Tel: 0532 455717 Opposite Lewis's Department Store. Open 9-6pm Mon-Sats., Late night Thurs til 7pm.
LIVERPOOL: 69B Church Street, L1 1DN Tel: 051 708 7484 Corner of Parker Street. Open 9-6pm Mon-Sat., Late night Thurs til 7pm.
LONDON: 2 London Bridge Walk, SE1 2SX. Tel: 01 403 1201 (10 Lines) 01 403 4710 On the Walkway (not in A-Z) over Duke St. Hill. (not on street level) Open 10-7pm Mon-Fri. 10-5pm Sats.
STOCKPORT: 4 Wellington Street, SK1 3RN Tel: 061 480 1700 100 yards Stockport Station (opposite Station Approach) 10 yards off the A6. Open 9-6pm Mon-Frid, 9-5pm Sats., Late night Weds til 7pm.
YORK: 6 Feasegate, YO1 2SQ Tel: 0904 645535 30 yards St. Sampson Square. Open 9-6pm Mon-Sat., Late night Thurs til 7pm.

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WE LOOK FORWARD TO SEEING YOU!

PURE CLASS

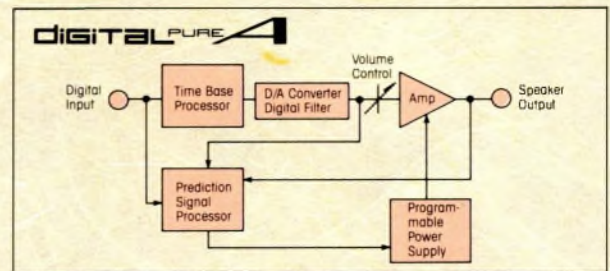


If you regard power with refinement as more of a necessity than a luxury, then consider JVC's revolutionary new AX-Z911BK integrated amplifier.

It's in a class of its own; Digital Pure-A, to be precise. JVC have solved the fundamental problem of amplifier design – how to achieve Class A sound reproduction, considered to be the purest form of amplification, with the efficiency of Class B.

The digital Pure-A circuit predicts the power demand and automatically increases or lowers the supply voltage as required, allowing the amp to operate as Class A, but without the consistently high voltage demand. Which means the purity and power of a traditional pre-amp with the flexibility and convenience of today's high technology.

This application of digital technology is typical of JVC's **SUPER DIGIFINE** series of hi-fi separates – high performance combined with ease of operation. Many of



the features are now computerised and can be handled from our exclusive COMPU LINK remote control.

JVC

FOUNDERS OF THE FUTURE

For the majority, of course, JVC's digital sound reproduction will probably remain out of reach. But for the purist, hearing anything less is an unacceptable price to pay.

SPECIFICATION · 2 x 100 watts · 8 ohms at 1Khz (DIN) / 2 x 120 watts · 4 ohms at 1Khz (DIN) · Digital Pure-A Circuit for class-A operation · Dynamic Super-A with Gm driver (for analogue signal) · "D/A CONVERTER DIRECT" to amp connection · Built-in D/A converter with quadruple oversampling digital filter · Three digital connections: optical, electrical (coaxial), in/output for OAT · Low noise motor driven volume control · Gold-plated terminals.



PRODUCTS

ALLISON RETURNS

Allison Acoustics loudspeakers from the US are once again available in this country. Prices now look competitive too, the highly regarded Allison 6 model which has gained an obligatory CD to its nomenclature being priced at £270 – only £20 or so more than it was five years ago! The same goes for the rest of the range: CD7 (£340), CD8 (£500) and CD9 (£850).

There's good reason for the keen pricing, in that the newly

The *Mini Series*, meanwhile, consists of the *Mini 2* (£150) which uses a 4-inch driver and 1-inch tweeter in a cast aluminium enclosure, the *Mini 2P* which is the same speaker but with on-board 15watt power amplifier (£270), and the *Mini 2SW* subwoofer system (£170) intended for use with the *Mini 2* (or other miniatures) as satellites. *Mini 2s* with a *Mini 2SW* subwoofer can be bought as a package for £300.

Expect Allison speakers to start appearing in selected shops around Christmas time. Allison Acoustics Ltd, 20 Cleveland Way,



The Allison family, back from the States: flying economy class doesn't mean "nothing to declare."

formed UK company is a wholly owned subsidiary of Allison Acoustics Inc. and not just an independent distributor. After establishing a new dealer network for Allison speakers in the UK the company will expand into Europe (where in certain markets the brand is already highly respected) and the intention is to begin manufacturing the speakers in the UK before 1992 to cover both home and export markets.

Allison has already been exhibiting at this autumn's hi-fi shows up and down the UK, showing the aforementioned models already familiar to the UK alongside the new *LC100 Series* and *Mini Series* loudspeakers. The *LC* (low cost?) models are the *100* (£170), *120* (£200) and *145* (£240) which employ Allison's convex diaphragm tweeter and long throw bass/mid drivers, housed in vinyl wrap cabinets for "economy of cost".

Shelley, Huddersfield, W. Yorks HD8 8NQ. Tel: (0484) 603965.

BACK IN GOLD – CONRAD-JOHNSON RETURNS

Audiofreaks has been dramatically expanding its catalogue of prestige equipment. The most notable addition must be Conrad-Johnson and its subsidiary brands *Motif* and *Sonographe* which have been without distribution since the demise of Automation Sciences. Audiofreaks' Branco Bozic intends to market the complete range from the relatively affordable *Sonographe* amps and CD player through the stylish *Motif* solid state electronics to the exotic C-J *Premier Seven* preamp, a snip at £7,500.

Audiofreaks has also taken on Audion, a new British company reputed to take as much care

over aesthetics as sound quality. Audion's valve amplifiers include three preamps and a monoblok power amp, with prices starting at £399 for the CD/line preamp. Audiofreaks – 15, Link Way, Ham, Surrey TW10 7QT. Tel: (01) 948 4153.

BEING THERE

Latest in surround sound products is the pictured Lexicon *CPI* 'digital audio environment processor'. The \$925 processor which sits between amplifier and speakers, promises 12 preset environments to give the user a sense of 'being there' when he listens to music. The environments include three different 'panoramic' settings, three ambient (concert hall) settings, three reverberant settings and three for surround sound. It also has a memory for 12 more presets to allow existing settings to be tailored to the user's taste.

Lexicon, of Massachusetts is best known for its products and work in the professional market. Michael Cooper, of FWO Bauch, the importer (who also handles Revox in the UK) said that in a recent survey of 534 recording studios in the States, 86 per cent used Lexicon product.

The all-digital *CPI* has outputs for six loudspeakers and can be used with Nicam decoder-equipped TVs to get full surround sound from a film recorded in Dolby Stereo by using the Pro

Logic setting (employed by West End cinemas).

FWO Bauch has also launched a 'budget' Revox tuner – the \$667 *B160* which strips away some of the "bells and whistles" of the *B260*.

QUAFF THIS

Along with the (dubious) resurgence of '70s culture (or lack of it) comes a redesigned Jordan-Watts *Flagon* loudspeaker, priced £287.

The *Flagon* employs a full-range drive unit (this sadly is the only really redesigned bit) and novel die-cast aluminium enclosures based on an ancient Aztec design. The neck of the *Flagon* serves as a tuned port! Jordan-Watts says it will blend harmoniously with your room decor; the Portuguese plates, Moroccan beads, Afghan rug and Paisley bean bag no doubt!



"Yeah groovy baby... uh, pass my brushed-denim flares."



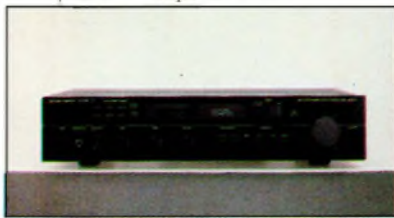
"Holy Lexicon Batman, we're running on one exhaust!"

WALL HUNG

Studio Power continues to add to its range of loudspeakers with the *Sound Panel* – a natty square number you can hang on the wall. Behind grey grilles the £189 speaker consists of a six-inch bass unit and two-inch dome tweeter. *Sound Panels* are 16cm deep and measure 43cm across. They can be attached to the wall using an inclusive bracket. Their character is described as: “lively, offering clarity and *punch*” – which is always nice . . . seeing as it's Xmas.

NEED A RECEIVER?

Harman Kardon introduces a receiver this month described as a fusion of the *PM635i* amplifier and *TU909* tuner – neither of which has yet been reviewed by *Choice*. The £259 *HK330Vi* features digital seek-or-manual tuning, 12 FM and six AM presets, two speaker switching and six inputs including one for video and two *tape* monitors.



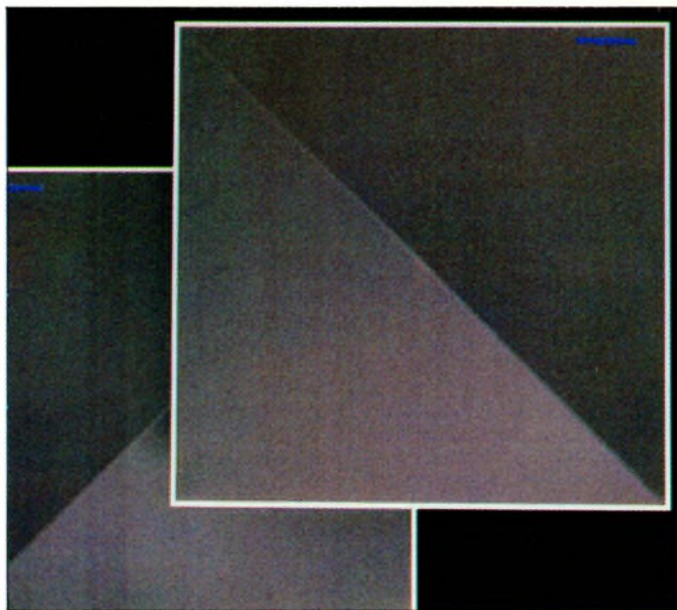
Programmed to receive: Harman Kardon's latest.

ELEGANT LINES

A new line in elegant hi-fi furniture caught the eye of our Editor as he made his weary way towards Tottenham Court Road tube station a few weeks ago. The modular storage system is the work of cabinet maker Martin Leighfield and currently it has pride of place in the shop window of Playback, the tape specialists at 15 Percy Street, London W1.

Although we would maintain that a high quality record player really needs a specialist turntable table (or wall mount) to give of its best, for other system components this may well be the answer to many of your storage problems. Shelving is adjustable and the robust, smooth-running drawers can include natty devices for holding compact discs and cassettes.

The units can be purchased separately or connected together to form a customised storage unit; prices start at around £160 rising to £850 depending on design and choice of finish. Check them out at Playback if you're visiting London (Tel: 01-637 8392), or you can contact Martin Leighfield direct for further details: 'The Howe', Howe Road, Watlington, Oxon OX9 5EX. Tel: (049 161) 2697/2296.



Wall-hung stereo: speakers from Studio Power.



Designs on the market: but is it art?



Musical dresser: organise your soft and hardware . . . and let the bank find out later.

MATRIX TWO

B&W has introduced new *II* series versions of its *Matrix 1, 2* and *3* models. Important changes include a new metal dome tweeter, a modified cone profile on the mid/bass driver and consequently a simplification of the crossover which has resulted in a sensitivity gain of 1dB.

All three models are bi-wireable and fitted with Michell 4mm sockets and the technology behind the name, the cell like bracing system inside the cabinet, has also been improved to aid rigidity. Prices now run £595, £795 and £1,145 for models *1, 2* and *3* respectively.

The more substantial *801* and *802* models have been officially launched in their *Matrix* guise and also feature the new tweeter. Prices are £2,495 for the *801* and £1,750 for the *802*.

AFFORDABLE ART

A new company looks set to upset the valve-amplifier market with a range of 'affordable' pieces. Art Audio is a two-man team from Calverton, Notts, who have spent the last two years developing their products. So far three amplifiers are on offer: the £175 *VP1* valve preamplifier, £255 *P180* stereo transistor power amplifier and the *Quintet*, due in December, a stereo valve power amplifier for £395.

Art partner Tom Willis, an electrical engineer, said there had been no expense spared with product components. "It's all good stuff; we use Wonder Caps, Holco resistors, ALPS volume pots – yet our finished products are about a third of the price of many other valve amps," he championed.

Art has apparently had interest from several countries including Hong Kong, though as yet none of the products have been reviewed. On the horizon is a valve mono power amplifier for £790 (per pair). Art Audio tel: (0602) 653604.

TECHNOLOGY SNIPPETS FROM TOKYO

Rob Follis of Hayden Laboratories Ltd., attended the Tokyo Audio Fair and reports on some of the more interesting products seen at the show. . .

Lunatic Loudspeakers

At every Tokyo show there are some strange new loudspeaker designs and 1988 was no exception. Technics took this year's prize with the *Sound Space Twin Load Horn*, the first Saxophone loudspeaker! This strange beast features a twin horn enclosure, comes with its own amplifier (a 6-inch cube) and was demonstrated with a portable CD player. At nearly £1,000 they seemed a mite expensive to plug into *Walkmen* (sic), however the red candy flake paint job was pretty stunning. Running a close second, Sasaki Acoustics showed the latest of its range of esoteric speakers made out of varying sizes of goldfish bowl (goldfish to medium size shark, that is). The added attraction this year was the matching amplifier, looking exactly like a metallic blue 1950's flying saucer. To give the company its due, the sound produced was remarkably good.

Aiwa Digital Connect System

This year's Aiwa exhibit took the current trend towards optical connectors to the 'nth' degree. From a digital microphone with ADCs (analog to digital) built in, the signal is transmitted digitally via fibre optics cable to a DAT recorder and then connected again via a fibre optics cable to headphones with their own DACs and amplifiers built in! An optical switch box allows connection and rerouting of any digital source. Expect to see elements of this futuristic system on sale within the next year or so.

Optical interconnects

It had to happen and it has! To mark the arrival of optical interconnects in a big way, we now have the tweaky version. Furukawa Electric was showing three varieties of 1.0m fibre optic cable varying in price from £20 to over £100. All featured the new standard Toshconnect and appeared to vary quite substantially in internal construction. Only time will tell whether eight core stranded sounds better than optical monocrystal; watch out for a *Hi-Fi Choice* 'Supertest' soon.

CD Transport - What? No DACs!

There are a number of two-box

CD players on the market featuring separate CD transports, but these are usually sold as pairs. Kenwood is the first company to take the bold step of introducing a transport-only CD player. It was very easy to miss at the show, the only giveaway being the squeaky clean front panel. With many amps and preamps on the market fitted with on-board DACs (of varying quality) this is a logical new introduction and one that most manufacturers will undoubtedly emulate. The catch? At approximately £350, the transport alone costs more than many full line CD players.

The 3-inch CD

This is a concept that is being pushed very hard, especially by Sony. Most Tokyo record shops stock a good selection of 3-inch discs and all sorts of neat carrying cases, accessories etc

are on offer. At the show Sony introduced the *D82*, the first portable player built for 3-inch CDs *only!* The machine is tiny and cute and it's also cheap, the price of approximately £75 being well below most other 'walkCDs'. Sound quality was good and shock resistance probably the best yet. The format now looks set for long term success.

DAT

To be brief on this subject there were lots of machines and almost no sales! So far DAT has been a relative failure in Japan (and world wide). The Tokyo hi-fi shops all have last year's DATs on sale at half price and this year's machines are not being bought, even by the retailers. Every manufacturer had a machine to show but until the copyright problems are sorted out the market will stay dead.

The Bit Wars

Marketing-led competition has led to a rampant 'bit war' with every manufacturer striving to engrave the most bits on the front panel of their CD players. Sony led the way with large 45-bit(!) stickers on many machines although this seems to be 45 bit filtering only. Denon showed true 20-bit players offering tremendous resolution (*says Rob, waving the Hayden flag! - Ed.*). Yamaha offered 18+4 (22-bit?), and TEAC even had 18-bit + 14-bit on one machine. Oversampling rates appear to have settled down at 4, 8 or 16 but undoubtedly 32, 64 and more are on the way.

The moot point as to whether the numbers game and esoteric digital technology actually makes more music will have to wait until these machines arrive.



Weird and wonderful loudspeakers from Yamaha (above) and Sasaki Acoustics (below).



Tweaky fibre optics from Furukawa Electric.



Aiwa's digital mic, DAT recorder and digital 'phones.



The first saxophone speaker from Technics - the Sound Space Twin Load Horn!

Sony's D-82 CD portable is built for 3-inch CDs only.



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BUSINESS

RECEIVERS CALLED

Cambridge Audio Systems International, maker of CD players and amplifiers, is in receivership following a decision by the directors and the 3i group, who owns 30 per cent of the company. Angela Curtis, the present chairman, told *Choice* that since her husband Stan's imprisonment for fraud and burglary in September "some people have not had the same amount of confidence in the business." The company accumulated a profit loss of £160,000. "We are in receivership because it is the safest and most honest route to take," she added. However Mrs Curtis said that negotiations were taking place for someone to step in and buy Cambridge out of trouble. "We have had a lot of interest from other British Audio companies," she said, though she declined to name which companies.

Mark Palios, the receiver, of Arthur Young Chartered Accountants, Cambridge, was called in on Friday November 11, and told *Choice* that "within hours" he had had a lot of interest from companies wanting to buy the firm. "It is an attractive proposition for many people, combining a big award winning name with a low deficiency," he said. Mr Palios would not be drawn on which companies had been making bids but said that for some speaker makers the firm represented a way into the electronics industry and that foreign firms were interested in Cambridge as a way round "anti-dumping legislation - a British firm would protect them against restraints on foreign goods." Some interest from outside the audio industry had also been expressed following an advertisement in the *Financial Times*, he added.

Cambridge, which is based in St Ives, employs a workforce of 25 and has a paid up share capital of £208,000. 3i also lent the company £100,000 and wants as much of the money back as possible. Mr Palios was expecting a deal "within days or weeks."

GOLDEN EARS

British firms recently picked up nearly half the prizes for 'High-End Design Achievement in the last 15 years', in the Golden Ear Awards sponsored by American audio magazine *The Absolute Sound*. SME, Quad and Linn were presented with awards for the SME *Series V* pivoted tonearm, *ESL 63* electrostatic

loudspeaker and *LPI2* turntable respectively.

Founder and MD of SME, Alastair Robertson-Aikman (ARA), attended the awards ceremony which took place in Gulls Head, Long Island, New York. "There were 35 nominees for seven awards, one for each category of audio equipment," said ARA. "Selection was the result of balloting 40 audio writers and high-end experts in the US."

The other awards went to: Audio Research for amplifiers, Koetsu for cartridges, Monster Cable for accessories and Sheffield Labs for their direct-to-disc recordings.



Award winner: Alastair Robertson-Aikman.

GOING DIGITAL

Recent market research commissioned by Sony shows 77 per cent of CD player owners to be satisfied by the medium, with none dissatisfied. 75 per cent of those questioned said they could tell the difference between the sound of CD and vinyl but apparently 97 per cent agreed that CD sound quality was excellent! None of the 500 sample had experienced deterioration (CD rot) with any of their discs, while 40 per cent were still hooked on the market-speak that discs would last forever. CD players are now to be found in ten per cent of British homes according to the survey. While 98 per cent of the sample owned "audio equipment" 30 per cent of those questioned owned a CD player.

TAPE TAX QUASHED

Home taping rights campaigners celebrated a victory when The Copyright Bill was approved by parliament last month with no mention of a blank tape levy. The campaigners have fought the record industry's desire to raise money by an audio tape (cassette) 'tax' for three years. Now the issue of a harmonised blank tape levy for Europe will be put before the EEC Commission but David Hall, boss of the anti-tax lobby, said it wasn't likely for Europe to decide on the matter before 1992.

The campaigners' argument, which prevailed among MPs, was that a tax would be unfair to consumer groups (such as the blind who rely on blank audio cassettes for news or letters etc), manufacturers, and would be unworkable in the record industry. The record industry has long been whingeing of lost profits from home taping which infringes artists' copyright. The Home Taping Rights Campaign points out that many people merely tape a record they have bought to play in their car or walk-person. They argued: why should someone have to pay copyright twice? They also contested that a levy would be unfair to the many consumers who use tapes for sources without copyright, and that to allow record industry publishers to decide which artists got the booty (on a who-sells-most system) would do nothing for the poorer artists who have most claim to lost revenue.

Peter Scaping, head of research and information at the British Phonographic Institute (which represents the recording industry) told us that Britain was lagging behind other countries who already levied tax on blank tapes. "Germany, France, Australia . . . and others, have a system of taxation; Britain stands out like a sore thumb," he said. A delegation from the industry was to lobby MEPs in Strasbourg in late November on the subject of "harmonising copyright laws throughout the community" added Mr. Scaping, but on this occasion it was unlikely they would be bringing up the subject of a blank tape tax for Europe.

FREE POSTERS

Fans of Bruce - The Boss - Springsteen and Michael - Wacko Jacko - Jackson, will appreciate Fuji's current audio tape promotion. Free original posters of these men are being given away with every 5-pack of Fuji blank cassettes.



CELESTION BOOST

Speakers and panties maker Celestion Industries plc has announced new blood on the board following the decision by founder and president Mr Daniel Prenn, 84, to sell his third share of the company's capital. A group of City investors, led by Mr Charles Ryder, Celestion's new Chief Executive, bought Mr Prenn Snr's 7,048,718 shares at 55p each. Mr Prenn will remain President of the company which is still 30 per cent owned by his family. Celestion's clothing concern, which largely makes lingerie for retail giant Marks & Spencer, saw a loss in profits by £297,000 last year. Conversely the audio business increased significantly and is seen to have potential for development with the possibility of new products as the magical 1992 date draws near.

IN BRIEF

Naim Audio products are now being sold through Soundwaves of Holbury Hampshire.

Newbury in Berkshire has a new specialist hi-fi dealer, Newbury Audio. Single speaker demonstrations, of mostly leading British equipment, are offered in customers' homes or at the shop in Weavers Walk, Northbrook St.

Zenonlec, the distribution company has moved. The new address is 10A The Broadway, Newbury, Berkshire RG13 1BA. Tel: (0635) 528636.

Aston Audio in Cheshire is holding an Alphason musical evening at the Stanneylands Hotel in Wilmslow on January 31. Tickets: (0625) 582704.

The Hi Fi Experience chain of dealers has opened up a new shop in Bath Street, Glasgow.

Bruce wishes he had button flies. Michael: "That's bad."

DMP CD OFFER

*Special offer to Hi-Fi Choice readers.
Save £5 on DMP compact discs.*

Digital Music Products is a CD-only jazz label imported from the USA by leading audio specialist Absolute Sounds. As an introduction to the superb quality of DMP CDs, Hi-Fi Choice is offering its readers DMP CDs at a special price of £13.00 each, £5 off the recommended retail price.

As part of its exclusive deal with Hi-Fi Choice, Absolute Sounds is offering automatic free membership of the DMP Club as soon as you place an order for a DMP CD.

Membership of the DMP Club entitles you to:

- *Select any of the CDs in the DMP catalogue at special discount prices.*
- *First option on all new DMP releases.*
- *DMP's quarterly newsletter, which keeps you up to date on all the new releases, live tours, and forthcoming projects by DMP artists. The newsletter also features regular competitions in which you could stand to win any number of the hi-fi accessories distributed by Absolute Sounds.*

CD-443: TriCycle, Flim & the BB's

Voted best jazz CD of 1985 by readers of Digital Audio in the US, combining pop melodies and jazz improvisation. Arguably the definitive DMP album, TriCycle has become a standard demo CD for stretching hi-fi loudspeakers to their limits.



CD-447: Tunnel, Flim & the BB's

Flim & the BB's second album for DMP voted best jazz CD of 1986 by readers of Digital Audio magazine. A collection of joyful, melodic songs superbly played and recorded.

CD-451: Incredible Journey, Bob Mintzer Big Band

A must for all jazz and big band lovers, Incredible Journey features Mintzer supported by some of America's finest jazz musicians - including Michael and Randy Brecker, Peter Erskine, Lawrence Feldman and Marvin Stamm.

CD-453: NY Cats Direct, John Tropea

Brilliant New York guitarist John Tropea plays bluesy, improvisational jazz which alternates between thoughtful, melodic passages and electrifying blues solos. Supporting musicians include Steve Gadd and David Spinozza.

CD-454: Big Notes, Flim & the BB's

Another tour-de-force from jazz quartet Flim & the BB's. Superb sound, joyous, uplifting music - and... (yup, you guessed it) ... voted best jazz CD of 1987 by readers of Digital Audio magazine.

CD-455: Lighthouse, Billy Barber

One of the most popular DMP recordings, and rightly so - Barber's second album for DMP is full of beautiful melodies and heartfelt tunes. Barber's piano playing is stunning, accompanied throughout by an array of imaginative keyboard and synthesizer sounds.

CD-459: Brazilliana, Manfredo Fest

Blind-from-birth jazz legend, Manfredo Fest returns to the world of recording with this stunning CD invested with the rhythms and melodies of Brazilian jazz. Fest's piano playing throughout is inspired, as are the pure vocals of Roberta Davis.

CD-460: Thom Rotella Band, Thom Rotella

DMP discovery Thom Rotella combines melodic acoustic guitar with funky electric solos on this mainstream jazz CD. Great sound - the recording was a prototype for one of the first Sony R-DAT demos.

CD-461: Spectrum, Bob Mintzer

Spectrum is still fired with the big band sound of Mintzer's earlier DMP albums, but also sees the acclaimed saxophonist and composer experimenting with quintet and quartet arrangements. A superb collection.

CD-462: The Further Adventures of Flim & the BB's, Flim & the BB's

The BB's fifth album for DMP and perhaps their best to date. Once again the band's characteristic blend of dynamic jazz, driving rhythms and pop melodies combine to form a memorable collection of songs.

Simply fill in the order form opposite (or make a photocopy of it, if you prefer not to damage your copy of Hi-Fi Choice) and post it without delay to take advantage of this limited special offer.



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- CD-451: Incredible Journey, Bob Mintzer Big Band
- CD-453: NY Cats Direct, John Tropea
- CD-454: Big Notes, Flim & the BB's
- CD-455: Lighthouse, Billy Barber
- CD-459: Brazilliana, Manfredo Fest
- CD-460: Thom Rotella Band, Thom Rotella
- CD-461: Spectrum, Bob Mintzer
- CD-462: The Further Adventures of Flim & the BB's, Flim & the BB's

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CHOICE SESSIONS

Things we hear . . . This month, we take a look at a Voydi/Audio Innovations/Snell system, a swanky little TV/videorecorder from Sony and JB's favourite intelligent remote.

THAT SONY MAGIC

Alvin Gold reports on the EV-DT1, Sony's go-anywhere portable TV with in-built Video 8 recorder.

Sony has an unerring talent for producing technological toys more glamorous and desirable than anyone else's. The company is simultaneously the envy and the despair of its competitors, and its eagerness to be the first and the best has sometimes led Sony to become damagingly unstuck. Remember *Elcassette*? *Betamax*? Even *Video 8* is struggling to find a niche, though I think it's found one here.

For all that, there is no more exciting Japanese company to watch. Sony's mistakes

may be glorious, but its hits – *Trinitron* picture tubes, the *Walkman* amongst others – are even more so. And the failures are honourable failures. *Betamax* made Sony a mint before the company finally stopped pretending it was a serious rival to VHS, and it was always technically better than VHS of course – still is. *Elcassette* never stood a chance, but it was good, too.

I don't know if the £900 *EV-DT1* is going to be a success or a failure. Certainly, I don't see it becoming the universal aspirational symbol of desire like the original 13inch Sony *Trinitron* or the *Walkman*. It's far too expensive for that, and for all its sophistication, it marks the end of an old era rather than the start of a new one. Even its proportions and

stooped, rounded lines are curiously dated, as though the machine had stepped out of a '50s time warp.

OK, so that's where it came from, but what is it . . . ? It's a colour television combined with an 8mm video recorder, that's what. It has a screen just over 5 inches diagonal (actually 12.8cm), which is about the minimum useful size for arm's length viewing. There is even a remote control, without which almost no executive toy is complete these days. It works on car batteries using a standard cigar lighter adaptor, though in normal use it will be plugged into the mains for bedside, or even office desk viewing. This is the perfect second or (more likely these days) third TV, and it's beautifully made, a real 'Roller' of a product.

The video recorder uses tapes which look like miniaturised VHS tapes, or slightly out-size DAT tapes, but they can be run at normal or half speed giving 90 minutes and three hours maximum recording time respectively. Sound is mono but based on the FM carrier system used in hi-fi VCRs, and it works to essentially high fidelity standards.

Next, what does it do? More than you might think in some ways, and less in others. The one thing it doesn't do that you might reasonably have expected it to is record one channel whilst watching another. The reason for this particular restriction is that there is only one tuner. And one of the less expected things it will do, is operate as a video clock radio (remember what I said about bedside viewing?). It will switch itself off using a sleep timer facility, and back on the next morning with *Breakfast Time* or (if you're a complete masochist), God's very own answer to insomnia, *TV AM*.

The Sony has composite and RF video inputs, a 30 channel tuner and three event, seven day timer which uses a control panel that pulls out of the base at the front and a display that's superimposed over the screen – both eminently understandable. Headphones can be used, but there are very few gimmicks or gadgets otherwise.

Paradoxically the most important attribute of any video system, if you think about how TV imparts information, is its sound quality. Many small TVs and some larger ones have disgusting, even unintelligible sound. This one is clean, clear and articulate, as I proved when my small offspring used it to watch movies whilst I drove up towards Edinburgh. It was tailor made for the job.

It's no slouch elsewhere either. Picture quality is objectively limited only by the size of screen and the number of display elements (pixels) it contains. But it looks wonderful. The screen is bright, clear and has excellent colour saturation. It is also highly stable. The video recorder did surprisingly little to spoil matters. On the contrary, it was often all but impossible to distinguish off-air from off-tape

Ideal for the family on the move, Sony's EV-DT1 is a five inch colour TV with in built Video 8 recorder.



with normal speed recordings, and half speed recordings looked little worse apart from some blotchiness in the reds and oranges at times. I have no doubt that had I been able to show the picture on a large screen, it would have shown its limitations more plainly. But I wasn't able to, and the 8mm recorder section is at least as good as it needs to be.

Early next year this machine will be joined, and in short order (I have no doubt) replaced by the *Video Walkman GV-8* (£800 approx) based on liquid crystal display tech-



Expected in the UK in the spring – the GV-8 'video walkman'.

nology. Altogether more practical, this one really is a technological tour de force, and possibly will just trigger the start of a *Walkman*-type revolution that will conquer the world, heaven forbid. But I doubt if it will have the sheer excellence of picture quality of this model, especially under conditions of high ambient lighting, and I'm sure it won't have this model's excellent sound quality. And I very much doubt if it will have its magic either. The *EV-DTI* is truly wonderful and desirable, but only affluent hedonists should apply.

AN INNOVATIVE SYSTEM

Jason Kennedy gets to grips with an Audio By Design system and comes up smilin'.

For several months now I have been using a system supplied by Audio By Design of Brighton. Because the proprietor, Peter Qvortrup, prefers to have his equipment reviewed as a complete system rather than in bits, many of the components have received little attention from the press. However, due to favourable results from certain 'back door' reviews Peter's attitude now seems to have mellowed and *Choice* managed to test a bunch of Audio Innovations amplifiers recently.

The line-up I've been living with is made up of the *Valdi* turntable fitted with a *Helius Scorpio 3* tonearm and *Goldring Eroica L* cartridge, Audio Innovations *1000 Series* step-up transformer, Audio Innova-

tions *500 Series* integrated amplifier and *Snell Type J* loudspeakers, with cables and connections by Audionote. Audio By Design manufactures the amplifier and imports and distributes the speakers and cables. Thus it is very much representative of the 'Qvortrup philosophy of audio', the primary component of which is the quest for total accuracy to the vinyl recording.

The man spends his few spare moments searching for records which have truly wide bandwidth and dynamic range in order to prove that his systems really do extract the maximum information from the disc (the discs in question being black vinyl; CDs don't get much of a look in). He claims that many contemporary records sound worse on his systems than on others because what's actually on the vinyl has been compressed or badly recorded or even (heaven forbid) digitally recorded.

The components themselves are quite unusual and worthy of some description. The turntable is a two motor version of the bigger three motor *Voyd*. The idea behind the twin, high torque motors is that one can achieve high inertia without having to use a heavy-weight platter, thus avoiding the inherent problems of energy storage that that involves. The platter on both *Voyd* turntables is made of acrylic. The extruded aluminium subchassis is hung on three damped springs and supports the arm on an aluminium plate – it retails for £550. The *Helius Scorpio* tonearm at £120 is the cheapest in the company's range but is no less chunky and well built. The arm rest is hardly convenient and the anti-skate mechanism had to be disconnected due to poor setting up, but sonically this is a good match for the turntable. I recently heard an A/B dem against the *Rega RB300* which convinced me that the *Helius*, on the *Valdi* at least, is a sonically stronger tonearm. The low output version of the *Goldring Eroica* should be a bit more familiar; suffice to say it is one of the best sub £100 cartridges I have come across.

The Audio Innovations *500 Series* is an integrated valve amplifier rated at 25 watts. It has a full complement of inputs (gold plated sockets on phono and CD) and the usual valve restriction of a low gain phono stage. Because of this the output of the *Eroica* is boosted by a *1000 Series* impedance matching transformer which accepts various plug-in modules to match different cartridges. This particular device is very fussy about where it sits and has to be kept away from other equipment, especially the amp. It's also quite expensive but Qvortrup claims that it is preferable to active devices.

The loudspeakers are *Snell IIIs* supplied with fairly heavy Foundation stands (Peter is now distributing the even heavier *Pirate* stands which I've heard and am keen to borrow). These are fairly substantial boxes of the type that would, until recently, have been considered floor standing. They feature a rear firing reflex port and two pairs of binding posts for bi-wiring, but otherwise are quite undistinguished in appearance. Peter claims that the crossovers have 'constant phase' regardless of frequency, but that demands some technical investigation in order to back up this claim. What is perhaps more relevant is their sensitivity which is quoted as 90dB/W, and very suitable for the amp.

Last, but by no means least, are the cables. Both the interconnect between step-up unit and amp and the speaker cables are a fairly esoteric stranded silver type from Audionote of Japan. They easily make the very expensive class but are significantly better than anything else I had to hand.

Using the system my first impression was of an extraordinary control and preciseness of presentation. With solo instruments there is so much space/time around individual notes that the turntable almost seems to be

State-of-the-art system from Audio By Design featuring the gigantic Snell Type A speakers. The system supplied to Jason is less costly and not quite so ambitious.



“The consistency with which audio ideals have been allowed to predominate over gadgets and facilities is what marks the Denon range out. . .”

Hi Fi Choice, April 1988.

DR-M07 £124.95

“In practice the ‘M07 simply sounded marvellous with good stereo, abundant detail and a welcome lack of artificiality. Obviously Best Buy material.”

Hi Fi Choice



DR-M12HX/R £219.95

“...the DR-M12HX proved extremely easy to use and provided fine sound quality both with recordings and pre-recorded tapes... it offers good results in every respect.”

Noel Keywood, Hi Fi Review.



DR-M24HX £289.95

“This is a very clean, open and spacious sounding recorder with an attractive range of facilities. The sound is very positively presented, to the point of being larger than life at times. A deck of breeding, and very well built to boot.”

Hi Fi Choice



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running slow. But what it's doing is giving you a whole lot more information and presenting it with remarkable clarity such that well known LPs revealed previously unheard subtlety and nuance. This sense of coherence is largely created by the *Valdi* which seems to be a remarkably neutral transcriber. Given records which actually contain very low or high notes it will reproduce them, but given an average example of contemporary rock material the lack of LF emphasis can make the sound rather dry. But of course the goal should be to faithfully reproduce what is on the vinyl and in this respect the *Valdi* is remarkably successful.

A remarkable front end wouldn't be so noticeable if the amplification wasn't doing its damndest to amplify that information without distorting or colouring it, and this is

make out lyrics that had previously been unintelligible.

The system's no wimp either, delivering neighbour nauseating levels with negligible discomfort. The only criticism I could level at the system, or more specifically the front end, is one that many would consider too subjective. It's that old saw – musicality, or rock 'n' roll involvement as I would prefer to call it. In the context of this system I would still rather listen to my *Xerxes* which has the edge when it comes to presenting a musical and enjoyable feel.

Whatever my subjective preferences may be, this system has given me many hours of

We couldn't resist showing you this: it's Voyd's \$5,000 limited edition Reference turntable with two-box power supply. The Valdi is somewhat more affordable!



what the *500* makes a very serious attempt to do; what's more, it largely succeeds. I haven't been able to make serious comparisons with similarly priced alternatives but I do know that only the better pre/power combinations give it any competition when it comes to clarity and dynamic range. One has a tendency to wince at the HF distortion created by many solid state amps. And after living with the *500* I can't imagine ever hearing a better integrated amplifier, mainly because when other companies come up with equipment this good they want to give it prestige in the market place and sell it as a pre/power combination. The advantage of making it as an integrated amp is that there are considerably fewer components and thus the price can be extremely competitive.

The loudspeakers are also remarkably revealing and neutral, so much so that they have no real character of their own, which is basically what hi-fidelity equipment should be about (but that doesn't make very good copy). However, the amount of dynamic range and new detail that could be heard on well known discs was positively enlightening. Only last night I was listening to an old favourite, *Van Halen II* – a live studio recording that is totally rock 'n' roll – and could

musical entertainment. It's the sort of system to which I can listen after hearing something costing five times as much without feeling that I'm really missing anything. Check it out.

Voyd <i>Valdi/Helius Scorpio III</i>	
Goldring <i>Eroica L</i>	£760
Audio Innovations <i>Series 1000</i>	
moving coil transformer	£299
Audio Innovations <i>Series 500</i>	
integrated amplifier	£750
Snell <i>Type III</i> loudspeakers	£699
Total system price	£2,508

ARMCHAIR THRILLERS

More remote nonsense as John Bamford plays with the Philips RC775 intelligent handset.

A few words on the Philips *RC775* Universal Remote Control Transmitter, a month later than promised . . .

I hinted in the November issue of *Choice* that the *RC775* was the neatest 'intelligent' handset to have appeared in the market in recent months. As you would expect, it comes pre-programmed for Philips *RC-5* system control of the ten most-used audio and video

components, and can be re-programmed by single alphanumeric commands for any other components with *RC-5* system control. But like all 'intelligent' transmitters, it can be re-programmed to address practically any equipment designed to operate via infra-red remote control – not just your TV, video recorder and hi-fi gear but maybe your room lighting and automatic garage doors as well.

The programming method is similar to that of all intelligent handsets in that to learn the functions of, say, your TV remote control you position the *RC775* nose-on to the TV's handset and work your way through the commands. Philips supplies a transparent overlay card with the *RC775* to simplify re-programming without complicating the handset for normal use, and all programmable keys can be re-allocated to other functions as desired. What will swing it for many of you is that the *RC775* can also control Teletext functions.

A comprehensive liquid crystal display (LCD) tells you which equipment has been selected and the associated special functions, as well as giving step-by-step programming instructions and "transmitting" and "battery exhausted" indications. The *RC775* runs on four AAA cells.

Unlike the Denon *Unimote* which is the size of a Filofax and designed to reside on a coffee table from where it can control all the audio and video gear in your living room, Philips' *RC775* is a more conventional 'carry it around the house' sort of handset. Size is 69 x 202 x 21mm and the price \$69.99. Do you love anyone enough to buy it for them for Christmas?



*No more searching for the correct handset – the *RC775* operates up to ten items in the home.*

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New Hi Fi Sound, March 1988

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Hi Fi News, December 1987



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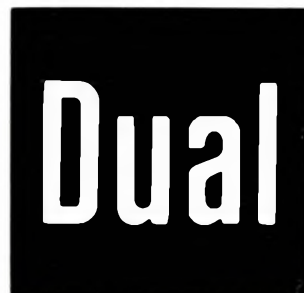


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What Hi Fi, December 1987

“... 505-3 sounded better separated and slightly more vivid.”

What Hi Fi, December 1987



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READERS WRITE CHOICE ANSWERS

CHIRRUPING IN NZ

Could you please tell me how the van den Hul *Grasshopper* compares with the Ortofon *MC3000*. I am considering purchasing one of them and would appreciate your advice.

Having said that, is it worth spending a lot of money on a cartridge or can you get the same or similar performance from a cheaper model?

DAVID KIFF,
AUCKLAND, NZ



State-of-the-art Danish style, Ortofon's MC3000.

We described the MC3000 as "quite simply, the most accurate transcription device yet created", which makes it a pretty hard product to beat. However, personal taste and ancillary equipment have also to be considered. We only know the *Grasshopper* by reputation but it may well have greater appeal – in other words you've got to listen for yourself. Either way, you'll end up with a superb cartridge.

Can you do as well for less? And is it worth it? Both are rather subjective questions, but there are some less expensive cartridges well worth auditioning. These must include the Audio Technica ATOC9, Audionote 102, Roksan Shiraz and the two more common van den Hul MCs – all excellent cartridges which are capable of blowing your socks off in a good system. Mind you it's only worth investing in a very good cartridge if the rest of your system can do it justice. If you're considering such a buy then we assume you realise as much, but as a guideline it would be difficult to get a worthy turntable and arm combo for less than the price of the dearer of these cartridges.

CABLE FEEDBACK I

Whilst I am delighted that Kimber Kable *4TC* did well in Paul Miller's review of speaker cables, I am surprised that our top of the line cable *8TC* was not featured. I find this a surprising omission considering the stunning performance of the cable at a very reasonable price. Ignoring a leading contender gives your readers an incomplete and distorted view of the market.

In spite of our good performance on test I must express my very strong reservations about Paul's test method. Though I have no argument with his stated aim of removing test variables, his method is quite unsafe and unprofessional in the context of a review. The Deltac double-pole/zero phase compensation network is very interesting but of no proven worth or general acceptability. Worse than this, from a professional reviewing point of view, an unfair advantage is conferred upon Deltac when their own cables are being tested on what amounts to their own demonstration set-up. This alone invalidates the review as a fair and objective test.

I am further concerned about the use of Magnepan speakers for a speaker cable test. The Magnepan is an unusual speaker and an unusual load. Your readers are really interested in how the cables on test will sound in their own systems, and since 99 per cent of them use moving coil loudspeakers it will surely be most helpful to everyone to test speaker cables using the real world load of a moving coil loudspeaker.

RUSS ANDREWS,
RATA, CUMBRIA

CABLE FEEDBACK II

Paul Miller's cable review in the November issue of *Hi-Fi Choice* has prompted me to write.

I note with interest that our *DNM Solid Core* speaker cable has moved from not recommended in an earlier Paul Miller review (in another publication) to recommended. I cannot help wondering what has changed. The cable is the same and so are many of the hi-fi

systems. Perhaps there are now more 'sympathetic' systems for solid core cable. The word sympathetic is Paul's own description and it seems to imply that something needs to be wrong with the system to balance out an aspect of the cable that he considers wrong. This is certainly a novel way of looking at a problem that may not exist!

I suspect the real problem for Paul is that one of the things he can measure – resistance – deviates from the historically accepted norm. Cable resistance is therefore my first point of discussion.

Unless Paul is still using two year old samples of *DNM* the core diameter is 0.65mm and the cable resistance is therefore lower than he has quoted. However, I do not believe this to be as important a parameter for sound quality as Paul indicates. The logic behind this statement is simple and inescapable. To obtain low resistance values it is necessary to compromise the cross-sectional size and shape of the cable which will produce audible higher frequency smearing, the severity of this depending on the actual geometry of the cross section – i.e. how many strands and how much excess copper is used. (In Paul's review nearly every stranded cable is criticised to some extent for a high frequency related problem – sibilance, coarseness etc – so he did notice the effect.)

A small amount of resistance allows an almost perfect cross-section, (from the field point of view), improves amplifier stability, but may introduce up to 1dB or so (on very long lengths) of frequency response deviation. However, the loudspeaker frequency response in the listening room varies by ± 25 dB or

more and it must therefore be obvious that we are not sensitive to this kind of response anomaly. In fact our hearing system is very much geared up to eliminate it. Why then does Paul continue to have this aspect of cable performance as a top priority?

It really is time that some common sense was put to the public by technical reviewers on the subject of capacitance and inductance of the cables. If the hot and cold lines to each speaker were run along opposite sides of the room this would give about the highest possible inductance and the lowest capacitance. Under these conditions it would still be more than possible to electrically convey the full audio bandwidth to the speaker. Therefore for Paul to suggest that all the ribbon cables in the review have too high an inductance is frankly ridiculous.

The higher the distributed inductance that the cable exhibits the better the stability of the amplifier will be and the commonly used output inductor coil can be eliminated if the amplifier has good stability characteristics. The situation with cable capacitance is different. Because capacitance across the amplifier output causes the load to drop towards zero at high frequencies it tends to make the feedback amplifier unstable. Long before total instability occurs the sound is seriously affected by marginal stability conditions.

Paul has always favoured the Deltac cable and this is highlighted by the statement that 16 insulated strands are considered 'eminently sensible'. Such logic defeats me completely. Insulated strand constructions are just as poor from the field point of view as



Deltac power amplifier: an unfair advantage?

uninsulated ones. They cannot be described as solid core because they are not geometrically field-correct and the essential constant spacing is ineffective.

Finally the retail price of DNM cable quoted in Paul's article was £2.30 inc. VAT. Some of the other cable prices seemed to be without VAT amounts giving a false picture of relative prices.
DENIS MORECROFT,
DNM DESIGN, ESSEX

Cable differences are just one area of hi-fi where the industry is in much disagreement. DNM has its own theories on solid-core cables, whereas other manufacturers ridicule these theories as nonsense. It's much the same with hi-fi enthusiasts: some listeners prefer the sound of some cables to others and, what's even more confusing, they prefer the sound of one cable in one system and another cable in a different system.

We would concede that Deltec 'sensing' cable may well work best with a Deltec amplifier – just as DNM cable gives best results with DNM amplifiers and Exposure cable with Exposure electronics, and so on. There's no getting away from this, which is one reason why it's impossible to make definitive statements about which cable is 'best'. Several readers have complained that we didn't publish a 'Recommendations and Best Buys' summary page at the end of the tests – many of you, it seems, still want to be told what to buy – when in fact the best advice we can give is 'suck it and see'. You need to choose a cable which delivers the sonic goods in your system, and the best our reviews can do is try to describe the overall characteristics of each cable and hopefully give some useful pointers to help draw up a shortlist for experimentation. (Of course, some listeners may disagree entirely with a reviewer's findings. Reviewers disagree with other reviewers all the time...)

The double pole/zero phase compensation network of the Deltec power amp operates about the end of the speaker cables thereby enclosing the attached leads within the feedback structure. Thus the DPA 50S does not utilise a speaker cable in the conventional sense, but merely as a low current interconnect lead. This explains the purpose of using such an amplifier for it is then possible to compare the

sound of 'no cable' with 'some cable', the latter existing outside of the amp/cable/feedback network. There remains no other way of achieving such a low output impedance and therefore revealing the sonic consequences of cable resistance, for instance.

The test system was not improved by any of the cables, some simply imposed less of a degradation than others. Actually, the argument that a length of Deltec cable might confer some advantage over other cables in this set-up holds no water.

The benefits of a revealing and reasonably neutral transducer such as the Magneplanar loudspeaker also extend to the moderate and principally resistive nature of the load. Certainly, a cruel or highly reactive load might precipitate some slight sonic differences, but the general trends observed between the cables in our tests should remain reasonably consistent. It is a mistake to equate the exotic appearance of such panel speakers with an unusual load. They are no more or less demanding of the amp and cables than the vast majority of budget moving coil loudspeakers.

Sorry we couldn't include a review of Kimber 8TC in addition to 4TC and 4PR, but we had space for only 40 cables. (Only 40... Heck, we'd better watch out in case other hi-fi magazines begin to make us look cheapskate!) Don't feel hard done by, Russ; Monitor PC has dozens of cables in its catalogue yet we only managed to include one of them in the tests. We can't cover everything, especially in just one issue. And to say that ignoring 8TC gives our readers "an incomplete and distorted view of the market" is, of course, quite ridiculous.

As an aside, Paul Miller is quite familiar with 8TC having tried it at home, but he prefers the cheaper 4TC cable. Ho hum... -Ed.

SPLIT OPINIONS

With regard to your headphone reviews in Issue No. 63, I recently bought some Sennheiser HD480s and although not ecstatic when I first heard them (I bought them for my Pro Walkman) I was still quite shocked that Jason Kennedy found them so poor. I wonder if he had them positioned correctly as they do sound much better if worn too high on the ear. What also confuses me is

Alvin Gold's review of both the 450 and 480 in another magazine. He says that they walk over the competition costing even two or three times the price! I must admit I find this hard to believe but still wonder why and how two reviewers can disagree to such an extent.

I have decided to sell my 480s as they do not do justice to my source. Would the Aiwa HP-X8s be suitable and are they significantly better than the Sony MDR-V3s? I don't want to spend more than £70. I like a fair amount of bass in music but also a wide dynamic range and I don't like too much softness in the sound.

MATTHEW EARL,
SHEFFIELD



Controversial cans, Sennheiser HD480.

I also was surprised to read Alvin's review of the Sennheisers and can't easily explain our difference of opinion. However, I noticed on recent loudspeaker listening tests that I prefer a brighter, clearer sound that some others find aggressive. Obviously we use different music and equipment which would slightly alter our perception, but taste is inevitably the main cause for the difference. Anyway, the fact that you are selling your headphones would seem to back me up in this instance. As for a replacement, the Aiwa HP-X8 is definitely worth the extra £20 as it gives deeper bass and a smoother, slicker sound than the V3, it is even more efficient.

FREE CD

It is some time since I last purchased a copy of *Hi-Fi Choice* and I was a little surprised to find that the cost of the November issue had risen to £3.95. Being in the market for a CD player, I decided that the outlay would be acceptable, especially with the 'free' sampler CD.

However, the invitation to the Charter Subscription Offer says

that the newstand price is £35.40 per annum, ie £2.95 per issue. Furthermore, the back issues section states that the November publication can be purchased for £3.50 including post and packing. The cover clearly shows £3.95 and this I was charged at my newsagent. Could it be that the CD was not really free, or was it a genuine misprint? Whatever, someone has made a good profit. I would appreciate an explanation and look forward to future issues of your excellent magazine.

Incidentally, you have confirmed my opinion that the Marantz CD65/11SE is one of the best value for money CD players on the market.

I. J. COLDER,
DERBY

You're right about somebody making a profit: it's Her Majesty's Customs and Excise. As you may be aware, newspapers and magazines are exempt from VAT, as are childrens' clothes and food (but not confectionary). However, recent legislation dictates that if you put a 'free gift' on the cover of a magazine you must pay VAT on the value of that gift.

When you purchase a magazine direct from us, eg via subscription or as a back issue, we are cutting out the 'middlemen' (the wholesaler/distributor/newsagent) and we therefore make more profit. This is why we are able to offer reduced prices on subscriptions, for example, and why we decided that we would swallow the cost of paying the VAT ourselves on subscription copies and back numbers of the November issue.

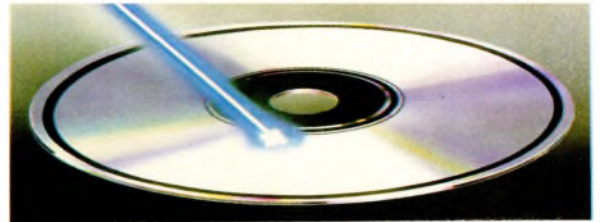
You've spotted, meanwhile, that you could have saved the princely sum of 45 pence by sidestepping your newsagent and buying a back issue direct from our warehouse. Perhaps you can console yourself in the thought that telephoning our Back Numbers department would have cost the best part of 45p anyway.

Your praise of the magazine is greatly appreciated, and rest assured that future issues of Choice will remain at £2.95. We've more CDs and other gifts planned for next year – and now that we're aware of current VAT rulings we are working out ways to absorb the extra costs. Someone has suggested that the Editor might like to consider taking in washing.

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ASPIRATIONS

The brief for Sir David Scholey's system was for realistic sound in a room with no evidence of equipment. Dan Houston writes; Colin Clarke photographs.

Bespoke Sounds



Sir David Scholey's drawing room has been used for relaxing recreation since 1820 when it was built as an extension to this Georgian London home. For the first 100 years (or so) it most likely served as a billiard room but now the sounds of clacking balls have been replaced by a wide ranging classical and jazz repertoire through some very original hi-fi equipment. Sir David is chairman of the City merchant bankers Warburgs, and he uses his hi-fi music and room as a way to relax from a Trojan working lifestyle.

We have only photographed this music room but the rest of the house is decorated in much the same way. Seventeenth and eighteenth century furniture, paintings and ornaments set the timbre alongside bronze maquettes by sculptor and friend David Wynne (among others). An ancient (but working) harpsichord in the curve-ended hall makes one imagine that a young Mozart is about to slide down the bannisters of the spiral staircase! To say the house has character is a gross understatement.

Upstairs in his study Sir David keeps a second system of Denon equipment, "which I listen to every morning and evening – and my wife listens to all day"! This system comprises a *DCD 600* CD player, *DRA 35L* stereo receiver and *DRM 07* cassette deck. Some (fairly old) Mordaunt-Short *Carnival* (Series 2) loudspeakers



are placed high up in the bookshelves which line three of the walls in the south facing room. No attempt was made to hide the equipment here and it's sited within easy reach of Sir David's desk. A QED switching unit allows it to be played in the bathroom next door through brick-size wall-mounted Canton *Plus S* speakers and Sir David is very complimentary of the sound which serenades him in his Jacuzzi.

Yet more hi-fi is to be found in another upstairs room (out of habit still called the nursery). Sir David describes most of that system as "cooking" but still appreciates the style (and reliability) of an ancient



wedge-shaped Yamaha *TC 800GL* cassette deck designed by Fellini.

The drawing room itself is square, with high ceilings, vaulted in the corners, and features a large alcove and fireplace as its main focal point. Sir David and his Canadian wife Sandy had the back of the alcove panelled in pine with matching corning and archway. During our visit, sunlight streamed through the bay windows, further enhancing the warm patina of Chippendale and Sheraton, not to mention the Steinway. A portrait of Lady Scholey's mother, by Raymond Skipp, greets one on entering the room.

The French and English furniture here is set off by an Eastern flavour from ornaments, and an 18th century Chinese mirror-painting in a Chippendale frame. These are from Sir David's own family and his wife's, representing a collection inherited and added to over the years.

The hi-fi was supplied by Colin Howard who installed the room's original system nearly 20 years ago, just after the Scholeys moved in. It is all hidden in 'cupboards' which had been sealed when they bought the house. It was when these cupboards were opened up that the billiards' connection was made; they apparently served as

Spot the speakers: the hi-fi is heard but not seen.



In ascending order: woofers are actually decoupled from the Linn below Meridian's CD player and tuner, topped by a Nakamichi.

Lady Scholey's mother is flanked by Chippendale; David Wynne's maquette to the fore.

cue space with the racks still on the wall. Now, two screens open to reveal the electronic trappings of a modern music lover's life . . . plus a drinks cabinet. Close the screens and a pair of mid-eighteenth century French door panels hide the equipment. Woofer access is afforded through material stretched over the screens.

This installation took two days to complete and Colin pointed out that some degree of performance had had to be lost because of the parameters imposed. He believes, for instance, that free-standing loudspeakers would give a better sound. The vinyl source is a Linn *LP12* record deck, *SME IV* tonearm and Dynavector *Karat* cartridge. Meridian's *CD 207* remote control CD player and *204* tuner sit underneath a Nakamichi *CR 5E* cassette deck. Colin spent nine years with Meridian and so had a hand in designing their award-winning pieces here. A £100 add-on analogue step-up board allows the *CD 207* to act as a preamplifier for the Linn as well as the other sources.

The active loudspeakers are split into two boxes with the eight-inch Peerless bass units in the 'cupboards', while the SEAS mid and treble satellites are tucked away on the lower shelves of the pine alcoves behind yellow silk grilles. The Scholeys wanted the mid and treble units to 'disappear' so Colin made boxes which were just four inches deep! The shelves still



have room for ornaments to be placed in front of the loudspeakers so the disappearing act is complete.

Colin explained that to maintain sonic integrity within such parameters he had put the units into wedge-shaped boxes with extra-strong bracing and filled with long-hair wool. The speakers go down to about 90Hz and it's a tribute to their design that the imagery was good enough to get one guessing as to their situation at first! The power amplifiers are also out of sight, below the bass units in the cupboards. These are also a Colin Howard custom design, and there are three each for bass,

mid and treble on both channels.

The system was finally 'tweaked' with the aid of a spectrum analyser to achieve optimum results for Sir David's main listening position. The problem is that he has two listening positions: "I like sitting near the system for chamber music and piano pieces, but prefer to sit back by the window for Wagner, Duke Ellington or choral music," he told me.

On listening to the system one immediately appreciates the room itself. It is large (which helps) but the 'squareness', which one expects to hear in the form of echoes, is very tame. Furniture, carpeting, cur-



tains and oil paintings all play their part in helping to make it acoustically 'dead'. And the alcove presents the sound much like a huge horn; it is very difficult to 'see' where the sound is coming from within it. However, imaging is not missed and the system represents a credible alternative to the (often exaggerated) stereo of free standing loudspeakers. The speakers present a very warm sound, which tones down the clinical nature of CD. And there is an absence of the 'dissected-and-presented' sound that one can get from some high-end systems which makes the ears work fiendishly to cope with each musical instrument as if it is playing alone. (I often get a headache listening to high-end systems; I didn't this time.)

Our listening began with The Chamber Orchestra of Europe (a brilliant group of musicians according to Sir David who supports them personally and through Warburgs) playing Vivaldi, and then moved on to Benn Moten's Kansas City Orchestra (Moten Swing) with Count Basie followed by Charlie Byrd, Erryl Garner, Muggsy Spanier and Charlie Parker. It was real Sunday afternoon stuff. Some of the vinyl was over 30 years old, yet there wasn't a whistle or pop in evidence. Sir David never cleans his records and obviously looks after them. And he is patently passionate about music - with the flourish of a conjuror he brings out new finds and old favourites like The

Smithsonian Collection - a comprehensive classic jazz compilation. While live music is important to him and he goes to concerts, "as often as possible, but still not enough", reproduced music does allow him to listen more attentively, he said. However, he does not liken the hi-fi's sound to that of a live hall where one is "more emotionally embraced". Here the capabilities of the system, both on vinyl and CD, together with the characteristics and setting of such a superb room allow for a more relaxing recreation of the musical records.

The system:

Meridian 207	£950
Meridian 204	£525
Nakamichi CR5E	£995
Linn LP 12	£509
SME Series IV Arm	£810
Dynavector Karat	N/A
Custom Power Amplifiers	
Custom Loudspeakers	

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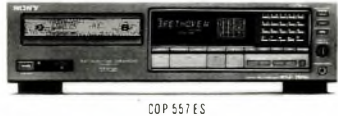
The back of the room contains more music making equipment: a Steinway.

The bottom shelf hides Colin Howard's 'Satellite' speakers. A Nanking sake cup (top shelf) is among Sir David's favourite pieces.



Your ears tell you it's British, your eyes tell you it's not. Which do you trust?

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in the World (the British), is cheating you might say.

Maybe. But there's definitely no cheating on what goes into our equipment.

Both the CD player and the amplifier featured for example, have Gibraltar chassis. (Rock solid bases that keep vibration and magnetic interference to an absolute minimum.)



TDX 700 ES

Both have 18-bit linear converters with eight-times oversampling. (To save you looking through reams of competitive specifications, that's the



APM 12 ES

best there is.) In fact, we've gone to extraordinary lengths to keep sound signals pure.

The CD player is copper shielded, its loading tray acoustically sealed. The tape deck is divided

into three compartments (all shielded), with equal weight distributed on each foot to reduce vibration. The tuner



STS 700 ES

(What Hi-Fi 'Tuner of the Year' Award 1989) has AM circuitry specifically designed for the UK's medium and long wave bands.

Lastly, the loudspeakers have titanium tweeters to improve treble and a reflex design for more accurate bass.

**IF IT WASN'T FOR ONE SMALL DETAIL
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All these measures would be pointless, though, if you skimmed on cable. We don't.

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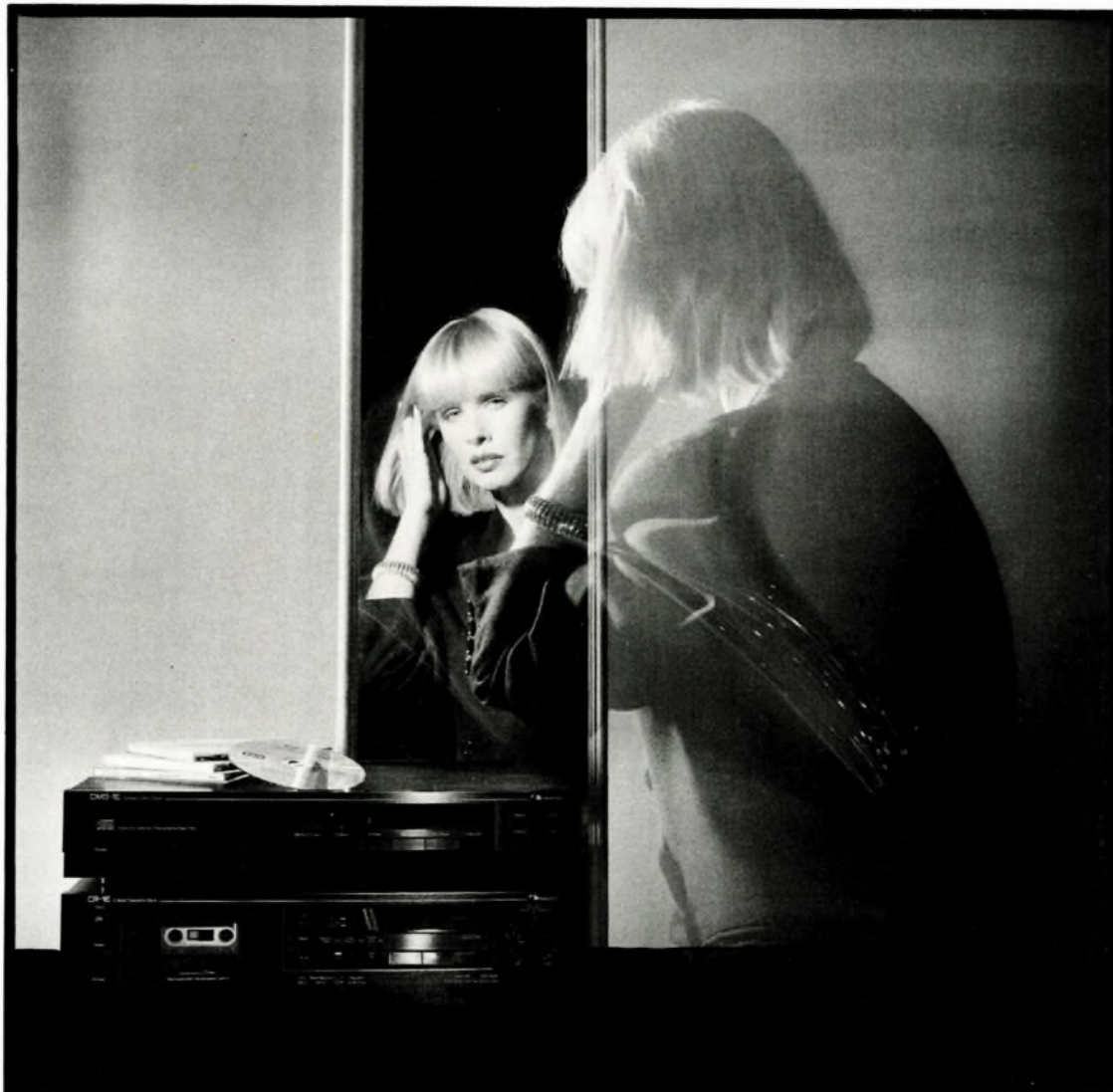


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SONY ES



PERSPECTIVES

On the face of it, a loudspeaker is a pretty simple device. But as Richard Black explains, there is diversity of design approaches, and of opinions on which approaches 'work' and which do not.

Moving Air

A loudspeaker is a transducer; a device that converts one type of signal to another. In this case, an electrical signal is converted to an acoustical one, which should be a perfect copy of the electrical original.

Transducers have a difficult job covering the audio range, and this is particularly true of loudspeakers. Music consists of changes in air pressure at the eardrum, and a loudspeaker must induce pressure changes identical to those that were picked up by the microphones at the recording. The task of simulating the air movement caused by a large symphony orchestra is not easy, and is well-nigh impossible in a small room when the source is a loudspeaker of very much smaller dimensions than, say, a double bass. On the other hand, although loudspeakers produce more distortion as a simple proportion of their output than any other device in an audio chain, they can produce at best a remarkably good impression of a musical event.

Ideally, a loudspeaker should reproduce the entire audio spectrum, 20Hz to 20kHz and then some, with very small response variations and negligible distortion, up to a sound pressure level (SPL) of at least 100dB in a typical listening room, equivalent to an orchestral peak or loud(ish) rock band. In practice, only a handful of loudspeakers can approach this, but the rest can sound quite respectable with smaller bandwidth and relatively high distortion. 80Hz to 18kHz within 5dB, and distortion below 3 per cent at 95dB SPL, looks bad on paper but need not be a disaster by any means. A loudspeaker possessing a reasonably flat midband response, low resonance levels, low distortion and good phase coherence will sound quite natural and realistic, as its spurious output is of a type already present in the original signal and is therefore somewhat 'masked' to the ear.

DEVELOPMENT OF AN IDEA

Many good minds have been applied to the problem of moving air in imitation of musical instruments. 100 years ago, the acous-

tic gramophone used a horn to amplify the air movement produced by a diaphragm attached to the replay needle. Later, the horn was used to amplify the acoustic signal from a carbon or magnetic earpiece. Many people still swear by horn loudspeakers as a principle, but undeniably a good horn is bulky and awkward to make.

Most loudspeakers today use a direct radiator, where the moving part is on the surface of the loudspeaker and couples directly to the air around it. The direct radiator principle was introduced around 1920, with the Rice-Kellogg loudspeaker, a cone-type driver which, although strictly a moving iron rather than moving coil type, can be said to be the direct ancestor of most loudspeakers produced today.



Amplion Dragonfly bookshelf horn, circa 1920.

The majority of modern loudspeakers have two or three direct radiating, moving coil dynamic drivers on one face of a box. Other designs use planar drivers, which cover the whole area of the loudspeaker and are driven over their entire area. More esoteric principles include the ionic driver, where ionised gas is moved by an electrostatic field.

Loudspeaker design involves many disciplines. For a start, a loudspeaker is not a simple transducer. Between the electrical signal and the acoustical one, there lies an intermediate mechanical stage. The electrical signal must be accurately converted into movement of the driver, which must in turn be converted into movement of the air (a pressure wave). So the loudspeaker designer must be expert in electronics and electrical theory, mechanics and vibration theory, acoustics and psychoacoustics. Small wonder that few loudspeaker sys-

tems are designed by one person alone.

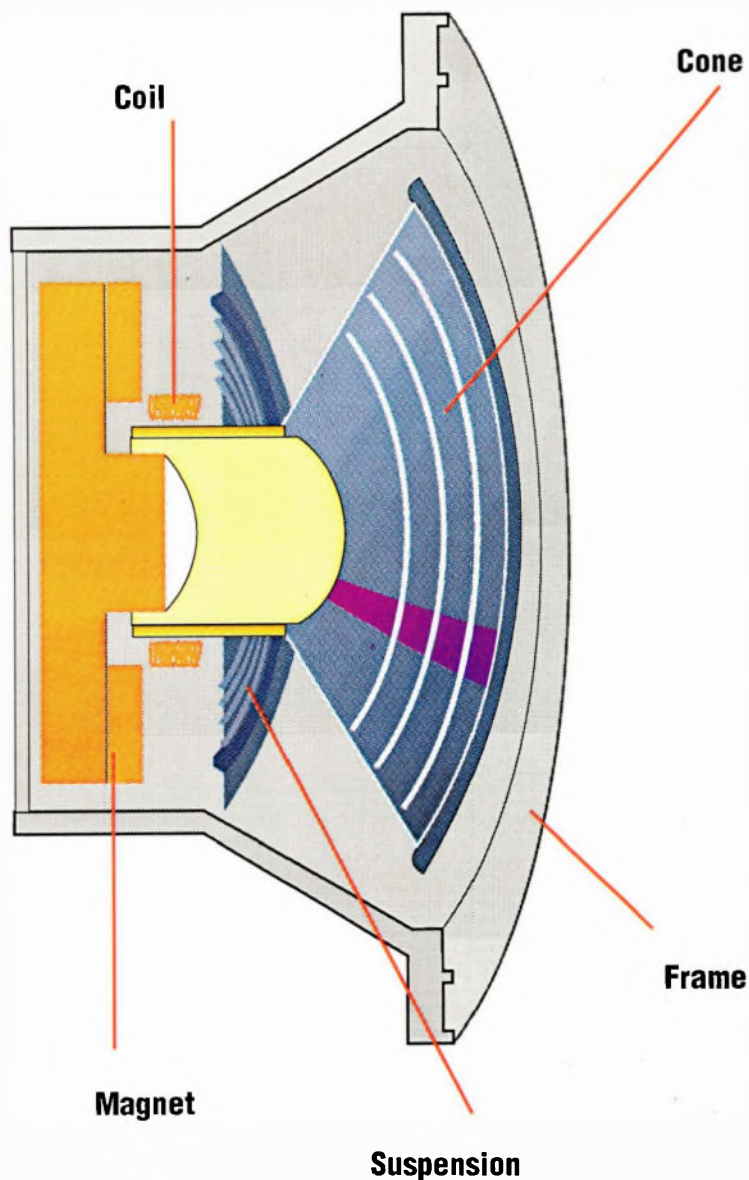
In 1962, Focal Press published a book imaginatively entitled *Loudspeakers*, by E. J. Jordan (then of Goodmans, now of E. J. Jordan Designs and 'Jordan Module' fame). As a presentation of fundamental loudspeaker theory, based on Jordan's own research and that of preceding workers, this book was and remains probably unsurpassed (and is now out of print – shame!). Jordan's work dispels the myths surrounding several areas of loudspeaker design with clear explanations and hard fact, and indicates directions for development. (For example, did you know that putting a larger magnet on a cone driver can decrease its bass efficiency? The efficiency is decreased, not only relative to high frequencies, but in absolute terms, contrary to the view often stated that a big magnet equals big bass. Jordan derives the equations that govern this and presents a graph illustrating the effect in actual drivers.) The book and the more recent *Jordan Manual* point out several errors in current design 'wisdom', and much of what follows has been influenced by Jordan's writing.

CONES, DOMES AND BOXES

Since the dynamic driver accounts for the vast majority of loudspeaker production, from the cheapest and cheerfulest to systems costing thousands of pounds, let us examine this type. A dynamic driver consists of a coil of wire in a magnetic field, attached to a cone or dome diaphragm. Current passing through the coil causes it, and the diaphragm, to move one way or the other. The diaphragm in turn moves air, and the resulting pressure wave travels to the ear. The assembly is restrained by flexible suspension, linking the coil to the driver frame, and in the case of a cone driver a further flexible 'surround' joins the cone edge to the frame.

A common approach to a dynamic driver is to consider the diaphragm as an 'ideal piston', that is, one which moves in and out as a rigid body in response to the forces generated in the coil. At some high frequency, it is supposed that this diaphragm 'breaks up', or starts to flex, at which point its output becomes distorted. This then defines the upper frequency limit of the driver. This is what scientists call a 'factoid', a wonderful term denoting something which is widely known to be true, but is in fact false, or at best unproven.

Unfortunately, the model neglects to



Cross section through a typical high quality moving coil cone driver.

take into account a fundamental and unavoidable fact of nature, namely the finite speed of sound. This means that motion as a perfectly rigid piston is physically impossible at any frequency, and is at best an approximation. Consider a cone driver. When the coil starts to move forwards from rest, the edge of the cone does not start to move at the same time. The edge of the cone must be told to move, and the signal that tells it to move is a wave which travels through the cone, from the coil, at the speed of sound. In other words, it has to wait for this wave to arrive before it can start to move.

Thus the cone must flex in order to operate. Now at low frequencies the amount of flexing is very low, so the 'piston' approximation is valid (otherwise, car engines would be in some sort of trouble!). At higher frequencies, however, the flexing becomes significant, and eventually the time taken for the wave to cross the cone is greater than the cycle time of the signal. This is where what is conventionally

termed 'breakup' can occur, and if the cone is designed in the hope of perfect rigidity it probably will behave in an uncontrolled manner and emit all sorts of distortion. But if the cone is designed to accommodate the finite speed of sound, accurate reproduction can extend higher than this and the flexing turned to advantage.

The exact criteria for determining cone material, shape and size are quite complex. Suffice to say that good ol' paper turns out to be highly viable, as is metal. Plastic cones can behave well, but it is important that the plastic used does not suffer from hysteresis, that is, it must return at once to its original shape after being flexed. This is not true of many plastic materials in use. For any material, the cone shape and the characteristics of the surround and suspension are critical.

Cones can work well to frequencies above 20kHz, but the most common high frequency driver in current loudspeakers is the dome tweeter. In this unit, the voice

coil is at the perimeter of the diaphragm, so the diaphragm surround and the suspension are one and the same. The voice coil is large compared to that of a like-sized cone and so the power handling is good, and there is plenty of wire in the magnet gap, which improves efficiency. The source also is small and therefore avoids HF beaming.

Unfortunately, a dome does not behave well with regard to flexing. When a wave sets out from the perimeter, it converges on the centre of the dome where it has nowhere else to go. The energy in the wave must do something, however, and it can result in the dome breaking up catastrophically, giving very high distortion levels at very high frequencies. The distortion might well be ultrasonic, but many designers feel it will in general cause modulation of the audio signal. Domes usually show up reasonably well on distortion tests



Townshend Glastonbury uses a metal-coned Jordan driver, reflex port, and 'brute force' technique of plaster and steel to achieve cabinet rigidity.

with sinusoidal waveforms, but tend to distort transients and complex waveforms far more. This may be why many dome tweeters can sound shrill and harsh. Plastic domes can reduce breakup by dissipating the wave before it gets to the centre of the dome, but this can mean that the dome suffers from hysteresis, which as mentioned above is undesirable.

Dynamic drivers are normally mounted in a box (or baffle), which prevents radiation from the back of the driver travelling round to meet that from the front and can-

Continued on page 36.

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Some successful designs have light but very rigid boxes. Celestion's SL700 employs Aerolam - an aluminium honeycomb sandwich material - for its cabinet. The design of the stand is a critical factor in determining sound quality too.

Reflex enclosures are an elegant means of obtaining bass from small boxes.



*Moving Air
continued from page 33.*

celling it. Not surprisingly, the characteristics of the box are at least as important as those of the driver. The box should remain perfectly still while the driver moves in and out, which calls for great weight and/or stiffness, and good damping. The least important of these in isolation is weight, as the box will only move as a bulk object at low frequencies and will only introduce a small and linear error even then.

Rigidity and damping are very difficult to achieve, especially when cost is critical. Brute force techniques such as plaster, concrete and steel with generous damping panels are still best, but some designs have had success with light, very rigid boxes which do not resonate offensively at any particular frequency. Resonance is the devil of loudspeaker enclosure design, and is responsible for most of what is normally termed 'coloration' and 'muddle'. Some loudspeaker stands can also reduce resonance by effectively clamping the loudspeaker to the floor.

What sort of box should be used? Instinctively, the ideal sort would seem to be a closed one (an 'infinite baffle'). A closed box is relatively easy to design and build, and can help a driver reproduce low frequencies, down to an arbitrary limit. As this limit is extended, efficiency is reduced (for a given box size), and when manufacturers talk about high efficiency and good bass from small boxes they mean in comparison with other small boxes. The very smallest loudspeakers seldom reproduce much below about 80Hz, but if the harmonics are reproduced accurately the ear will happily fill in the rest, and lack of bass extension is not disastrous.

Some loudspeakers use a box with a hole in it. This hole is a 'reflex port', which uses a clever acoustical trick to improve the low frequency response of the loudspeaker. In effect, the reflex system takes two resonances - one inherent in the driver, and the other in the box - and combines them to create a new damped resonant system with (if correctly designed) a flat bass response to a lower frequency than a closed box of the same size. Below this frequency, response drops off very fast.

The reflex enclosure is a technically elegant and effective solution to the problem of obtaining bass from small boxes. Its only problem is of 'one-note bass', due to the response of this kind of coupled resonant assembly to transients. In a well designed reflex enclosure, this need not be serious. More serious is the fact that designing a reflex system properly is not easy, and requires a driver with very particular characteristics. Because of this, some reflex loudspeakers work better than others. As always, the ear must be the judge; when auditioning, listen carefully for the 'one-note' effect - a distinct frequency of thud on transients such as kick drum.

Closed box and reflex speaker cabinets share most of the market. Other methods sometimes used successfully include the transmission line, which is an open pipe (which may be folded) on the back of the driver, full of absorbing material which should stop sound ever reaching the end of the pipe, and the open baffle, which is simply a board with a hole for the driver.

JUST UPSTREAM

Once the drivers are in a box together, each must be fed the correct frequency range. This is done with a crossover network, an electrical filter which sends treble to the tweeter and bass to the woofer. Crossover design is not so much a black art as a badly misunderstood science. Most designers manage to get the amplitude characteristics more or less right, so that the frequency response is level, but very few pay any real attention to phase, so transients tend to come out 'bent'. It is sometimes stated that simple crossovers are inherently phase linear. This is another factoid. Simple crossovers are preferable to badly designed complex ones, but properly designed complex crossovers repay the effort that must be put into them. One result of the standard two-way crossover alignment is that the phase response is often almost correct if the speaker is tilted backwards a bit. Try it. You may notice a distinct improvement in stereo imaging and clarity.

The other almost universal problem with crossovers is that the most common crossover frequency of 3kHz is just the point where the ear is most sensitive to amplitude and phase errors (which show up often as 'top end spit' and 'aggressive treble'), so it is particularly difficult to achieve a satisfactory response. On the other hand, crossing over at 300Hz or lower gives far fewer problems and results in a comparatively seamless treble. The 3kHz crossover point is technologically convenient, but for very high quality loudspeakers it is certainly preferable to cross-over lower down. No problem; the woofer simply handles about three octaves of signal and the tweeter six octaves, instead of the other way round.

OTHER APPROACHES

Dynamic drivers can be suitable for use in the very highest quality systems. However, other driver systems are currently much in vogue in the high end, and these undoubtedly have much to offer. The most common alternative is the planar, or panel, speaker, whether electrostatic or electrodynamic. This is usually an open, large area driver using no box. The idea is to move a large amount of air with a very light diaphragm, often covering the entire audio spectrum from one driver. These systems achieve a very good midband/treble response, lacking most of the enclosure resonances, crossover artefacts and breakup characteristics that can dog dyna-



Electrostatic loudspeakers have much to offer – although they'll never be cheap! The British-made Quad ESL-63 is arguably the world's most famous model. Price is £1,538 per pair.

mic driver systems but bass is limited by the physical size of the driver and the room in which it is placed, and for this reason open panel speakers can be very room-dependent. They have a habit of being inefficient, and electrostatics especially suffer from limited power output – but for modest requirements (classical music at all but the loudest levels, and most styles short of reggae and heavy metal) the limitations do not intrude. Real bass is usually attenuated but clean, and can sound impressive for this reason. Very small panel speakers (a few inches across) are sometimes used as tweeters.

Horn loudspeakers are a breed apart from most hi-fi systems. A horn is limited in bass response by physical size, and a real full range unit would be the size of a garage. Nevertheless, realistically sized horns can give acceptable bass and have some distinct advantages in many areas over conventional drivers. Notably, their efficiency is very high, such that 1W is often all that is required to go very loud indeed. Loudspeaker efficiency is normally expressed in dB per W. For a modern medium size speaker, 88dB/W is about average. Horns can manage 108dB/W, or 100 times the output for a given input. Horns often sound very 'dynamic', which unfortunately usually means distorted, but the distortion is not the fatiguing kind. Given their impracticalities and admitted limitations, horns still have a distinct appeal.



Apogee Scintilla full-range ribbon loudspeaker from the US, priced £4,990 – approaching the ultimate in electrodynamic principles?

Most loudspeakers use a single tweeter, which results in what is called a 'point source' – the sound emanates from a single point. This means that the treble intensity decreases in inverse proportion to the square of the distance from the loudspeaker. If a long vertical line consisting of many tweeters (or wide-range drivers) is used, intensity only falls off in inverse proportion to distance. This situation is a 'line source'. Line source loudspeakers do exist, and in my opinion they possess

demonstrably better treble and transient behaviour (and therefore stereo) over a larger area than point source speakers. However, the cost of using many tweeters restricts the technique to high end speakers. Line source planar speakers can also be made and are rather more commonly found.

POSITIONING

The loudspeaker's task of moving air is affected by its environment. Also, perception of sound depends on the location of the source of sound. So it is important to position loudspeakers so that they are helped, or at least not hindered, by the room, and so that they transmit sound to the ear efficiently. How should this be done?

In general, loudspeakers should be placed near a wall opposite the normal listening position. Some manufacturers give advice on how close the speakers should be to any walls, and this advice is usually a good starting point – but do experiment. For best imaging with good recordings, the speakers should be angled inwards so that they point to a spot just in front of the normal listening position. This arrangement gives the most natural balance over the widest listening area.

Stands are almost always of great value with speakers, even when not specifically recommended, and the best stand is the most rigid, given the size and ugliness you require or can tolerate. However, design approaches to stands vary nearly as much as those to loudspeakers, and it must be admitted that the science of stand design is in some ways in its infancy. Should the stand be heavy or light? Low or high? Pillar or frame type? Spiked or not? It is impossible to generalise, except to say that the stand must complement the speaker that sits on it. Large heavy speakers may like strong metal frame stands, while light speakers may prefer a light stand built, for example, of Torlyte or Aerolam. Experiment and ask around dealers for specific advice.

Spikes at the base of stands are universal good news, as they ensure that the assembly rests on the floor proper, instead of rocking to and fro on the carpet.

FINDING YOUR IDEAL

Choice of loudspeakers is very personal. The flaws and compromises in most affordable loudspeakers are pretty obvious, but the result is seldom really unpleasant, and often very convincing. Remember that the designer presumably liked the loudspeaker when he made it, and the large number of designers means that the chances of at least one of them having similar tastes to yours are high. So be prepared to shop around and listen for whatever characteristics most please or irritate you. Experiment with stands and placement, and patience will be rewarded. Then just sit back and enjoy!

SEVENOAKS HI-FI & VIDEO

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The suggested systems priced below all include the popular Dual CS503/1 turntable, but alternative turntables and CD players are available at extra cost. Please see "OPTIONS" list below for further details.

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MISSION 707	£149.95	MISSION 737	£249.95		
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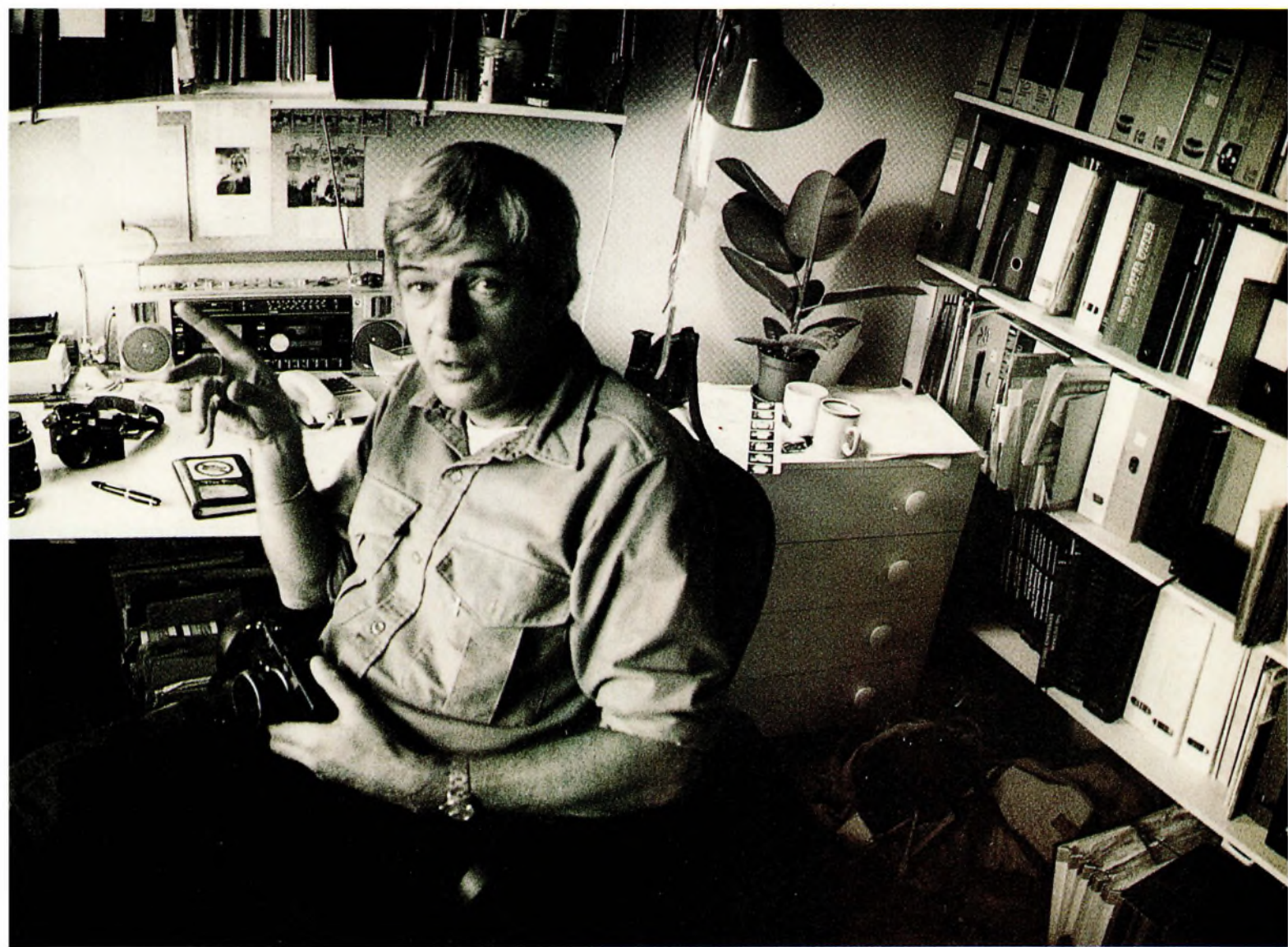
INTERVIEW

As part of an occasional series on people and their hi-fi Dan Houston visits Tim Page, photographer, best known for his portrayal of the Vietnam war. Photographs: Chris Richardson.



Tim Page

"All of a sudden I could hear most of the musical spectrum again – it was as though the digital sound went straight into my head!"



Compact disc sound was a Godsend to Tim Page, whose wounds while photographing the Vietnam conflict left him practically deaf in one ear and with impaired hearing in the other. He bought one of the first Philips players when they appeared and was immediately converted. "All of a sudden I could hear most of the musical spectrum again – it was as though the digital sound went straight into my head!" he enthuses.

Without wishing to cast any aspersions on the capabilities of Page's ancient AR record deck (bought at the PX in Saigon in the 1960s) or more latterly his Technics direct drive turntable, he undoubtedly

embodies the CD market which upgrades to digital format, while audiophiles remain resolute about the more mellow and musical characteristics of analogue sound. However, Tim Page did audition several turntables of similar price to his original CD player and says CD sounded totally new and different to him.

What does bug him about CD players is their reliability. After four Philips components he is now on his third Sony machine and he isn't anticipating having that as long as any of the rest of his system. His inbuilt belief that something should last for ten years is regularly shattered by having to cart the player back to his dealer.

Not that Page is light on hardware; his house in rural Kent is littered with broken cameras from his ruthless treatment of them in the war zone. They act as ornaments alongside Buddhas and artefacts brought home from his trips East. The rest of Page's system comprises NAD 3020E amplifier, Nakamichi EX100E cassette deck and Acoustic Research AR4 loudspeakers. These last are still producing the sonic goods after being carted about the world for the best part of 20 years. They were also bought in the PX and ironically are the only non-Eastern component in his system although they were actually bought in Vietnam. The sound from these speak-



The Spirit Captured

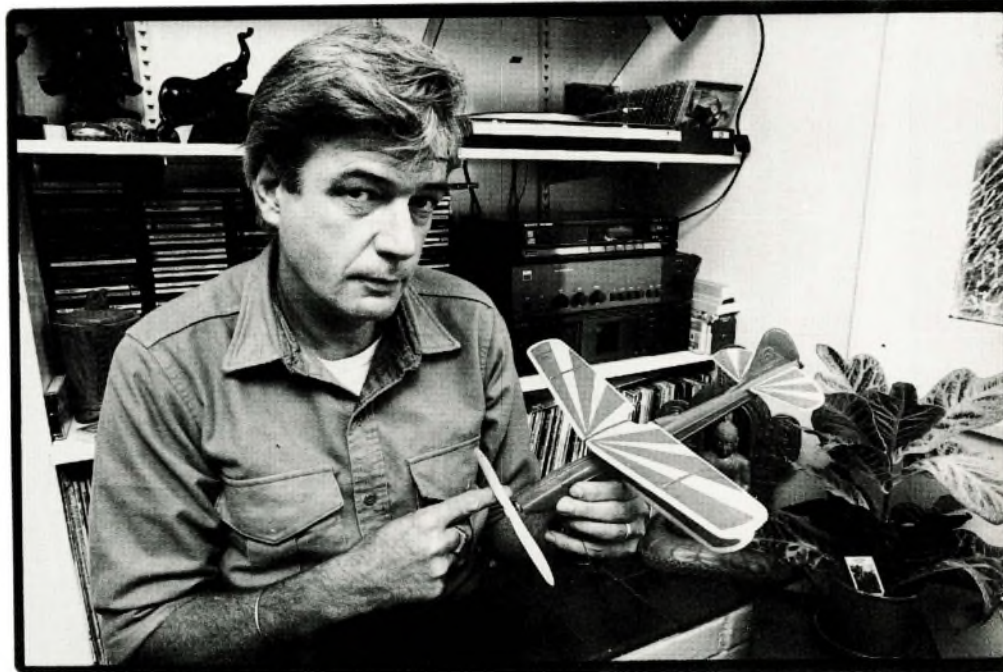
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ers (and system) is very warm; the AR4s are placed on a low tiled shelf on either side of the fireplace in Page's living room. But on both tape and CD they produced surprisingly good stereo and punch, with the kind of rocking characteristic one associates with the early '70s. They may miss some of the clarity and imaging of later loudspeakers but Page sees no need to change them at present and they are easy to live with.

The character of the house reflects that of the owner, whose whole working life has been tangled up with the war that increases to fascinate later generations. Page's two books on Vietnam, *NAM* and *Ten Years After* (Thames and Hudson), have made him a celebrity among the Vietnamese, veterans and buffs who appreciate him as much as a scarred survivor as a brilliant framer of the conflict and its aftermath. Indeed, entering LZ1 – "Hey it's the first place I owned, it's my firebase, what else could I call it?" – sends one into a timewarp with oriental artefacts, black and white photographs and framed Time Life Magazine covers bringing the late '60s and their crazy foreign-ness into focus. His study (he eschews computer in favour of Mont Blanc pen) is hung with model aircraft, made from beer cans by Vietnamese children, collected on his last visit to the country. They appear to dive-bomb his Bonzai trees. He points out that these 'toys' are hybrids of American and Soviet designs – the two superpowers that wrecked the country which is still fighting for survival. In such a setting Page's infectious "NAM-speak", a mixture of military acronyms and GI slang doesn't date him at all.

Page was wounded four times in his four years as a freelance photographer in Vietnam. On the last occasion (if one can call it that) a land mine exploded under a soldier in front of him, sending a piece of shrapnel into his brain leaving the left side of his body paralysed. The soldier lost both legs but now runs a ranch in America. Page fought his way out of hemiplegia however, and now the only obvious outward signs of that wound are a limp and the deafness in his left ear where he says the bones are welded together.

Inwardly, perhaps the scars are greater; while enthusing about the properties of CD he likened the drawer taking the disc to a cremation. "All you can see is like a little light inside, the CD disappears and then



there is this wonderful music!" Not many people have the imagination to equate such recreation technology thus, but then Page describes war machines as toys so perhaps it is just a different outlook!

Nor was Page's working life over with that last near-fatal medical evacuation flight or 'dustoff' out of the jungle. Among other exploits he has published a book on Sri Lanka, and with his fascination with communism ("it's absolutely dead, man") he has begun work on a book on Cuba. Last month saw the publication of his memoirs: *Page After Page* (Sedgewick and Jackson) and next month he will again be in the jungle. This time it's Colombia where he has been asked to spend 12 days walking the Darian Gap – the missing link in the Pan American Highway – for *Departures* Magazine. He hasn't been in such country since his days tagging along with US army patrols. His eyes light up at the prospect which was the suggestion of his American wife. Surely at 44 he doesn't need that . . . what about the heat, insects . . . snakes?

Page totes his Leicaflex R4 on its side: "You carry a snake bite kit . . . that's no biggy, that's no problem, I got used to that in Vietnam. It's a state of mind; every morning you get up, smoke a big fat number and say: 'they're not going to get me'. I prefer to be stoned like that; it gives the day a teflon effect".

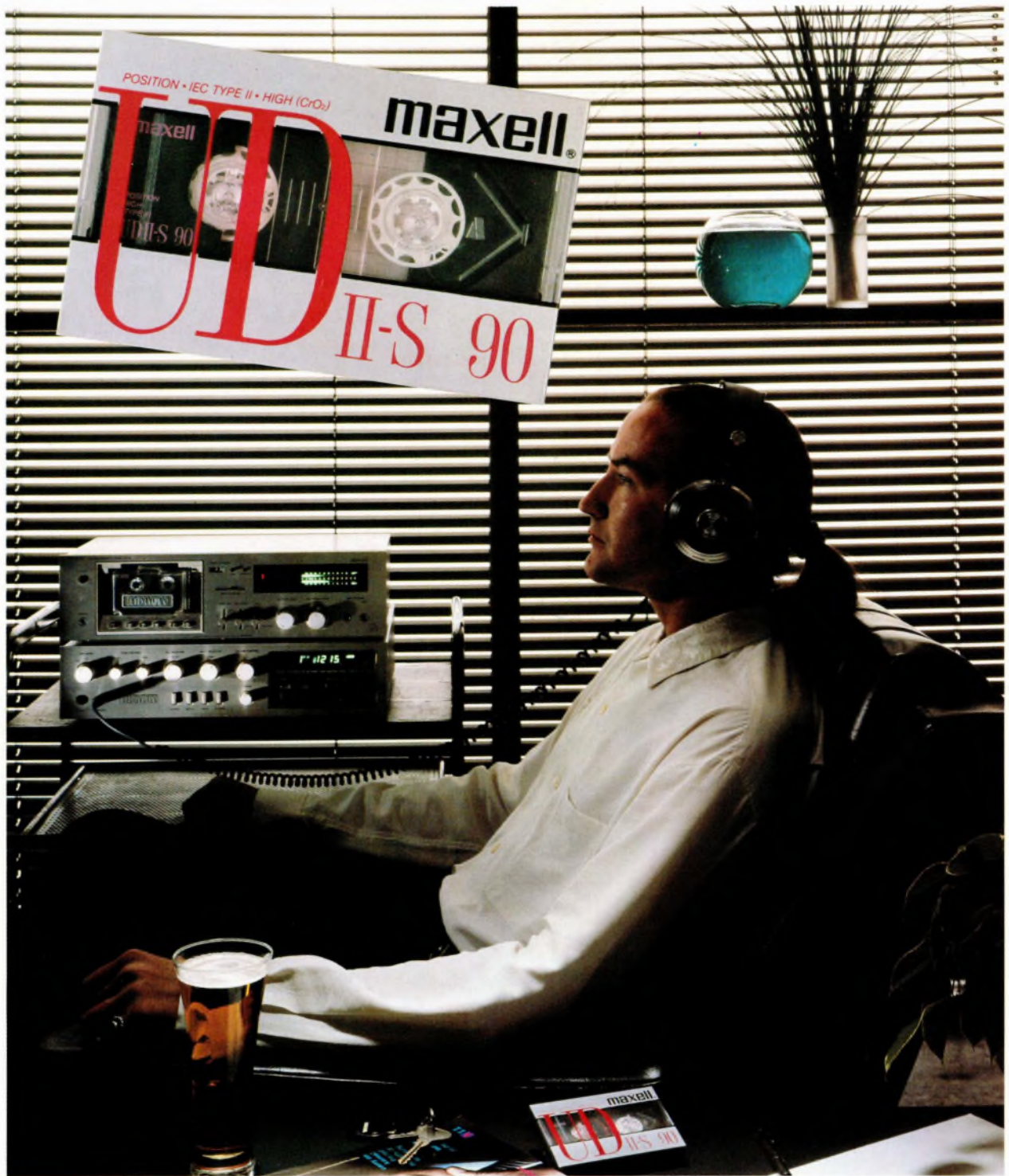
No wonder this man sees a CD drawer in terms of death.



The photographer winds-on: Tim Page prepares for take-off (after a big fat number)!

Grounded: A much-travelled AR4 loudspeaker, bought in 'Nam; still going strong.

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MARKET RESPONSE

In our exclusive market survey Dan Houston talks to British independent dealers about loudspeakers and investigates these current trends on reliability and sales.

For this market survey we received replies from dealers covering nearly 80 brands of loudspeaker on sale in Britain at the moment. There is intense competition with specialist dealers spreading their loyalty over the different makes, so it's difficult to say who is King. The good news for British engineering is that we can make loudspeakers, for our own market, cheaper and better than virtually anyone else. Even Japanese audio giants such as Sony, who claims to sell half a million loudspeakers (boxes) a year here, has 98 per cent of its models made by British firms.

Estimates on the size of the loudspeaker market vary but AGB (Audits of Great Britain) and BREMA (British Radio and Electrical Equipment Manufacturers' Association) figures put the value somewhere between £44m and £50m per annum. Gerald Harvey, who recently did a study on the subject for BREMA, said that the market was not growing significantly at present with the major British manufacturers selling around 160,000 units each year. "My own impression is that during '85-'87 the market spurted ahead due to the effects of CD and the spending boom, but it seems to have levelled out now," he told *Choice*.

More significantly, it seems that people are now willing to spend more on loudspeakers.



Target's popular budget category stands.

BREMA found that while the market for sub £100 loudspeakers only grew by four per cent from 1986-1987, the market for speakers priced £100 to £250 grew by 11 per cent and over that price level things improved by 31 per cent. Could it be that the loudspeaker is making a comeback as a more important part in the hi-fi system?

Rob Dowse, of Definitive Audio in Brighton told us that only a hard core of his customers were buying expensive loudspeakers and that the concept of the front end of the system being most important was still prevalent. This concept was begun in the early '70s, before which people would spend half their budget on loudspeakers and half on everything else according to Dowse. Linn Products effectively re-invented the wheel in terms of hi-fi philosophy and by the late '70s enthusiasts were spending many hundreds of pounds on the front end of their system and buying a £70 pair of loudspeakers. Now the trend seems to be evening out and the philosophy that your hi-fi is only as good as its weakest link encourages people to apportion equal amounts of budget on the different elements of their system. However, Dowse claimed that with neutral sounding components he could achieve the same sound from a £2,000 system with £400 speakers as he could with £2,000 speakers and £400-worth up front.

STANDS TO DELIVER

One of the most important requirements for loudspeakers is a pair of good stands. All the dealers we spoke to agreed they could demonstrate improvements in sound quality by using loudspeaker stands. Stands are now accepted as prerequisites for a hi-fi system but were once regarded with suspicion by the buying public who understandably saw this as a further demand on their wallet. Things have improved now and from dealers' replies we calculated that they sell stands with 76 per cent of their loudspeakers. In fact we heard

from several dealers that they sell loudspeakers and stands of the same price.

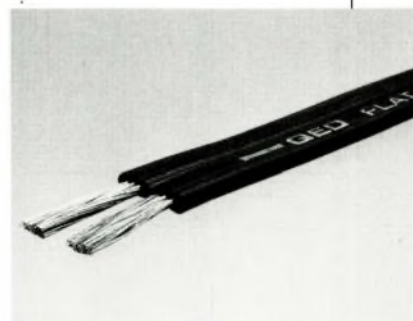
Paul McMichael, of Better Hi-Fi said he regularly sold pairs of £100 speakers with £100 stands to match. "You can spend £200 on speakers, £100 on stands and that will certainly sound better than a £300 loudspeaker system," McMichael told us. However, spending as much on stands as the speaker system is still uncommon practice even if this element in the set-up can be described as 'the most reliable'.

We asked dealers for their best selling stands in three price brackets to match the price of speakers. For the budget category (speaker price under £149) Target Stands were most popular with 71 points followed by Appolo (34 pts), Foundation Fred (24 pts) and Heybrook (20 pts). For loudspeakers priced £150 to £300 the most popular stand brands were Target (73 pts), Linn (43 pts), Appolo (38 pts) and Foundation Audio (34 pts). For speakers priced over £300 the result became a little less focused but Target were still top with 65 points followed by Linn (29 pts), Foundation Audio and Pirate stands with 20 points each.

CABLE

Perhaps as important as loudspeaker stands is some decent loudspeaker cable. While bell wire is a reasonably efficient conductor of electricity the difference made by dedicated loudspeaker cable can be easily demonstrated. During our last survey on loudspeakers we found that QED 79 Strand was the best selling cable by far. While 79 Strand is probably still the most common option, QED's flat 200 series also had several mentions as a best seller along with the more expensive cables by Naim (NAC 04) and Linn Products. Other brands mentioned as best sellers were from Monster, and the Rotel *Supra 4mm*.

Dealers told us they hoped to sell loudspeaker cable when they sold loudspeakers and from their answers we calculated they sell it with 71 per cent of loudspeaker sales. Whether you have to go the



QED's 79 Strand - still the most common option.

whole hog and invest in gold banana plugs and cable that looks like a prop from a film on the Loch Ness monster is a matter for conjecture. Several dealers told us that customers were treating cable as a sufficient upgrade to a system in itself and were wary of a 'cablists' takeover'. It is patently obvious that having cable with an 'nth' ohm resistance when you're operating a budget system wired with something less acquiescent gives you a high score on the Noddy scale. And, of course, where do you stop? One dealer (jokingly we hope) told us he was considering marketing gold plated fuse box units! The next step might be to get Cecil to lay down a golden national grid...

RELIABILITY

Will today's loudspeakers be soothing earthlings in the year 2010? The answer is probably yes. Mechanically the loudspeaker has just about grown up with tweak and counter tweak looking like its only future. For instance a new horn design, while eagerly awaited by some passionates, is unlikely to usurp the box-and-cones' poll position.

It would be interesting and controversial to give readers an insight into just which loudspeakers they could take to their coffin, but from our dealers' comments it seems that most of the brands available are of sufficient build quality and reliability to endure with care. Loudspeakers, being the most simple elements in the hi-fi system are, not surprisingly, also the most reliable.

We calculated that just 1.6 per cent of loudspeakers arrive from

the manufacturer as faulty. This is almost the same figure as in previous surveys. Damage in transit was most often the cause according to dealers, but we also heard tales of poor finish on budget loudspeakers. Peeling grilles and vinyl wrapping which left the chipboard exposed led to concern from dealers, who felt that in this sector of the market price rather than quality was more the manufacturers' objective. We asked dealers to list their most reliable and unreliable brands of loudspeaker.

From the results we calculated Rogers (19 points) as most reliable followed by Mordaunt-Short (17), Linn (15), Monitor Audio (15) and Ruark (13). All these, with the exception of Ruark, featured similarly in previous surveys. In matters of unreliability three brands came in for criticism: Tannoy (-20), Wharfedale (-19) and Mission (-16). These three brands were mentioned (in a different order) as unreliable in June. Tannoy and Wharfedale did receive a mention each for reliability.

If your loudspeaker does break down the most likely fault will be a blown drive unit. This is often easy to repair and normally a dealer would carry the parts in stock. Dealers also voiced their suspicion that in most cases blown drive units were self-inflicted wounds caused during the usual 'height-of-the-party-amp-into-hardclip-fizzbang' syndrome. However, we also heard several comments that in general loudspeakers are more capable of handling the various excesses of amplification with protection circuitry and the like. The incidence of 'burn-outs' has therefore fallen to the point where dealers cited many manufacturers sending them free replacement drive units (a sort of permanent guarantee).

Loudspeakers are also very easy to repair in most instances, and dealers rarely have to send the unit back to the manufacturers. We asked dealers to give us an average service and repair time and calculated a mean 1.4 weeks. Many told us they would carry out same day

repairs if they had the parts in stock. If parts have to be ordered some companies are more on the ball than others and we also asked for the names of the fast and slow coaches. Mission came out top in the Speedy Gonzalez (remember him?) table with an average time of less than a week. Linn Products, Acoustic Research, Monitor Audio and Heybrook also received praise on this front. Slow companies ("*manana amigo*") were said to be Wharfedale (five mentions) and Tannoy (three).

CONSISTENCY

We always ask dealers about the consistency of brands to find out who is making equipment that sounds the same from batch to batch (and who isn't). The aim is to get some idea about the manufacturers' commitment to his product. However, consistency was very nearly cancelled this month due to lack of interest, but from the paucity of comments we did receive, here is a rough low down:

Heybrook and Rogers lead the field followed by Linn, Monitor Audio and Mordaunt-Short. Adverse comments (three and two respectively) were made about Wharfedale and Mission.

THE BEST SELLERS

Dealers were given three price points to list their top selling loudspeaker models. The results are calculated on a points system: five for the best seller, four for the second and three for the third and then added up.

Budget below £149

1) Heybrook <i>Point Five</i>	31
2) Goodmans <i>Maxim 2</i>	29
3) Mission <i>70. II</i>	28
4) Tannoy <i>Eclipse</i>	28
5/ Wharfedale <i>Diamond III</i>	27

Of these Heybrook, Wharfedale and Goodmans were best sellers in June.

Mid Price £150-£300

1) Linn <i>Index Plus</i>	37
2) Heybrook <i>HB1</i>	34
3) Tannoy <i>Mercury 'S'</i>	34
4) Rogers <i>LS6</i>	26
5) Ruark <i>Sabre</i>	24

Heybrook, Linn and Rogers have maintained their positions

since our last survey.

Top price over £300

1) Monitor Audio <i>R852MD</i>	37
2) Rogers <i>LS7t</i>	28
3) Epos <i>E14</i>	25
4) KEF <i>104.2</i>	25
5) Linn <i>Nexus</i>	20

All these models (except KEF) featured as best sellers in June.

This survey was compiled by sending just over 100 questionnaires to dealers up and down the country. Telephone polling then puts flesh on the bones of the results. The survey is mostly random, though if a dealer wishes to be contacted regularly then we do so. As such it covers the more common brands so if a company is not mentioned it doesn't mean that is no good. The average dealer in this survey stocks just over ten brands of loudspeaker; no-one stocks everything.

The survey complements the main review topic in the magazine but is based on different criteria to give readers a distillation of dealers' views on the topics covered. It is also based on specialist dealers (for the most part) so the picture of best sellers for example will probably not be accurate for the UK as a whole; specialist dealers, it must be said, are entirely different animals from... well, non-specialists. It's a bit like contacting tailors as opposed to the huge clothing retailers. The survey is a poll and should be seen as such.

PARTICIPATING DEALERS

Our thanks to the following

dealers for helping us compile this survey:

Active Audio, Derby, Derbyshire.
 Aerco Ltd, Woking, Surrey.
 A. Fanthorpe Ltd, Hull, Humberside.
 Analog Audio, Finchley, London.
 Aston Audio Ltd, Alderley Edge, Cheshire.
 Audio Insight, Milton Keynes, Buckinghamshire.
 Audio South, Farnham, Surrey.
 Better Hi-Fi, Liverpool, Merseyside.
 Brentwood Music Centre, Brentwood, Essex.
 Bryants Hi-Fi, Aldershot, Hampshire.
 Chew and Osborne, Saffron Walden, Essex.
 Chichester Hi-Fi, Chichester, West Sussex.
 Cloney Audio, Blackrock, Dublin.
 Darbys Hi-Fi, St. Albans, Hertfordshire.
 Definitive Audio, Brighton, East Sussex.
 Eric Wiley, Castleford, W. Yorks.
 Gilson Audio, Middlesborough, Cleveland.
 Grahams Hi-Fi, Pentonville Road, London N1.
 Hi-Fi Experience, Camden, London.
 Island Compact Disc Centre, Ramsey, Isle of Man.
 Lyon Audio, Colchester, Essex.
 Moorgate Acoustics, Rotherham, S. Yorks.
 Norman Audio, Preston, Lancashire.
 Nottingham Hi-Fi Centre, Nottingham, Notts.
 Now That's Hi-Fi, Portsmouth, Hampshire.
 Paul Green Hi-Fi, Bath, Avon.
 Paul Roberts Hi-Fi, four shops in Bristol and SW.
 Pro Musica Ltd, Colchester, Essex.
 Radlett Audio, Radlett, Hertfordshire.
 Richer Sounds, 12 shops in London and UK.
 Stereo Stereo, Glasgow.
 The Audio File, Bishops Stortford, Hertfordshire.
 The Cornflake Shop, Windmill Street, London W1.
 University Audio, Cambridge, Cambs.



Monitor Audio's R852MD - the top price best seller.



505.2 in Black Ash



512.2



510.2



507.2



505.2



504.2

YOU DON'T NEED A SCREW LOOSE TO RECOGNISE GOOD SPEAKERS

Screws in fact, loose or otherwise, are just one of the things which separate the Wharfedale Precision Series from ordinary hi-fi speakers.

They've simply been eliminated by our unique Bayonet Fit driver location system which as well as a clean appearance, provides more even distribution of pressure and a tighter, more intimate bond with the front baffle. It's just one facet of the Precision philosophy which includes drivers with high rigidity diecast alloy chassis, MFHP cone material for superior damping properties, critically acclaimed aluminium dome tweeters and a choice of black ash or crown cut African mahogany wood veneer cabinet finishes. Assemble all this using our patented Build Ring technology and there can only be one result... the deeply satisfying sound of Wharfedale Precision.

We invite you to audition the range including our newly introduced model 505.2 at selected Wharfedale dealers or contact us directly for full colour information pack.



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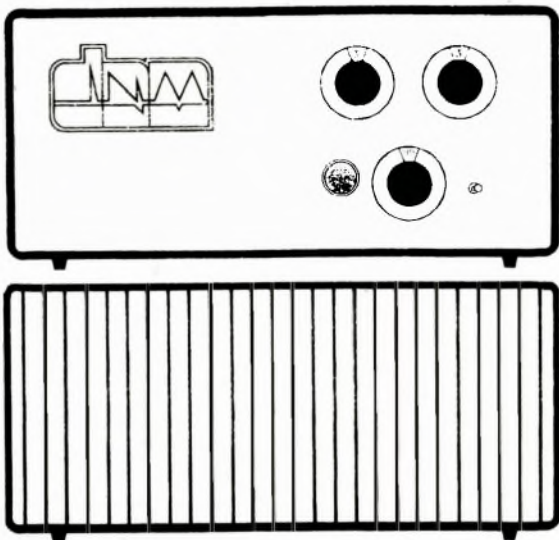
Sandleas Way, Crossgates, LEEDS LS15 8AL.
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DEALERS**

AVON	BRISTOL	Paul Roberts Hi-Fi	0272 429370
		Radford Hi-Fi	0272 294183
	WESTON-SUPER-MARE	Paul Roberts Hi-Fi	0934 414423
BERKSHIRE	BATH	F.H. Moss	0225 2140
	BRACKNELL	B & B Hi-Fi	0344 424556
	MAIDENHEAD	B & B Hi-Fi	0628 73420
	NEWBURY	B & B Hi-Fi	0635 32474
	READING	B & B Hi-Fi	0734 583730
BUCKINGHAMSHIRE	HIGH WYCOMBE	B & B Hi-Fi	0494 35910
CAMBRIDGESHIRE	AYLESBURY	C.F. Luke	0296 25119
	CAMBRIDGE	Steve Boxhall Audio	0223 68305
	CAMBRIDGE	Cambridge Hi-Fi	0223 67773
	CAMBRIDGE	Camplins	0223 312240
	PETERBOROUGH	Hi-Fi People	0733 41755
CHESHIRE	BROOMBORO	Peters Hi-Fi	0513 341874
	CHESTER	Peters Hi-Fi	0244 21568
	CHESTER	Peters Hi-Fi	0244 22063
	STOCKPORT	Ward & Williams	061 430 2934
	WARRINGTON	Doug Brady Hi-Fi	0925 828009
CORNWALL	HELSTON	ETS	0326 53801
	TRURO	Truro Hi-Fi	0872 79809
DERBYSHIRE	DERBY	Basikis	0346 863306
DEVON	CHELSTON	Cheiston Hi-Fi	0934 515936
DORSET	CHRISTCHURCH	HATV	0202 473901
	POOLE	Movement Audio	0202 730865
DURHAM	DURHAM	Lintone Audio	0385 44626
GLOUCESTERSHIRE	GLOUCESTER	Audio Excellence	0452 30046
	CHIPPENHAM	J.D. Stereo Centre	0249 654357
GREATER MANCHESTER	MANCHESTER	Cleartone Hi-Fi	061 835 1156
	BOLTON	Cleartone Hi-Fi	0204 399617
	ROCHDALE	Cleartone Hi-Fi	0706 524652
HAMPSHIRE	BASINGSTOKE	Sewards	0256 465665
HERTFORDSHIRE	CHANDLERS FORD	Hampshire Audio	07032 65332
	BISHOP STORTFORD	The Audio File	0279 506576
	WATFORD	Acoustic Arts	0923 33011
HUMBERSIDE	HULL	Superfi	0482 24051
KENT	ASHFORD	Ashford Audio	0233 29119
	BECKENHAM	Sevenoaks Hi-Fi	01 658 3450
	CANTERBURY	Canterbury Hi-Fi	0227 65315
	CHATHAM	Sevenoaks Hi-Fi	06314 46859
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	SEVENOAKS	Sevenoaks Hi-Fi	0732 459555
LANCASHIRE	PRESTON	Goodrights	0772 57528
	BLACKPOOL	Practical Hi-Fi	0253 27703
	LANCASTER	Practical Hi-Fi	0524 39657
	SOUTHPORT	Goodrights	0704 43615
LONDON		Brians	01 631 1109
		Doug Brady Hi-Fi	01 379 4010
		Spatial Audio	01 637 8702
		Sevenoaks Hi-Fi	01 855 8016
		P.A. Audio	0519 247287
		B.B. Adams	0603 63031
		R.J. Taylor	0493 857048
		Hi-Grade Hi-Fi	0604 233144
		Nottingham Hi-Fi	0602 786919
		Superfi	0602 412137
		Oxford Audio Consultants	0865 790879
		Westwood & Mason	0865 247783
		Cosmic	0932 854522
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		Jeffries Hi-Fi	0323 31336
		Hastings Hi-Fi	0424 442975
		Phase 3 Hi-Fi	0903 206820
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		Superfi	021 631 2675
		Alternative Audio	021 742 0254
		Cleartone Hi-Fi	0902 772901
		John Holmes Music Centre	0795 34095
		Superfi	0532 449075
		Jewels of Oakwood	0532 400666
		Superfi	0742 723767
		Loage Audio Vision	0924 374858
		Eric Wiley	0977 553066
		Holborn Hi-Fi	0224 585713
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		Hi-Fi Corner	031 225 9535
		Hi-Fi Corner	0324 290111
		Hi-Fi Corner	041 248 2840
		James Keir	041 332 0988
		Robert Smith	041 248 5242
		Audio Excellence	0222 28565
		Electro Trader	0492 48932
		Peters Hi-Fi	0492 76788
		Audio Excellence	0792 474608
		LRG Sound & Vision	0232 51381
		Lyric Hi-Fi	0232 381296
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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 £200, for example, one should probably allocate £140 for the speaker itself, £50 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 pinpointing 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 £1,000 system which suits me very well, but which certainly represents one extreme. It consists of a £600 turntable with £200 amplifier and £80 loudspeakers on £100 stands. At the other (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.

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



Inexpensive speakers such as Wharfedale's Delta 30 can work wonders when fed a high quality source signal.

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 or a full concert hall acoustic.

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.

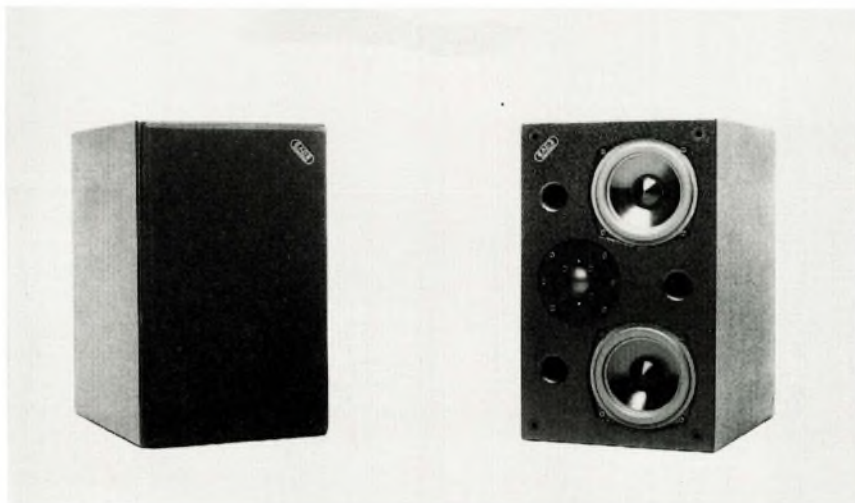
The underlying axiom is that great loudspeakers are not created by adopting a quick technological 'fix'. Indeed, history has often shown that the 'radical innovation' is a mere flash in the pan, with benefits in one area more than offset by unforeseen penalties elsewhere.

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.

ACOUSTIC ENERGY AE2

ACOUSTIC ENERGY LTD., 3a ALEXANDRIA ROAD, LONDON W13 ONP. TEL: (01) 840 6305.

RECOMMENDED



Acoustic Energy is a comparatively new operation that is successfully managing the difficult task of crossing over from the ProAudio to the hi-fi world. Furthermore, the AE loudspeakers have done so without the need for 'furniture' finish – they look Pro, and are fashionable partly because they look Pro, though the possibility of oak, yew and white domestic finishes is being considered.

There are three models in the range. The tiny but very expensive *AE1* wowed our reviewer into unusual enthusiasm last June, while the still small £1138 *AE2* threatens to do the same this time around. There's also a not very large and even more expensive *AE4* that we'll probably get around to once I've acquired the necessary heavy lifting gear.

Anyone familiar with the Pro market today will be aware that fashionable monitors like Questeds and Westlakes are dumpy and very heavy, finished in a rugged gunmetal grey and used without grilles. Such is true of the *AE2*. It looks as if it would survive an accident with a forklift truck, while at the same time one would be handy for moving it around. There is a grille, strictly for the visually squeamish in this instance, since the tweeter dome has its own protective cover.

What does distinguish the AEs from most other Pro and hi-fi loudspeakers is its use of metal diaphragms throughout the operating range – the cone of the twin bass/mid units as well as the tweeter. The broadband aluminium cone driver is not unique – Ted Jordan was doing it twenty years ago – but it is unusual: a unique selling point, to take the cynical view.

The twin 100/130mm bass/mid drivers aren't the only fancy engineering, in a loudspeaker with one of the most comprehensive published specifications I have come across. The 22mm MDF triple-ported enclosure is a piece of genuine engineering, and the crossover

is an elaborate 21-element confection, using fourth-order LF rolloff and third-order treble feed; bi-wire/amp operation is feasible. The *AE2* is designed to be used in free space, preferably on AE's own heavyweight pillar stands.

LAB REPORT

Although sensitivity does reach the specification 91dB around 1-2kHz, 88/89dB/W (150-600Hz) is a more realistic rating in our opinion. Impedance too drops to a rather low level in this power hungry region, but then you're hardly likely to find a pair of these hung on the end of a budget midi system. The distortion levels are not serious, but better figures might have been expected, given the technohype.

The overall 1m response trend is pretty promising, marred by a couple of notches that are substantially eliminated out at 2m. Low frequency extension is good for the box size, but the grille clearly should be used for some more useful purpose like lining the cat's litter tray. The 2m response set shows remarkably close on- and off-axis conformity below and above the crossover point, with some unevenness from 1-4kHz. The room response could be smoother, but is basically very sound nonetheless.

SOUND QUALITY

Technohype or no, the pudding was convincingly proven in the listening tests, where the *AE2* was a clear and virtually unanimous favourite through two separate presentations. There was extensive praise for fine coherence, good stereo stability and depth, fine delicacy and dynamics and a generally good, slightly 'forward' balance. The bass showed fine speed and control, but in the final analysis the small size is recognised and does represent the most obvious limiting factor.

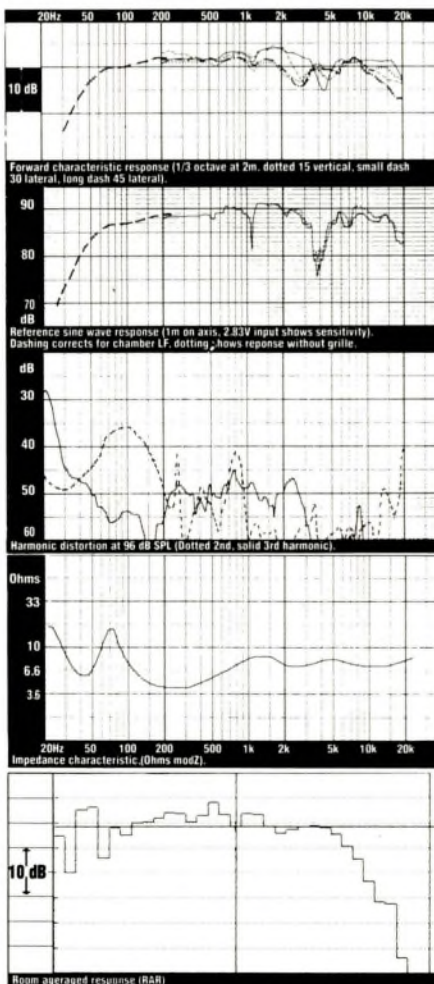
CONCLUSIONS

The *AE2* may be small, expensive and slightly hyped, but it also delivers the sonic goods and can therefore be confidently Recommended. It's not only good, it's also more nearly all things to all men than any loudspeaker I have yet encountered, though it is also likely to be both room and system (source, stands, wiring etc.) supersensitive.

TEST RESULTS

Size (height x width x depth)	39 x 23.5 x 29.5cm
Recommended amplifier power	15 – 200 watts
Recommended placement	on heavy stands in free space
Frequency response ($\pm 3dB$, 2m)	40Hz – 20kHz*
Low frequency rolloff ($-6dB/1m$)	45Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	88.5dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	very good
Typical price per pair inc VAT	£1138

* $\pm 5dB$ necessary to contain axial crossover unevenness



AR 112

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



AR, also known as Acoustic Research, has been one of hi-fi's great innovators. The company typified the US 'East Coast' sound for many years, but has since gone international, and loudspeaker models intended for European consumption are designed and manufactured in the UK.

Winter '88 sees the launch of a new range of six models under the 'Spirit' banner, ranging from the baby £120 112 through to the £450 162, each partnered by an appropriate stand made by Monotrak Engineering.

The 112 is about as small a loudspeaker as any loudspeaker can afford to be if anyone is going to take it seriously. And that's not to say that everyone is going to take it seriously. Small it may be, but it's just as well built, finished and what-have-you as the others, and has the same attractive combination of smart yet discreet styling as its bigger brethren.

It also has the same excellent grille arrangement, for those who prefer their loudspeakers clothed yet who are reluctant to accept the sonic compromise. Specifically, a groove is cut around sides, top and bottom, about an inch away from the front baffle. This locates and disguises the elastic band that holds the otherwise frameless grille cloth in place.

The vinyl clad 15mm particle board cabinet is available in 'black ash' or 'walnut', while the 'double baffle' combines with MDF to create a 36mm slab - no need for bracing here. It's a sealed box (the ideology couldn't allow otherwise), is nicely finished and presented, and is designed to be sited close to a rear wall, on rigid stands.

Tonegen made drive units comprise a 120/150mm bass/mid unit with doped paper cone and a low cost dome/annulus 25mm tweeter. The bass/mid unit uses no electrical crossover components, relying upon the natural

rolloff of the driver itself. A second-order network feeds the tweeter.

LAB REPORT

Given the 'stepped' response (which in practice is at least partly filled in by wall siting), the 87dB/W sensitivity rating is a bit of a rough estimate, but is pretty good for the class of speaker, though this is partly due to a lowish impedance characteristic. Distortion is reasonable enough for the type too, though starting to show the strain a bit at our 96dB test level.

The response 'step' looks a little extreme for full wall compensation here, and the mid and treble are a little uneven, if broadly balanced. The 2m off-axis set show reasonable coherence, but clearly highish stands (or, dare one suggest, a bookshelf) are needed to avoid the severe above-axis crossover 'glitch'. But the 800Hz-3kHz prominence remains obvious both here and in the room averaged response, while the latter confirms some loss of crossover region energy.

SOUND QUALITY

The validity of AR's wall siting recommendation was confirmed by accidentally presenting the 112 in open space, with unfortunate results. Matters were certainly improved when correctly sited in a subsequent presentation, at least to the point where the panel took them seriously, albeit without any great enthusiasm.

The bass fills in quite well at the wall, producing an effective overall balance, marred by the dreaded 'three-humped' effect. This is often initially impressive but can become fatiguing over the longer term, imparting 'cuppy' and 'hollow' colorations to the mid band and leaving bass and treble both slightly exposed and reducing the

impression of coherence.

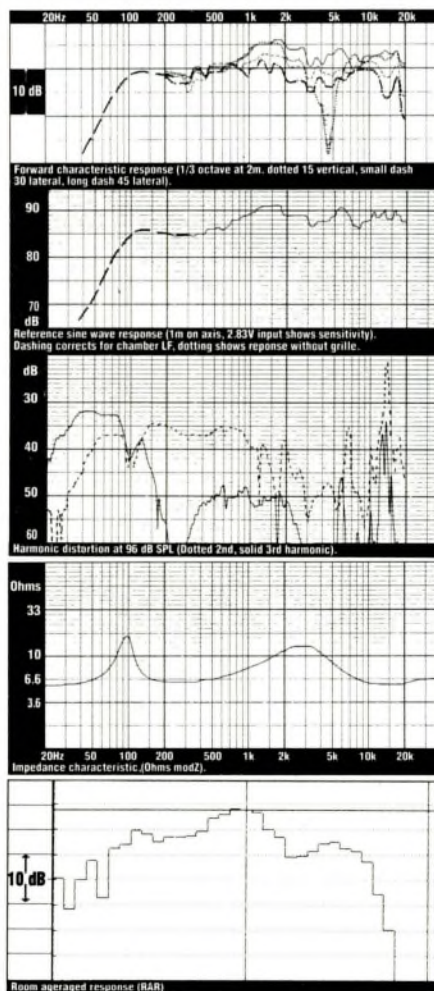
CONCLUSIONS

The AR 112 looks a neat enough package, certainly has the build quality to justify its price point, and also incorporates a number of neat design details. But it didn't find particular favour with the listening panel (when correctly sited), and perhaps suffered a little from being a shade too small, rather in the way the not-sure-where-to-stand 132 was a little too large.

TEST RESULTS

Size (height x width x depth)	36 x 19 x 18.5cm
Recommended amplifier power	15 - 75 watts
Recommended placement	on stands near rear wall
Frequency response ($\pm 3dB$, 2m)	95Hz - 20kHz*
Low frequency rolloff (-6dB/1m)	75Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	reasonable
Forward response uniformity	reasonable
Typical price per pair inc VAT	£120

* $\pm 4dB$ necessary to accommodate 'step'



AR 132

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



Winter '88 sees the launch of a new range of six AR Euromodels under the 'Spirit' banner, ranging from the baby £120 *112* through to the £450 *162*, each partnered by an appropriate stand manufactured by Monotrak Engineering.

The subject of this review is the £180 *132*, a medium size 'bookshelf' model that may be placed virtually anywhere as far as room boundaries are concerned (a little wall assistance could be beneficial). It's a simple two-unit closed box design, and our sample was supplied in a pretty unconvincing 'walnut' vinyl, but black is (of course) also available. Ours also came without a grille, though the *132* shares with all *Spirits* a very neat system originally seen on Linn speakers, whereby the cloth is held by a captive peripheral elastic band that sits unobtrusively within a groove between baffle and carcass and causes negligible acoustic interference. 'Neath the grille the baffle is a model of good taste and understatement - indeed we originally assumed that it was designed as a grille-less model, like some upmarket Celestions.

The *132* uses a 'full size' bass/mid unit with 165mm carbon-loaded polypropylene cone on a 200mm frame, driven by a 25mm voice coil. The tweeter is a ferrofluid-cooled soft cloth dome device. There are no electrical crossover devices in the bass/mid unit path, while the tweeter is fed from a second-order network, and all is hardwired. The response to our questionnaire claimed a 36mm cabinet thickness, which seemed unlikely from the all-up weight, and further investigation (not without difficulty, as main driver removal seems next to impossible) confirmed that 36mm refers to the elaborate MDF/chipboard 'sandwich baffle'. As with the cheaper *112* model, the remainder of the cabinet is constructed from conventional 15mm stock.

LAB REPORT

Sensitivity hits the average right on the nose on our assessment (debatable due to the stepped response), while the impedance graph trundles along at around 50ohms for much of the midband. Distortion levels are perfectly adequate, as is the 1dB pair matching.

The basic response curve lies within a respectable ± 3 dB limit across a wide band, but there is also a noticeable depression in the important region 200-500Hz. The 2m forward response set shows how the directivity of the largish bass/mid unit at the top of the range can leave the treble region somewhat exposed off-axis. The integrated room averaged response confirms both these observations, showing a slight 'three-humped' character that is slightly prominent in both upper bass and mid treble, and more so in the midband.

SOUND QUALITY

The listening panel wasn't too impressed by the sound delivered by the *132*s, though one reason might have been that they were upset by the effects of wall-mounting a speaker which is barely suitable for such a location. The *132* is in fact one of those compromise '1ft away' designs that are currently much in vogue but which (one could argue) end up falling between two stools and coming up covered in etc. etc.

The panel criticism was quite severe, one post-prandial panelist actually nodding off during the presentation. The main complaint was of poor basic integration, with adjectives like 'thrummy', 'niddy' and 'fizzy' tending to confirm the frequency balance characteristics, plus some 'boxiness' and muddle. Auditioned subsequently and sighted, I must nevertheless admit to quite liking the sound for its dynamic liveliness, in spite of some

boxiness and fierceness.

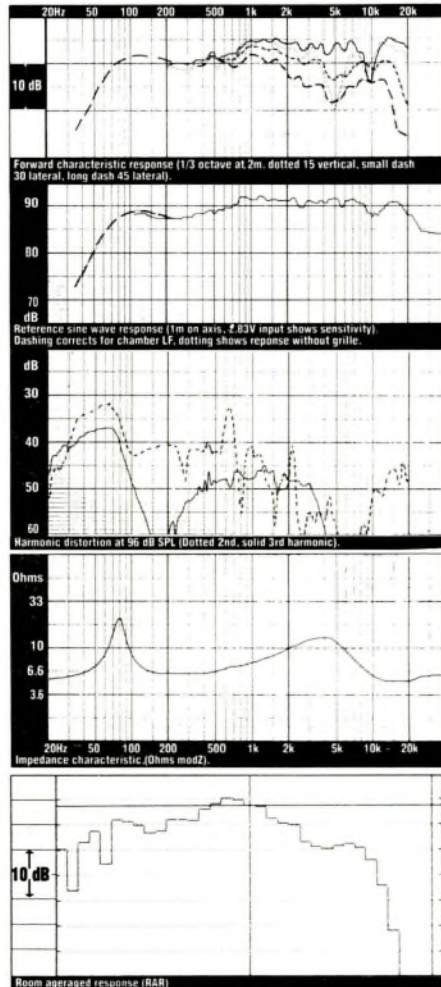
CONCLUSIONS

The basic ingredients of the *132* all look very positive, but the measured balance shows a characteristic which clearly upset the listening panel. Behind the balance lies a basically informative model that many will like.

TEST RESULTS

Size (height x width x depth)	44.5 x 23 x 25.5cm
Recommended amplifier power	20 - 80 watts
Recommended placement	on stands 1ft from rear wall
Frequency response (± 3 dB, 2m)	55Hz - 20kHz*
Low frequency rolloff (-6dB/1m)	50Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	adequate
Typical price per pair inc VAT	£180

* ± 5 dB limits necessary to accommodate 9kHz notch.



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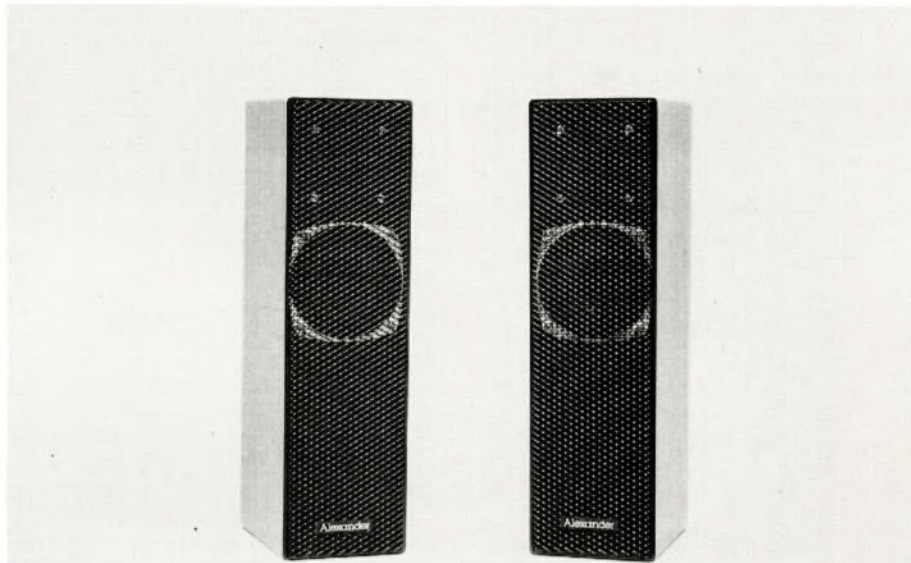


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I recently wrote about this loudspeaker in my *Personal Messages* column, and admit a personal liking for the design. But one point that arose from that coverage was that a loudspeaker can't be expected to deliver its true bass performance unless used on its own purpose-designed stands. Since the original stand was being changed as I wrote, I felt able to plead mitigating circumstances. And since neither old nor new stands were supplied for this review, it was inevitably impossible to assess the *Aurora* under optimum circumstances. But experimentation does suggest the central pillar stand is the best choice, and it's probably better to go for Alexander's own, as the enclosure shape demands a narrow top plate. To some extent negating compact dimensions that beg to be tucked away on a bookshelf, the *Aurora* needs free space siting.

The slim, fairly shallow but quite tall enclosure is black powder coated carbon steel throughout, the thickness varying between 3 and 12mm. A large diameter, deep port is set into the inset rear panel, and a very open weave metal grille is (more or less permanently) fitted. The whole mechanical assembly is undamped and inclined to 'ring' if struck, though the enclosed air volume has fibreglass fill.

Both sourced from SEAS, the bass/mid driver has a 100mm polypropylene cone on 25mm voice coil, and the tweeter a 25mm aluminium dome. The crossover is virtually non-existent, consisting of just a first-order feed to the treble unit, so it's surely an ideal candidate for fitting bi-wiring/amping terminals. One unit developed a rattle sometime during its travels, perhaps the crossover or wiring coming loose inside.

LAB REPORT

We estimate the *Aurora*'s sensitivity at a

somewhat below average 85dB/W, but the impedance characteristic stays comfortably above 6ohms and the bass extension is pretty good considering the small enclosure. Distortion levels are higher than usual, though the worst is at very low frequencies where information content is minimal, and much of the rest is comparatively benign second harmonic. The odd 'spike' at 200Hz is also seen on the frequency response at high writing speed, and could possibly be a grille resonance. The pair match is very close up to 9kHz.

The 1m reference response is reasonably well balanced overall, though with some unevenness not unlike a 'three-humped' variation. The 2m response confirms the rather 'lumpy' character but shows pretty good forward radiation consistency. The room averaged response is rather more promising in terms of midband smoothness, but still shows the rather exposed bass 'bump' seen in the anechoic traces.

SOUND QUALITY

The panel was a bit equivocal over the *Aurora*, though I was chuffed to find my own comments paralleled my 'sighted' observations of a few months ago reasonably well. Most approved the basically neutral overall balance, precise stereo imaging and good coherence while criticising a degree of 'cuppy' midband coloration.

But there was clear and unfudgable disagreement over whether the sound was dynamic or bland. My interpretation is that inherently good subjective 'speed' is a little obscured by a slightly depressed presence region.

Interestingly, the bass was consistently praised for its speed and clarity, and extension seemed more than adequate in the context of the market as a whole.

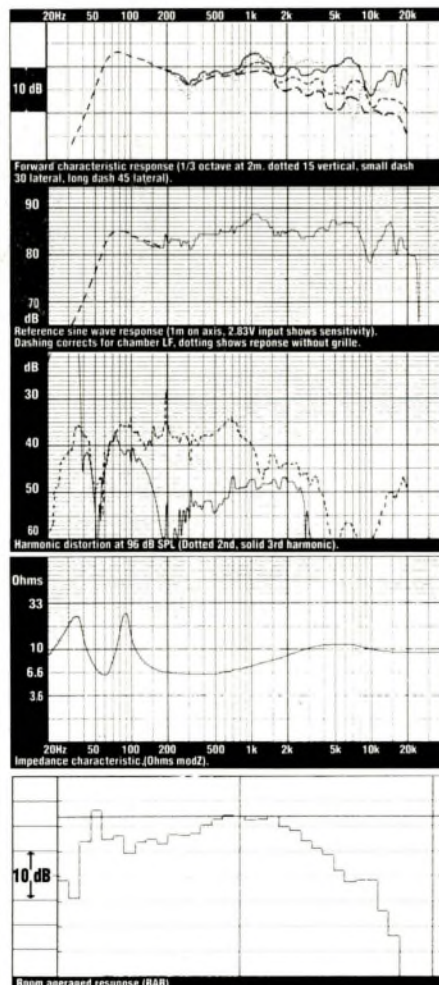
CONCLUSIONS

This Alexander is a bit of an oddball. It measures reasonably well but there is certainly some room for improvement. The sound is promising if a trifle unrefined, and the presentation is attractive and unusual. The price is perhaps a little high for formal Recommendation, especially if the cost of stands is added, but *Aurora* is certainly worth considering by anyone seeking something just a little bit different.

TEST RESULTS

Size (height x width x depth)	42.5 x 14 x 19cm
Recommended amplifier power	20 - 80 watts
Recommended placement	on matching stands in free space
Frequency response (± 3 dB, 2m)	45Hz - 20kHz*
Low frequency rolloff (-6dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£350

* ± 5 dB needed to accommodate unevenness.



ARISTON IMAGE

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Starting out as a turntable manufacturer, Ariston the hi-fi company is steadily moving into other specialist hi-fi areas. And I'm very glad to say it is no relation of the white goods manufacturer of the same name - whose infuriatingly effective TV advertising jingle goes on, and on, and on inside my head - or the new *Image* loudspeakers would never get a fair hearing.

Image is a medium size 'bookshelf' model that sells for £185, which is only marginally more than the equivalent models from traditional mainstream loudspeaker manufacturers. And as Henry Ford might have said, you can have it in any colour you like as long as it's 'black ash' vinyl.

The grille is a piece of reticulated foam, whose acoustic properties are as good as its aesthetics are bad - these examples have a shiny *patina* that shouts plastic from twenty feet away under the wrong lighting. Unfortunately the appearance with grille removed is also pretty prosaic. Siting should be on rigid stands at least 18 inches from any side walls.

The cabinet is built up from 15mm stock, with a 'figure-8' internal brace, and is reflex loaded by a narrow tube set into the rear panel. Both units are manufactured by SEAS: the bass/mid unit has a smallish 125mm polypropylene cone with 26mm voice coil on a 165mm frame; the tweeter is a 19mm aluminium dome affair. The hardwired crossover provides third-order slopes on each arm, and is fed from a single pair of socket/binders.

LAB REPORT

According to our estimate, the *Image* rates 87dB for sensitivity, but such a glib 'figure of merit' merely draws attention to its 'differentness' from many competitors. The 2m frequency response comfortably stays within

± 3 dB from 55Hz through to 18kHz too, but the shape within those limits is quite the obverse of many rivals - slightly prominent from 100-800Hz, slightly depressed above 1kHz. Given this particular characteristic, the response traces are pretty good on the whole, though clear space siting is clearly desirable.

Distortion stays pretty well under control, particularly at higher frequencies, but the impedance characteristic dips marginally below 40ohms in regions of power - it meets the '6ohm nominal' just about, but certainly sails closer to the wind than most, so a good quality amplifier is advisable. As expected, the grille has minimal influence on the proceedings, and the pair match is quite acceptable.

SOUND QUALITY

To say the *Image* was rated a little below average on the tests would be a very accurate half-truth. The panelists' reactions varied significantly, and directly according to the degree to which they were upset by the abovementioned balance 'shift' from the uptilt that seems to have become the norm, to the Ariston's 'downtilted' character.

In the first place, therefore, there was criticism of some 'thickness' and 'heaviness' from what was indisputably perceived as a small box. The balance is clearly 'laid back', and this tends to detract from the initial excitement factor. However, those that were able to come to terms with the balance praised the speaker for its fine three-dimensional stereo imaging and good mid-to-treble clarity and coherence. And it is certainly a sound which is better suited to the CD than the vinyl age (turntable manufacturer or not!).

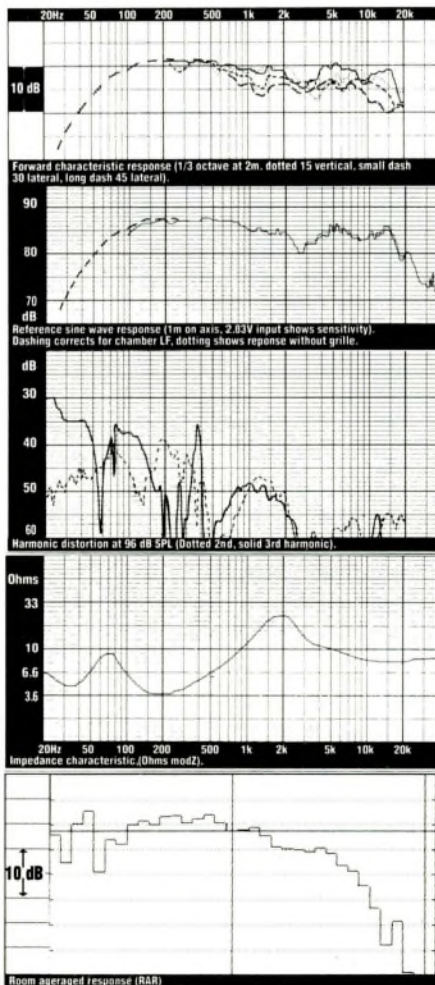
CONCLUSIONS

Under our listening conditions, the *Image*

was just a little too 'warm', 'rich' and distantly balanced to convince either the panel or myself. But it does have fine qualities lurking behind the balance, and could well prove the ideal solution for more aggressively balanced systems and/or rooms.

TEST RESULTS

Size (height x width x depth)	42 x 22 x 27cm
Recommended amplifier power	25 - 100 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	55Hz - 18kHz
Low frequency rolloff (-6dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	could be tricky
Forward response uniformity	good
Typical price per pair inc VAT	£185



B&W DM560

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B&W is one of the famous names of British loudspeaker manufacture, and has been hugely successful in export markets around the world. The company has its own research laboratories that are widely regarded as world leaders in acoustic developments and applied technologies, and has been responsible for many of the innovations that are now commonplace throughout the market.

Despite the dissimilar type number, the £200 DM560 is in fact inheritor of the famous mantle carried for so long by the DM110 – one of the most successful specialist loudspeakers ever. The price has crept up steadily over the years of course, but that is only a reflection of the marketplace, and presumably also reflects considerable detail refinement.

I would classify this a 'largish bookshelf' model, and tall and slim for the breed, though it really ought to be mounted well away from walls on open stands according to the explicit multilingual instruction manual. Finish is first class, with a most attractively textured and trimmed baffle beneath a plastic frame grille. The cabinet is trimmed in the standard 'black ash' vinyl, with 'walnut' as an option, and a fuse is fitted above the pair of socket/binders on the rear panel insert. A matching STA500 stand is also available, but was not supplied.

The enclosure is reflex loaded via a port that is part of the complex polystyrene baffle moulding. The basic cabinetwork is 15mm high density chipboard, with a further 12mm lining just behind the baffle. Both drivers are front mounted with a large number of quite small screws, covered by soft plastic trim.

The drivers are naturally of B&W's own manufacture. The bass unit has a cast frame and a generous 165mm diameter doped fibre cone, while the 26mm tweeter uses an aluminium magnesium alloy dome, thoughtfully

protected by a vestigial grille. The elaborate PCB network provides fourth-order acoustic slopes between the drivers plus a fourth-order vented low frequency alignment.

LAB REPORT

Sensitivity is a usefully high 88dB/W, so modest amplifiers should deliver good levels without strain. This is achieved despite good low frequency for the cabinet size, and with a reasonably innocuous impedance characteristic – it drops a bit low at 15kHz, but there's not much energy to worry about up there.

The response curves could be smoother and better maintained through the crossover region in particular. A loss of energy in the 2-7kHz region at 1m is confirmed at 2m off-axis and in the room averaged response. Pair matching and grille interference both show slight but fundamentally insignificant variations, while distortion is perhaps a little higher than might have been expected.

SOUND QUALITY

No member of the listening panel was particularly impressed by the sound of the 560s, and the overall rating fell a little below average. The overall balance was reasonably acceptable, and coloration pretty well controlled, but stereo imaging – described as confusingly inconsistent and 'phasey' with constricted depth – clearly upset some listeners. The midband sounded somewhat congested and muddled, while the treble quality was considered a little bit grainy and 'obvious'.

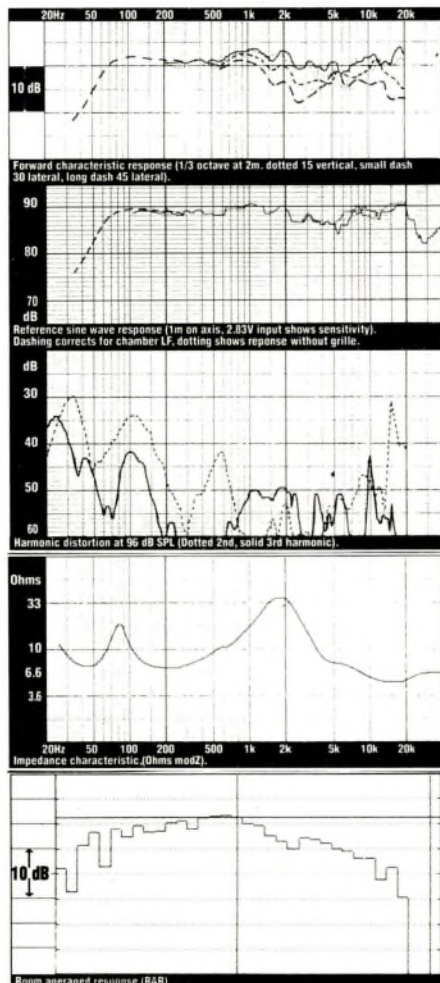
Subsequent listening did nothing to reverse the panel's verdict. The 560's sound is cosmetically quite acceptable, particularly from compact disc sources, but ultimately lacks the spark or magic that helps to raise the enthusiasm and maintain the interest of the listener.

CONCLUSIONS

Although the measured performance is a little rough around the edges, the DM560 looks to have all the right ingredients for a loudspeaker at its price. But it falls at the final fence as far as our listeners are concerned, perhaps through trying a little too hard to be all things to all men.

TEST RESULTS

Size (height x width x depth)	49 x 23.5 x 30cm
Recommended amplifier power	15 – 80 watts
Recommended placement	on rigid stands in free space
Frequency response (± 3 dB, 2m)	60Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	88dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	adequate
Typical price per pair inc VAT	£200



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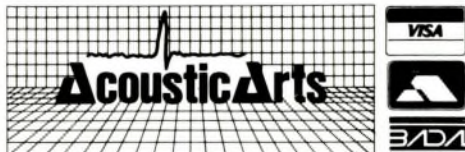
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Canton is a major West German manufacturer, unknown in the UK until Ortofon UK recently decided to import many of what is actually a vast range.

The £600 *Karat 60* is *Choice's* first Canton, and certainly doesn't look like any loudspeaker made in the UK. The bluff, squat lines, three-way driver lineup and not inconsiderable bulk look more like the sort of thing UK manufacturers might have produced a decade or more ago. Fashionable or not, it is at least different, and is attractively finished with radiused cabinet edges (for cosmetic rather than acoustic reasons) and good quality wood veneer.

Our samples came in the reddish mahogany veneer that seems to be the latest thing on the EC mainland and certainly makes a refreshing change from black ash vinyl. Back and baffle are both black, and the perforated metal grille glistens a little more than fabric types; we didn't detect any resonances, but couldn't figure out how to remove it without risk of damage to check its sonic influence. The unbraced sealed box is very solidly built, from 22mm MDF, with Rockwool internal damping.

This is very much a classic three-way box. Pulp cone 200mm bass and 37mm mid drivers are coupled to a high tech caesium/aluminium/manganese alloy tweeter, all arranged vertically in line. The recommendation is for bookshelf siting but free space looks (and sounds) the better bet. The crossover network is second order, crossing over at 400Hz and 4kHz, and has no bi-wire/amp facility.

LAB REPORT

Our sensitivity rating places the *Karat* at a generous 90dB/W, though this is at the expense of current-hungry 40hm impedance characteristic that demands decent ampli-

fier capability. The pair match is very good, and distortion stays consistently under pretty good control across the frequency range.

The frequency response traces show surprisingly modest bass extension and a slightly 'heavy' bass/lower mid region, some recession in the midband and presence regions and then a treble region elevated about 4dB above about 6kHz – not unlike the classic 'loudness' contour. The 2m response set shows good off-axis correspondence but a rather more 'lumpy' character through the presence region. Both this and the otherwise quite even room averaged response tend to confirm the excess treble and slight upper bass richness.

SOUND QUALITY

The slightly exaggerated 'large scale' *Karat* sound much impressed a panel which admittedly had just endured a string of the smaller, cheaper boxes. The slightly 'boomy' bass was recognised by all, and some also criticised the overbright treble as 'splatty'. But most regarded the balance as reasonably neutral elsewhere, with a nice open, articulate and expressive midband. The stereo image showed good transparency with reasonable depth and space, and the sound was quite dynamic and nicely coherent.

Subsequent sighted listening tends to confirm that this Canton is a lively performer that delivers a solid and impressive basic sound. But the balance does have a sort of 'loudness' character that is inclined to impress most on initial acquaintance, and the treble is a little too obvious, to the point where it could perhaps become irritating.

CONCLUSIONS

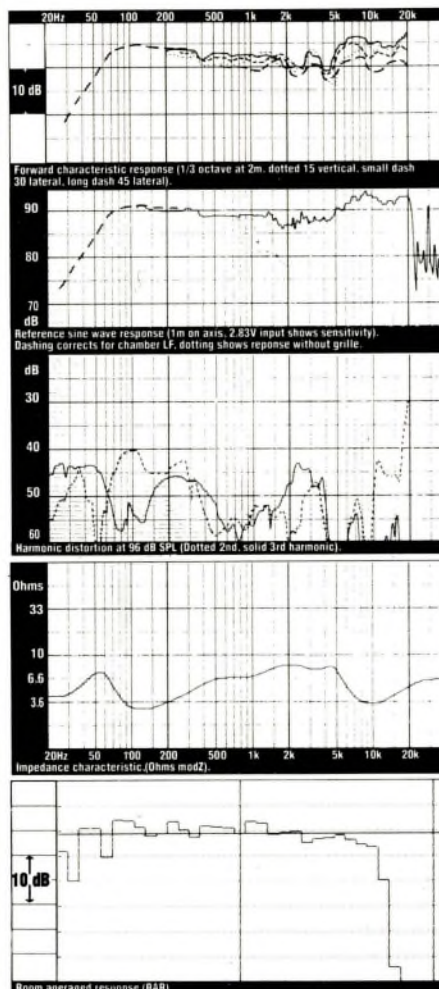
Although the ingredients fly in the face of current UK fashion, and even though the

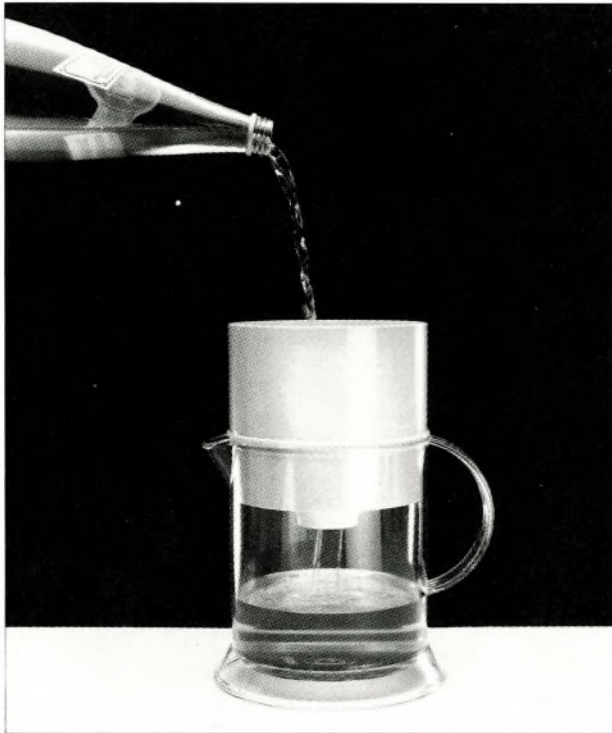
slight 'boom'n'tizz' balance did tend to stack the cards a little in its favour on the blind listening tests, I believe the *60 Karat* is a fundamentally honest design in engineering terms, and offers fine construction and finish besides. Though prospective purchasers should check their own reactions to the slightly obvious top end, Recommendation nevertheless is entirely appropriate.

TEST RESULTS

Size (height x width x depth)	58 x 31.5 x 31cm
Recommended amplifier power	15 – 150 watts
Recommended placement	on stands in open space
Frequency response (± 3 dB, 2m)	55Hz – 25kHz*
Low frequency rolloff (-6 dB/1m)	48Hz
Sensitivity (ref 2.83V-1W/0ohms; 1m)	90dB
Impedance characteristic (ease of drive)	current hungry
Forward response uniformity	good
Typical price per pair inc VAT	£600

* ± 5 dB necessary to accommodate treble rise





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CASTLE WARWICK

CASTLE ACOUSTICS LTD., SHORTBANK ROAD, SKIPTON, N. YORKS BD23 2TT. TEL: (0756) 5333.



Visit the Castle factory in Skipton at the gateway to the Yorkshire Dales and it's difficult not to believe yourself sucked back in time to a James Herriot world, such is the charming setting and gentle pace of life. But Castle is a long established brand with across-the-board manufacturing capability, known particularly as a cabinet specialist but producing in-house drivers as well.

The *Warwick* is new for Winter '88 and looks a most competitive proposition, not only matching competitors for size at £169 per pair, but also offering real wood veneers in place of the omnipresent 'black ash' vinyl. You get the choice of walnut, mahogany, (real) black ash, teak, oak, rosewood or yew, but I'm not guaranteeing the price on the last two options. Furthermore, the ported enclosure is veneered on all six faces, for those who prefer to leave off the grille.

The major difference between the *Warwick* and its contemporaries is something it has in common with the more expensive, long running *Durham*. This is the use of a smaller than usual main bass/mid driver – a flared pulp cone device with a 120mm cone on 160mm frame. Indeed, in many senses the *Warwick* looks like a cost-effective development of the *Durham*, though detail differences are numerous.

The carcass is a mixture of 15mm and 18mm chipboard, with MDF used for the baffle and with internal foam damping panels. The crossover operates around 3kHz, using second-order slopes and 'positor' driver protection. The tweeter is Castle's traditional 'annular' 30mm cone.

LAB REPORT

Sensitivity is a generous 88dB/W, with only mild compromise in low frequency extension, and none whatever in the benign impedance characteristic. Distortion is somewhat below

average, at both low and high frequencies, so maximum output may be a bit limited, but the protection should avoid any mishaps. Pair matching is acceptable.

The frequency responses are well ordered, if a little uneven through the upper mid/lower treble, with a small 'bump' just around and above 2kHz. The 2m set shows reasonable off-axis conformity, albeit to a slightly 'lumpy' characteristic, but the room averaged response is exceedingly smooth in comparison to the test group as a whole, lacking only in terms of low frequency output. The grille does interfere with the response, but not too severely.

SOUND QUALITY

Since most of the foregoing has built up a pretty positive picture of the *Warwick*, the listening tests proved a great disappointment, each listener rating the loudspeaker well below average, with quite good correspondence between the comments.

The problems did not seem to lie in the balance – which is perhaps just as well given the good measured room match. Instead there was universal condemnation of a 'soggy', 'sluggish' and ill-defined bass, and several criticisms of 'boxy', 'cardboardy' mid-band colorations. Dynamics too seemed somehow softened, and the speaker sounds if anything a little overpolite, at least at lowish levels. Then as soon as bass content at anything like a realistic level comes along, the difficulties seem to pervade the whole.

Further, sighted listening with a variety of mounting arrangements did lead to some improvement – Blu-tack coupling to a single pillar stand seemed preferable to a spiked open frame support – but the problems identified by the panel still seemed in evidence, if ameliorated to a degree. And ultimately the *Warwick* seemed unable to deliver a convinc-

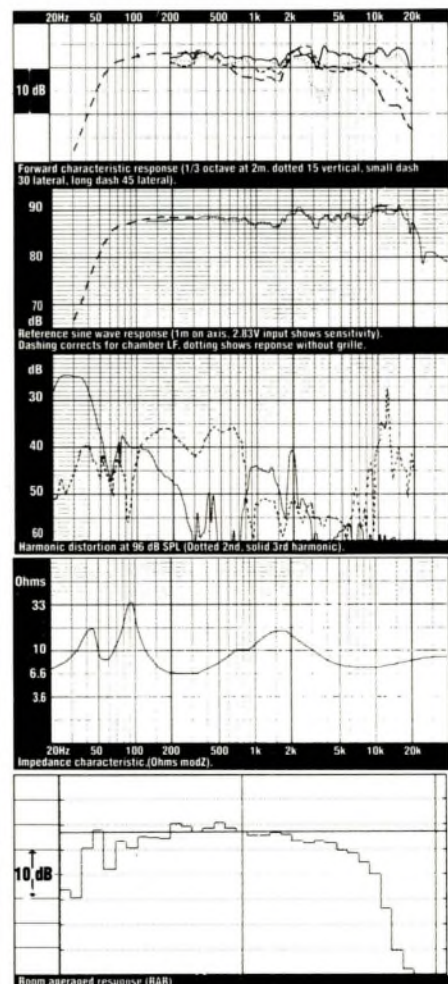
ingly energetic performance, even (or rather especially) when driven hard.

CONCLUSIONS

The *Warwick* remains something of a paradox, in that the lab test programme produced a reasonably positive set of results that were contradicted by the listening panel. Since further auditioning left me unable to overrule the panel findings, this potentially promising package must receive the sonic thumbs down, real wood veneer at a bargain price notwithstanding.

TEST RESULTS

Size (height x width x depth)	46.5 x 25 x 23cm
Recommended amplifier power	10 – 70 watts
Recommended placement	on stands 1ft from rear wall
Frequency response (± 3 dB, 2m)	60Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	50Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	88dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£169



CELEF CF1 CIRRUS

MARCEL AUDIO LTD., MARWAIN HOUSE, CLARKE RD., MOUNT FARM, BLETCHLEY, MILTON KEYNES MK1 1LG. TEL: (0908) 271818.



The Celef brand was a firm UK favourite at the beginning of the 'eighties, the redoubtable *Monitor* selling well over a long period – and bringing a new loudspeaker dimension to drinking straws by using them as resistive damping for the reflex port, a clever technique still practised elsewhere today.

Although the company's upmarket ProAc brand has still been available from a handful of UK outlets, most of Celef's recent output has been for export only. But now a marketing operation has been set up to bring a new range of competitively priced Celefs to the UK market. The range is named after clouds, even though the £180/pair *CF1 Cirrus* is neither fluffy nor white; *Nimbus* and *Stratus* sit further upmarket, but one wonders where they'll go after that – I can't somehow see a *Cumulus* catching on as a state of the art loudspeaker.

Cirrus is a conventional two-way bookshelf speaker, superficially almost indistinguishable from a dozen others at a similar size and price, though subcutaneously presumably enhanced by the undoubted skill of designer Stuart Tyler, whose ears are highly regarded in the industry.

£180 seems just a shade on the high side for what is fundamentally a simple two-way sealed box loudspeaker. But there are some redeeming features, notably the substantial 18mm thick high density chipboard cabinetwork, not to mention a pair of pretty gold-plated Michell socket/binders for rear panel connection. Recommended siting is neither here nor there – about a foot from a rear wall.

Basic build seems sound, albeit with some room for further tightening of the main driver screws. Finish is an innocuous, not to say anonymous, 'black ash' vinyl, and the grille has a rather thick frame, leavened by slight profile chamfering. Both drivers come

from Danish manufacturer Peerless, both have 25mm voice coils, while the bass/mid uses a 130mm polypropylene cone, the tweeter a 25mm fabric dome. The conventional PCB crossover network uses second- and third-order slopes on bass and treble feeds respectively.

LAB REPORT

The sensitivity is a lowish 84dB/W, which helps account for the high levels of distortion. However, don't expect to do too much damage to neighbours' sensibilities with this model, and do use a good quality amplifier, as the impedance hovers around 6ohms over much of the range. And despite these observations, bass extension is unremarkable.

The response shapes show a slight 'three-humped' appearance – a little prominent around 100Hz, 1kHz and 10kHz. The axial reference responses show several 3dB variations between the pair, particularly through the rather lumpy crossover region, and the grille too has more effect than might be desirable. The 2m responses show even more variation and unevenness, but the room averaged result suggests that the practical output may be rather better integrated than the anechoic responses suggest.

SOUND QUALITY

Cirrus was presented twice, once close to a wall, once in free space. The latter was generally preferred, but the speaker was still rated above average on both occasions. First and foremost the overall subjective balance was liked and *Cirrus* regarded as a good allrounder, combining respectable transparency and stereo imaging with good articulation and only modest levels of coloration.

Some criticism was directed at a slightly exposed top end, and an occasionally 'grumbly' bass. Complex passages did tend to

'clog up' the sound a little, but high level bass transients were handled with aplomb.

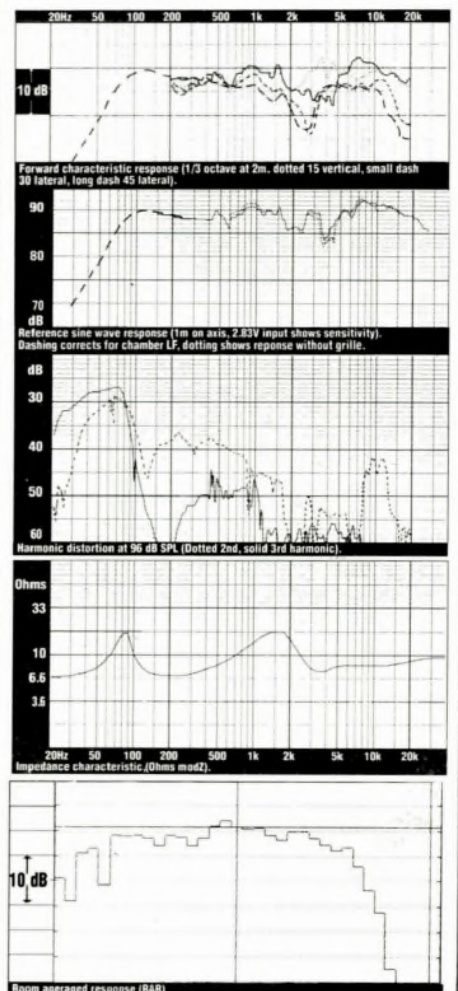
CONCLUSIONS

It's nice to see Celef back in the UK, and with what is clearly a competitive model on sonic grounds. The measured response unevennesses show sufficient room for improvement to mute our enthusiasm somewhat, but the listening panel delivers the ultimate thumbs up for Recommendation at a price which is fair enough, all things considered.

TEST RESULTS

Size (height x width x depth)	39 x 20.5 x 23cm
Recommended amplifier power	30 – 80 watts
Recommended placement	stands in free space
Frequency response ($\pm 3dB$, 2m)	70Hz – 20kHz*
Low frequency rolloff ($-6dB/1m$)	60Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	84dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	adequate
Typical price per pair inc VAT	£180

* $\pm 5dB$ limits to contain crossover region



CELESTION SL12Si

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



Celestion's *SL6* was one of the most influential loudspeakers of the current decade – the box that launched a hundred metal dome tweeters. Late '88 sees a major update to most of the range, which now sport *Si* suffixes, plus the introduction of the larger *SL12Si* reviewed here.

The cabinet volume is increased by 50 per cent, but the width remains the same and depth increased only marginally, so the new box presents a very different overall appearance. An additional bass/mid driver is added beneath the first, and this is designed to operate in tandem with the main bass/mid unit up to its 500Hz crossover. Each has its own 'sub-enclosure', though the isolation at DC is not as great as expected.

The loudspeaker is certainly reassuringly heavy, and very well built. The stands too are a model of simple self assembly, very professionally presented. Each driver has its special square alloy basket faceplate that fills (and determines) the width, and again adds to the impression of expensive quality.

The front grille has a decidedly thick and unchamfered frame which significantly compromises the acoustic performance. The box itself is built from medium density fibreboard (MDF), with 18mm baffle and 15mm carcass.

Drivers are Celestion's own, and similar to those used in all *SL* series models. Effectively identical – bass and bass/mid units have 130mm Cobex cones terminated in elaborate two-piece surrounds and driven from 32mm 16ohm voice coils. The tweeter is of course a metal dome – 32mm diameter aluminium to be precise. A complex crossover provides second-order low pass arms nominally turning over at 500Hz and 2.8kHz, and a third-order high pass at the latter too. Bi-wiring or bi-amping is available, Celestion providing two pairs of nice Michell type gold-plated screw-socket/binders.

LAB REPORT

The *SL* series has always had low sensitivity, and although the *12Si* adds a couple of dB, it's still 2dB or so below average. Furthermore, the impedance sits at around 4.5ohms over much of the lower midband, so a generously rated amplifier is doubly useful, and further encouraged by low distortion.

Notwithstanding the high tech drivers, the frequency responses are decidedly uneven. On the 1m reference response the 85dB sensitivity relates to 500Hz and represents a pretty fair average, but the whole area from 100-300Hz is more than 2dB. The 2.5kHz notch is certainly partly a function of our chosen measurement axis, and is less obvious off-axis at 2m. But it's still there, even in the room averaged response.

SOUND QUALITY

Whether consequently or coincidentally, the *12Si* proved a disappointment to the listening panel, and in fact suffered much the same affliction as the *Ariston Image*, which may be no coincidence since both share broadly similar response characteristics. The sound was dominated by the mid and upper bass over-richness.

The blind panel test procedure did not permit changes of stands as well as speakers (*HBS1s* were used throughout), so subsequent sighted listening was conducted on Celestion's own stand, with and without lead shot fill. Certainly this brought a significant improvement in the overall coherence, enabling the speaker to demonstrate some of its strengths to advantage – notably the stereo precision. But the over-warm balance remains, the bass still lacks precision and 'speed', and listening becomes something of an effort of concentration – rewarded by good mid and treble detail and definition, but an effort nonetheless. Compact disc was signifi-

cantly preferred to vinyl.

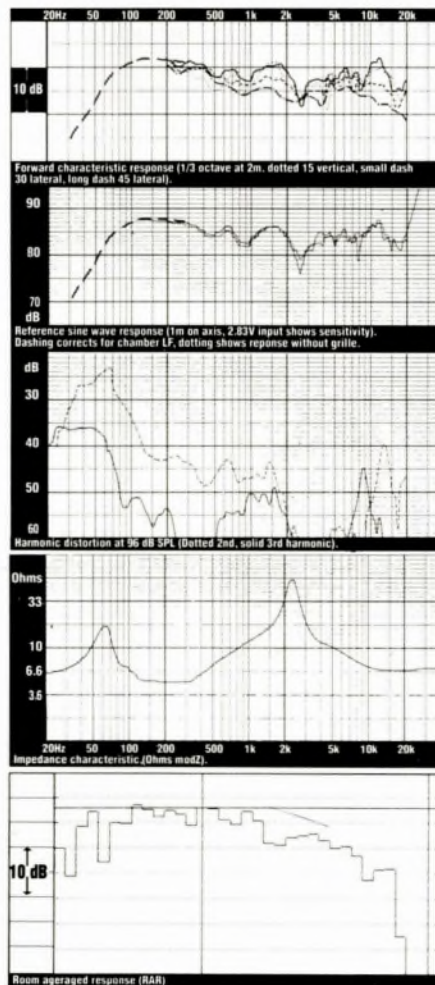
CONCLUSIONS

Had the *12Si* measured as well as a £600 speaker should, I would be tempted to excuse the disappointing auditioning results on grounds of system/wiring/placement/room incompatibilities (good speakers tend to be much more sensitive to such subtleties than cheaper models). But it didn't, so I won't, even though I'm sure there's a good loudspeaker lurking in there somewhere.

TEST RESULTS

Size (height x width x depth)	53 x 20 x 27cm
Recommended amplifier power	25 – 150 watts
Recommended placement	on matching stands well clear of walls
Frequency response (± 3 dB, 2m)	55Hz – 20kHz*
Low frequency rolloff (-6 dB/1m)	50Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	fairly good
Typical price per pair inc VAT	£580

* ± 5 dB limits needed to accommodate crossover notch



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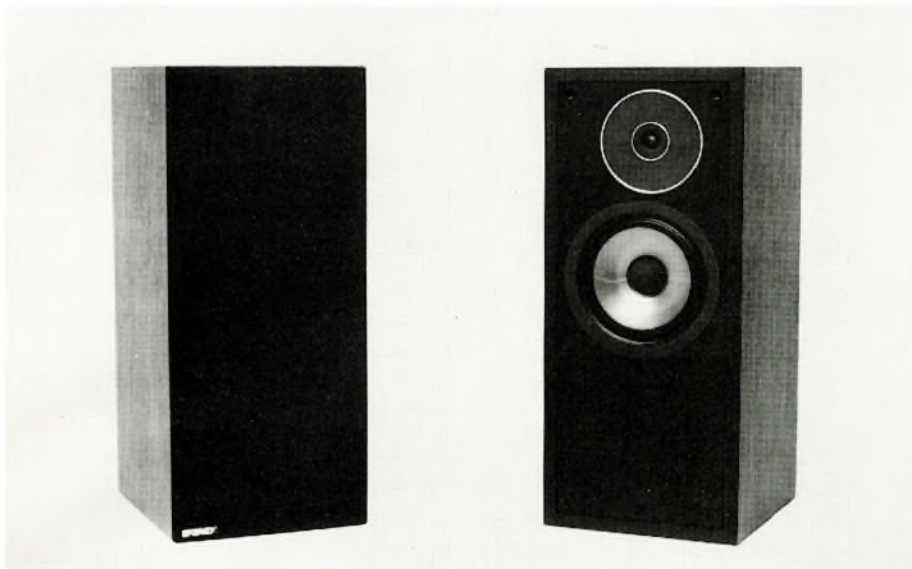
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ENERGY 22 PRO MONITOR

AUDIOFREAKS, 15 LINK WAY, HAM, SURREY TW10 7QT. TEL: (01) 948 4153.

RECOMMENDED



Canada is not a country normally associated with loudspeaker manufacture, but it looks as though Audio Products International Corp of Ontario plan to change that, with no fewer than ten different loudspeaker brands operating under its wing – the scattergun approach to niche marketing. However, I understand that the world's biggest factory for MDF (medium density fibreboard, a sort of machinable, fine grain chipboard) is sited nearby, which is a good enough excuse for setting up loudspeaker manufacturing in the area.

Energy is clearly a serious hi-fi brand, and the £600 *22 Pro Monitor* reviewed here is clearly a serious hi-fi speaker. It appears to date back to 1982, and has garnered a powerful reputation in various overseas markets, though this is its first UK appearance.

The box is biggish by UK standards, but quite sensibly shaped for stand mounting in free space. The package would be nicely finished too, were it not for a decidedly obvious 'walnut' vinyl finish on our review sample. We're told that a version finished in black is also available for UK buyers.

Reflex loaded by a small rear port, the enclosure is very solidly built from 19mm stock with extensive bracing and fibreglass fill. A thickish grille frame is at least chamfered to minimise its acoustic interaction, and the tweeter is slightly offset to spread baffle edge discontinuities – a nice touch, particularly as the loudspeakers are left and right handed, which is the correct way to do this.

The bass/mid driver is a decent size (150/190mm) polypropylene cone unit, while the tweeter is an unusual cone/annulus combination made of doped Egyptian cotton; both are made in-house. The conventionally wired crossover uses second- and third-order slopes.

LAB REPORT

Sensitivity rates a straight 87dB/W average, somewhat compromised by a current hungry impedance characteristic but compensated by rather better than average bass extension. Distortion is pretty well controlled but the grille is better left off and the pair match might have been tighter.

The 1m reference response shows a mildly 'kicked up' bass and mildly depressed presence region (2-5kHz) but quite good control elsewhere, while the 2m off-axis set shows very good overall integration given the size of the enclosure. These characteristics are further confirmed in the room averaged response.

SOUND QUALITY

The panel liked the Energy 22, with the sole exception of yrs trly. And I'm both allowed and in the position to change my mind, which I have. The basic sound is attractively open, dynamically impressive and generous in scale, with good stereo and focus besides. The upper bass is a little coloured and a bit too strong even in the largish listening room used for the tests, so those with smaller rooms should be a little cautious about system and room interaction. And the slight lack of presence energy does leave the upper treble a shade 'exposed' – but then it's quite a nice treble to leave slightly exposed (if you've got it, flaunt it!).

CONCLUSIONS

This is a difficult model to sum up. I tend to avoid comparisons, but inadvertently packing one Energy 22PM in the Monitor Audio 352/MD carton and vice versa made the contrast in price (between the same size box made in real wood in Cambridge at £300 compared to the £600 cheap plastic wrap shipped

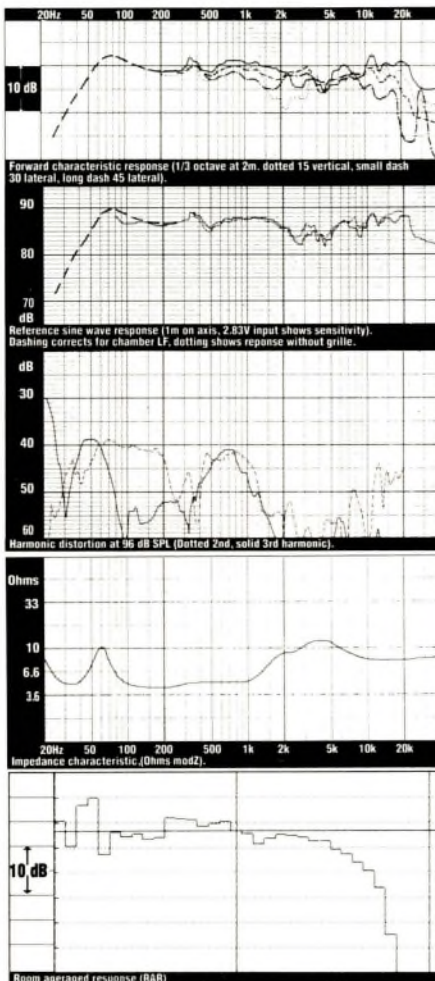
over from Canada) all the more obvious.

But I must also acknowledge that the superior sound of the Canadian model does much to make up for the apparent value difference. Save for urging some caution over the bottom end room match, and pointing out that the *22 Pro Monitor* doesn't look like a £600 loudspeaker, the sound is more nearly all things to all men than the vast majority of designs, and consequently deserves Recommendation on subjective grounds alone.

TEST RESULTS

Size (height x width x depth)	62.5 x 27 x 30cm
Recommended amplifier power *	15 – 100 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	40Hz – 20kHz*
Low frequency rolloff (-6 dB/1m)	40Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	current hungry
Forward response uniformity	very good
Typical price per pair inc VAT	£600

* ± 4 dB necessary to accommodate unevenness



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ENERGY 22

The Energy 22 Pro Monitor has been hailed by critics as one of the major loudspeaker design breakthroughs of the last decade.

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Comments from Top Reviewers about the Energy 22:

High Fidelity – USA

Energy has acquired quite a reputation, recently aided by the National Bureau of Standard use of Energy 22 loudspeakers in its test of the CBS Copy Code system. And the company has seen fit to make some distinct improvements in what was already a fine product.

Sound – Canada

The Energy Model 22 may very well be the best bookshelf speaker we have ever heard at any price. It deserves the highest praise indeed.

Sound RTE – Switzerland

Immediately apparent was the fresh, well-balanced sound character . . . With piano music it sounded free and open, beautiful and full. Violins were reproduced with mellowness and silkiness . . . its openness when reproducing orchestral string passages was considerable . . .

The fact that the Energy Pro Monitor can out-perform more expensive and more voluminous boxes in many applications is a great achievement.

Hifi Sound

Why beat around the bush? This pair of Energy 22 Reference Connoisseur loudspeakers was not just lent to us by the manufacturer, we own them . . . The response of this speaker is equal to the best we have ever tested . . . the very wide range is one factor which influenced our choice. The second is the sheer beauty of the music that comes out of this speaker. The detail is truly superb. The depth and stereo image are as good as we can recall hearing from any loudspeaker.

Australian Hi-Fi

The Energy 22 is an exceptional loudspeaker with a performance level totally out of proportion to its size . . . One thing was obvious – the Energy 22 had excellent treble dispersion characteristics, both horizontal and vertical . . . The stereo image was ultra precise and stable with no wandering at the crossover frequency . . .

Ace International

Audio Products International has scored a notable international success with its Energy 22 loudspeakers. Here we look at how a US\$500,000 R&D budget was deployed to achieve design breakthroughs – including outstanding sound stage recreation.

Sound – Canada

In the double-blind mono tests conducted in the lab the Energy Model 22 was a real knockout. The speaker made it all the way to our final listening round (number 9!) where it was pitted against the best of our last dozen bookshelf speakers. Judged by three veteran listeners, the Energy Model 22 easily defeated all comers and walked away the clear winner.

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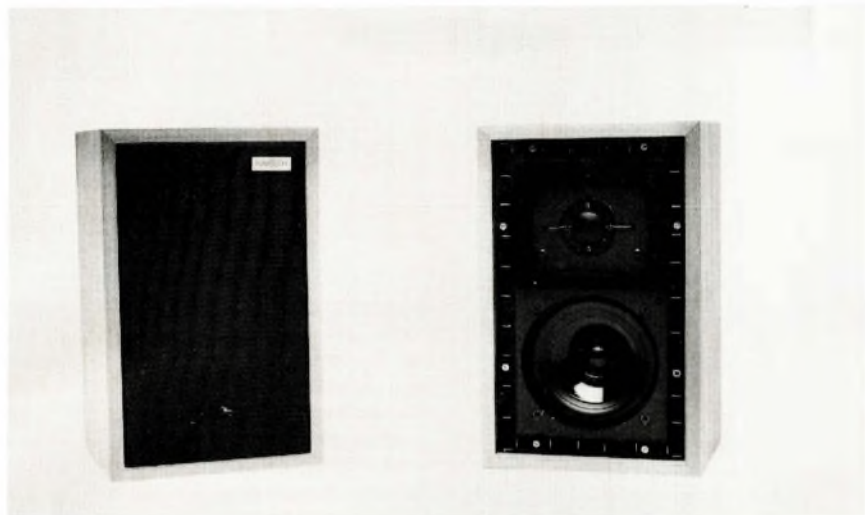
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ENERGY 22

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HARBETH LS3/5a

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This diminutive £300 BBC designed model has now been in continuous production from several manufacturers for at least fifteen years, and is widely recognised as a classic of its type. *Choice* has assessed the *3/5a* a number of times over the years, but the reason for this replay of Harbeth-made samples is that the design has just been updated, to accommodate inevitable changes in the availability of materials.

This is something of a heresy, given the BBC design philosophy that a *3/5a* bought new today should match one purchased a decade ago. (Indeed it's arguably harder to go on making a loudspeaker that sounds consistent than to keep on 'improving' a design.) But the new bass/mid driver with PVC surround has been mated to an all new crossover to minimise any subjective change.

The basic configuration of the *3/5a* has remained constant. It's a tiny and very rigid sealed box, built in thinwall (9 and 12mm) birch ply instead of the usual particle board variations, and is veneered in real wood (teak, walnut, rosewood, black, from £300), with bituminous damping pads for the panels plus foam fill. The good quality grille is carefully integrated with a thick felt tweeter 'blanket' to control distribution.

The bass/mid unit is a small 110mm unit with doped bextrene cone, the tweeter a 19mm plastic dome, both made by KEF. An elaborate, high quality crossover provides substantial equalisation, trading sensitivity in order to get some vestige of bass extension from the small enclosure volume. Outside broadcast vans apart, the recommendation for siting is in clear space, on highish rigid stands; smaller rooms with fairly well damped acoustics probably work best.

LAB REPORT

The *3/5a* has always been resolutely insensi-

tive, 81dB/W being our estimate from the slightly uneven 1m reference response. The impedance is easily driven, but loudness is limited by cone excursion and distortion considerations – our 96dB harmonic distortion sweeps are clearly close to the maximum. The pair match is pretty close, while the grille has a significant influence – but on balance probably a positive one from the response point of view, and definitely so aesthetically.

The basic response is balanced enough, though there is something of a bass 'bump' from 100-200Hz, some prominence around 1.5-3kHz and some treble unevenness, all remaining within fairly close overall limits. The 2m set and room averaged responses confirm the unevenness around 2kHz but are exemplary elsewhere, the latter showing surprising bass extension.

SOUND QUALITY

Though the panel appreciated many of the traditional virtues of this design – fine stereo imaging, good overall balance and generally low coloration – several listeners also reacted strongly against the overall sound on grounds of 'speed' and clarity and a general loss of the 'excitement quotient' in music. No-one seemed particularly happy with the bass either, which lacked real foundation and sounded a bit 'plummy' and ponderous. Dynamic range and power handling are, of course, limited.

Out of interest tinged with concern, I unearthed my decade-old pair of *3/5as* for comparison, and in the established tradition of soap powder commercials would not swap new for old. I can't check the older one's responses and so on, but the sound is cosmetically as similar as any two loudspeaker pairs are likely to be. However, the new one sounds a little 'reedy', lacking some body –

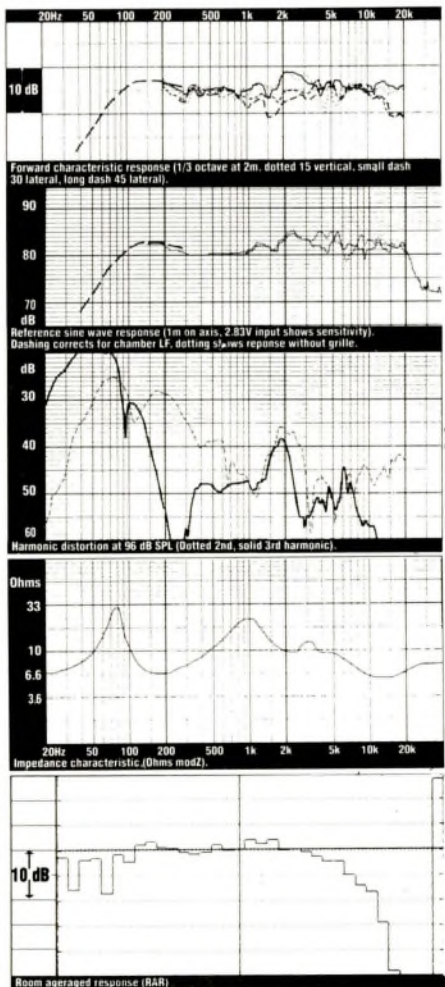
and more seriously for me, most of the 'boogie factor'.

CONCLUSIONS

I can't argue much over the measured performance of the current *LS3/5a*, but I have to remain somewhat unconvinced about its sonic performance, given the panel's findings and my own subsequent auditioning. Nevertheless it remains a worthwhile 'niche' product, providing unusual accuracy and stereophony in an ultra compact package at a reasonable enough price.

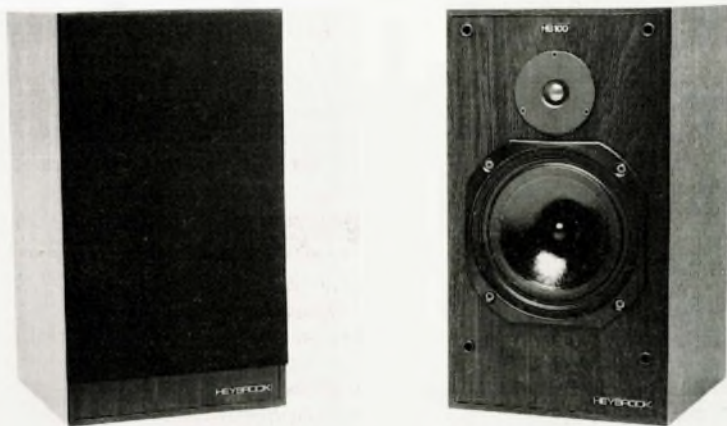
TEST RESULTS

Size (height x width x depth)	30.5 x 19 x 16cm
Recommended amplifier power	25 – 70 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	80Hz – 20kHz
Low frequency roll off (-6 dB/1m)	60Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	81dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	very good
Typical price per pair inc VAT	from £300



HEYBROOK HB100

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



There's been quite a flurry of new model activity from the West Countrymen at Heybrook lately. Earlier in '88 saw the introduction of the *Point Five* and *Point Seven*, slotting in below the long established *HBI*. Now the £250 *HB100* reviewed here comes in as part of a threesome that effectively replace the *HB2* and its successors at above £200.

The *100* is a largish 'bookshelf' model that shouldn't be placed anywhere near books or shelves, but which does demand a rigid stand close to a rear wall – no compromise 'in between' positioning here! Our samples came in a textured 'rosewood' vinyl that was more than halfway convincing (which makes a pleasant change). The grille frame is a little thick, though chamfered slightly in profile, while the 'wood' finish is perpetuated on the baffle for those who prefer to leave their clothes off.

Finish and build is to a high standard throughout. The sealed box enclosure carcass is built from 15mm stock while the baffle is made from thicker 18mm chipboard and the whole reinforced by a horizontal 'figure-8' brace, and damped by bituminous pads – a touch of luxury at this price.

The crossover network is as minimalist as possible, relying on the natural mechanical rolloff of the bass unit and feeding the tweeter via a single capacitor and resistor – both of good quality, as is the internal wiring. The rear panel carries two sets of terminals to permit bi-wiring connection.

The 'full size' Elac 200mm bass/mid unit has a 160mm doped paper cone and 32mm voice coil; a *Cobex* 'phase plug' protrudes in place of the normal dust cap, with the intention of smoothing the out-of-band rolloff. The tweeter is a SEAS 19mm aluminium dome.

LAB REPORT

Sensitivity is around 86dB, just a shade

below average, while the impedance characteristic is relatively benign, dropping gently to around 4ohms at very high frequencies. Pair matching is close enough, the grille influence is minimal and distortion stays under reasonable control.

The basic 1m frequency response looks very promising, with a smooth gently rising characteristic that should tie in well with wall reinforcement at low frequencies; marred only by a tweeter notch at around 10kHz. The 2m forward response envelope is rather more ragged, particularly above or well sideways of the main axis, but remains in reasonably good order. The room average trace looks pretty good, if a little prominent in the midband and the upper treble.

SOUND QUALITY

The above average overall rating disguises some significant polarisation of opinion amongst the panelists. For some the *HB100* offered some real magic in terms of 'speed', dynamics and 'openness', the sound being notably uncongested even though strict accuracy was a little compromised: "treble could be 'more accurate/transparent'... but what the hell", noted one listener.

Those who were less enthusiastic complained of a 'middy' balance, and certainly the subjective bandwidth is a trifle constrained. But playing the *HB100*s in the background whilst writing this review, I find myself very reluctant to switch them off and go and look for the next object of criticism. They are fundamentally more involving and informative than the run of the mill, notwithstanding some minor rough edges.

CONCLUSIONS

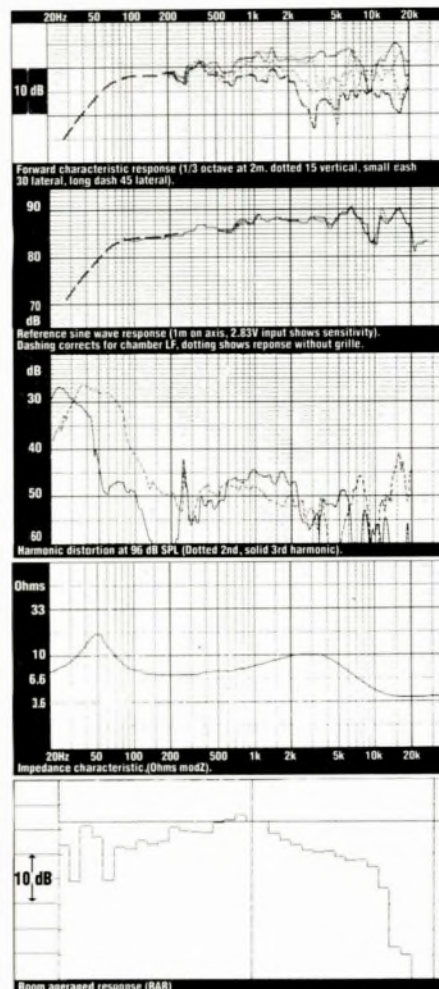
The question that needs addressing is whether the *HB100* offers sufficient advantage to justify its extra cost over the many

slightly smaller models that cost £70-80 less. And in my view the answer is most definitely yes. It isn't enough of a camel to appeal to a committee of different tastes, and strictly speaking the rating should perhaps be confined to Recommendation. But, to quote one panelist, what the hell – I shall exercise reviewer's prerogative and award a Best Buy, for anyone seeking an articulate and informative design that sits conveniently and effectively back against the wall.

TEST RESULTS

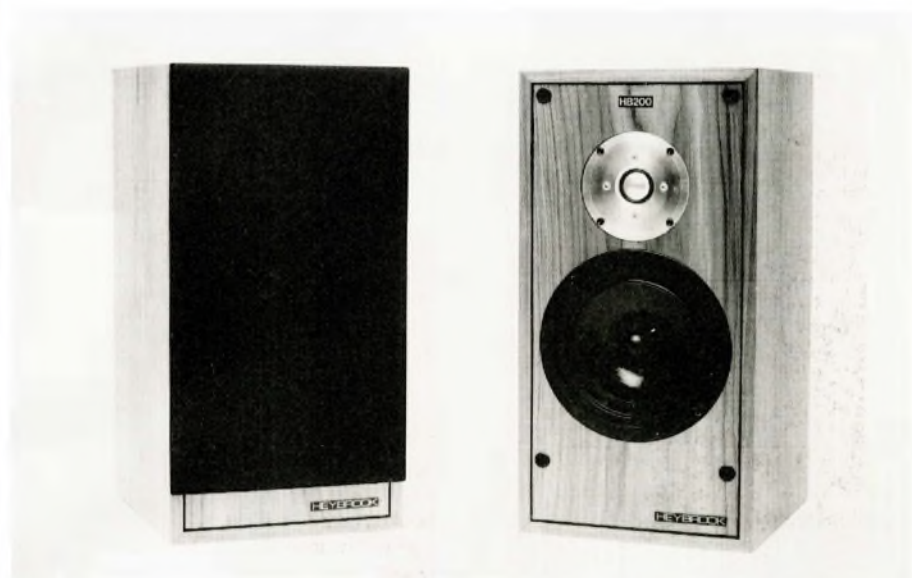
Size (height x width x depth)	47 x 26 x 28cm
Recommended amplifier power	20 – 80 watts
Recommended placement	on stands near rear wall
Frequency response ($\pm 3dB$, 2m)	55Hz – 20kHz*
Low frequency rolloff ($-6dB/1m$)	50Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	86dB
Impedance characteristic (ease of drive)	fairly good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£250

* $\pm 5dB$ limits necessary to accommodate treble notch



HEYBROOK HB200

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



West Country hi-fi manufacturer Heybrook is still at heart a loudspeaker specialist, despite forays into turntables and amplifiers. New models have been introduced rapidly over the past year or so, first with junior *Points* models coming in below the long-standing *HB1*, and now two new middle market models to bracket the *HB150*.

The £369 *HB200* is the most expensive of these, taking over the mantle of the original *HB2*, and has a number of luxury touches (like real wood veneer, metal dome tweeter, bi-wire crossover) over the less expensive *100* also reviewed in this test group. The two models look very similar in isolation, though the *200* is slightly the smaller, and uses a twin-port reflex type cabinet in place of a sealed box.

One of the hazards of inviting loudspeaker designers onto listening panels is their habit of bringing along the latest prototype in the boot of the car. In the case of the *HB200*, Heybrook's Peter Comeau brought 'production' replacements for the 'prototypes' we had measured in the chamber, and then departed with the originals before we could carry out comparative measurements on the two samples for purposes of correlation.

Heybrook's own data suggests that the second samples have 1dB less output from 2-4kHz, and 1.5dB more from 8-20kHz, giving a flatter overall treble. Note that our anechoic measurement traces refer to the original prototype, and the room averaged response to the second sample, which was used throughout the auditioning.

Such procedural problems out of the way, the *200* is a pretty little box of the 'medium bookshelf' variety, but follows the established Heybrook tradition of requiring decent stands and near to rear wall siting. It is available in either walnut or black ash veneers, over 15 and 18mm high density chip-

board with bitumenised damping pads. The rear mounted ports act as bracing for the baffle.

The bass/mid driver is a 130/170mm unit with a wide surround, a large 32mm voice coil and a doped paper cone with Cobex phase plug centre, the latter helping allow the unit to be used without any electrical crossover. The treble unit starts out as the Elac aluminium dome, substantially modified mechanically and acoustically by Heybrook, and fed via a third-order network.

LAB REPORT

Sensitivity is a little difficult to judge, given the nature of the 1m reference response, but round about average is a practical equivalent, given a little wall assistance, and the impedance should be easy to drive too. Distortion is adequate, given the compact dimensions. The grille influence is pretty innocuous, if still better left off - though note that the tweeter dome has no grille and is vulnerable to prying fingers.

The 1m response shows a smooth enough overall trend, but is rather lumpy within that trend. At 2m the lumpiness seems to become slightly worse, though the overall set across the measurement 'window' is impressively tight. The room averaged response is pretty smooth through mid and treble, but with some apparent loss of energy in the upper bass/lower mid. The pair match is fairly close.

SOUND QUALITY

Sonically the *HB200* split the panel into pro and anti camps. The sound certainly lacked warmth and tended to give a 'hard' presentation, while the treble is very detailed though also rather obvious. Information delivery is high, and the sense of rhythm and timing impressive, but the imbalance did upset

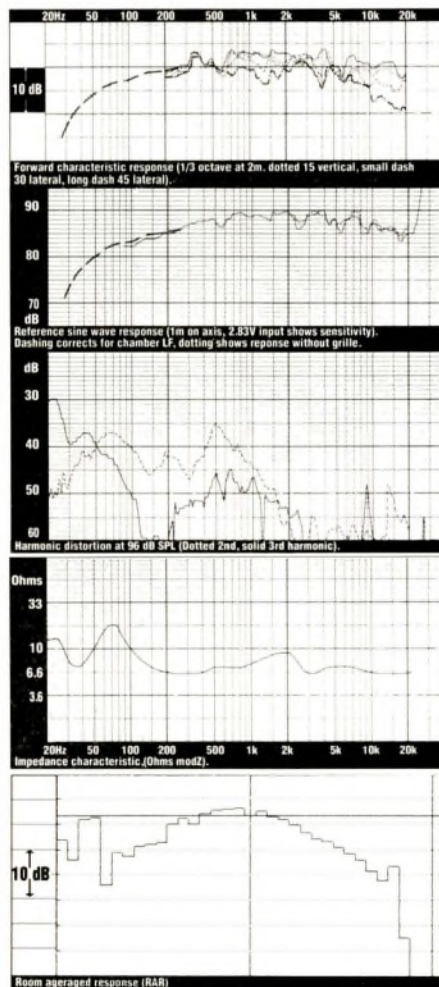
some listeners, leaving some upper mid coloration exposed and prejudicing stereo depth. There was some preference for vinyl over CD with this model.

CONCLUSIONS

The *HB200* shows considerable promise, but also room for some further refinement. Our findings suggest that room matching can be somewhat unpredictable, as can listener reaction, but it is nevertheless an interesting model that some will favour.

TEST RESULTS

Size (height x width x depth)	46 x 23 x 26cm
Recommended amplifier power	20 - 100 watts
Recommended placement	on stands against rear wall
Frequency response (± 3 dB, 2m)	80Hz - 20kHz
Low frequency rolloff (-6 dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	good
Typical price per pair inc VAT	£369



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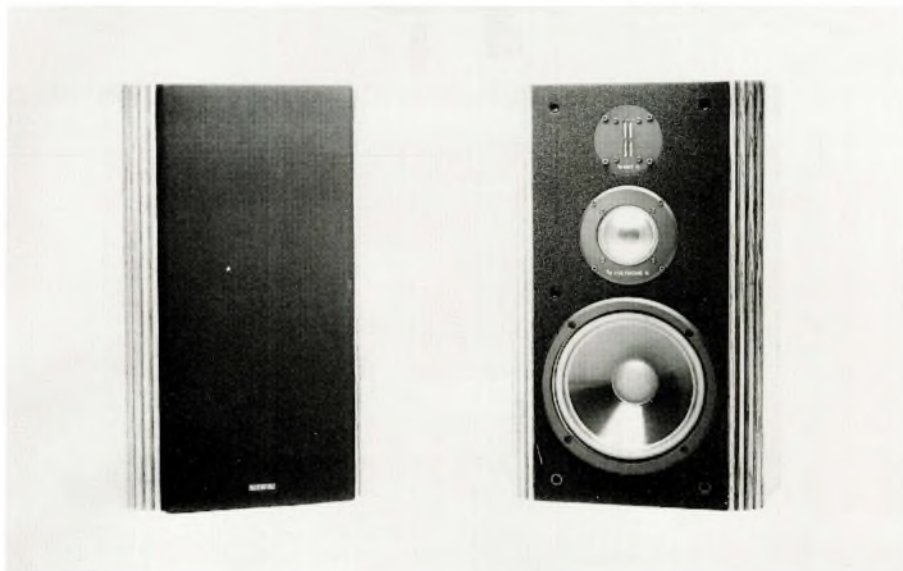
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American loudspeaker giant Infinity's four(!) distinct ranges start with four *RS* models and lead on to six upmarket *Kappas*, the £695 *6 Kappa* being the least expensive of an imposing range which features multiple 'high-tech' driver arrays and unusually assertive cabinetwork.

Infinity regards the *6 Kappa* as a bookshelf model – proof positive of the aphorism that Britain and the US are two countries divided by a common language. By UK standards it's a pretty large box, the more so because of its wide and shallow, bluff appearance.

The cabinet has a high quality, heavily figured oak veneer on top and sides, with santos as an option. The baffle has an anti-reflective fibrous finish and radiused edges to distribute diffraction effects, the latter turned into a strong styling feature with pronounced hardwood ribs. The quite thick, plastic frame grille stands well proud of the baffle and has chamfered profiles. Internally braced high density particle board of 19mm and 25mm thickness makes up the carcass and baffle.

Each of the drivers has its own little bit of technohype. The 210/235mm bass unit has a very stiff, graphite-fibre-loaded polypropylene cone, while the midrange has a very large (8.5cm) peripherally driven, dome, also poly/graphite composite, looking like a giant tweeter. The tweeter is an EMIT planar type, not unlike a ribbon unit. The three-way network has 12dB/octave slopes, at nominal 800Hz and 4.5kHz crossover points, and is fitted with level controls for mid and treble output – a feature still beloved by the American consumer, despite the inevitable compromise involved.

LAB REPORT

Our sensitivity rating is a rather below aver-

age 85dB, and the impedance dips below 4ohms and stays pretty low, so an amplifier with some power in reserve is suggested, particularly if the *Kappa's* substantial loudness capabilities are to be exploited – and providing you can listen past the surprisingly high distortion levels we measured.

Controls set 'flat', the responses are dominated by the 7dB bass bump at around 70Hz, which suggests the *Kappa* must be sited away from walls and preferably in a large room. But for the rest of the range the traces confirm good engineering with fine forward integration across the listening window. The room averaged response confirms the bass 'bump' and is a little short of energy through the midrange below 1kHz. Pair matching is good.

SOUND QUALITY

Presented on stands in free space, the listening panel was pretty enthusiastic over the *Kappa*, though not without some dissent. Undoubtedly there was some relief at hearing a 'full scale' sound amongst a group dominated by much smaller boxes. The exaggerated bass level was quite audible as warmth and richness, but was not generally disliked qualitatively. Indeed the overall balance was well liked, if a trifle 'thinned' and 'laid back', and vocal registers were well handled, at least on simple material.

Coloration is well controlled, but there was some complaint of 'slowing' and poor leading edge differentiation, and this was later confirmed in subsequent sighted experimentation. Although we don't have measurements to confirm the effect of the contour controls, even at maximum mid and treble settings the *Kappa* remains determinedly sleepy and soporific and consequently the chosen programme seems reluctant to grab one's attention.

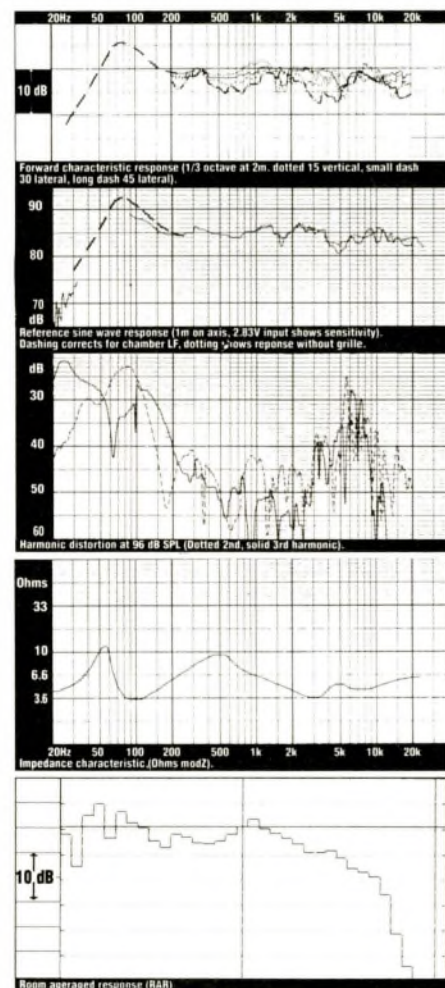
CONCLUSIONS

Despite the upfront and high tech presentation, the *6 Kappa* is quite a warm and cuddly loudspeaker, and in fact sounds surprisingly close to the British/BBC type monitor sound in some respects. Fine for those with large rooms who like a laid back sound, it nevertheless lacks the ability to convey drama and emotion with any real conviction.

TEST RESULTS

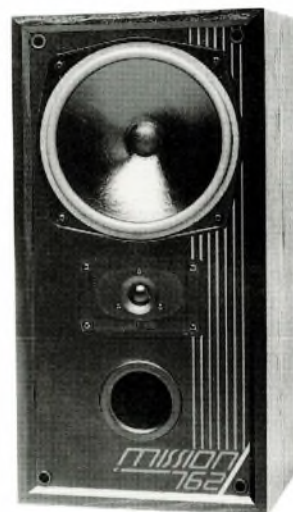
Size (height x width x depth)	63 x 38 x 24cm
Recommended amplifier power	20 – 200 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	40Hz – 20kHz*
Low frequency roll off (-6 dB/1m)	35Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	tricky
Forward response uniformity	very good
Typical price per pair inc VAT	£695

* ± 5 dB necessary to accommodate bass 'bump'



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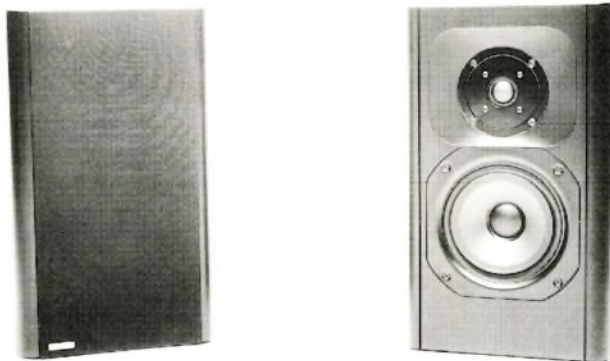
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JAMO CONCERT II

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Jamo is a successful Danish manufacturer whose products are imported into the UK by Goodmans. Hitherto the brand has been firmly targetted at the headbanging community – those who assume that more (drivers), bigger (boxes) and louder (noises) means better. However, the *Concert II* clearly comes from a different planet than the ritzy, glitzy PA lookalikes we've come to associate with Jamo. It's quite small, perfectly formed and finished, has only two drive units, carries a far from cheap £240 pricetag and is described as an 'audiophile speaker system'.

In fact it's an attractively finished two-way 'bookshelf' model in a pretty deep red wood veneer. Heavily radiused baffle edges reduce the visual impact, and a slim, removable metal frame grille of promising acoustic properties is gripped by magnets secreted beneath the baffle trim. The cabinet is physically solid, being built from 21mm stock, and the enclosure is reflex loaded by a rear mounted cardboard tube. No details were available on the drivers and internal engineering, and access was impeded by the nonstandard socket head fixing screws, though heavy gauge multistrand wiring links the drivers internally. The bass/mid unit has an effective 125mm cone made from some sort of plastic, while the tweeter is a 25mm soft dome unit.

Although the manual starts off, "place the speakers on a firm base, more than 5cm from the rear wall", with hindsight (and the measurement data) the *Concert II* is clearly better balanced for free space siting. This is a point the brochure would do well to clarify.

LAB REPORT

The 85dB/W sensitivity is quite low by today's norms. Furthermore the impedance plot shows that the load drops to a lowish 40hm

minimum in the important crossover region, though the rate of change here is fairly gentle. Although the basic shape is flat enough, the various response traces all show mild but consistently noticeable 'boom'n'tizz' characteristics – a little heavy in the 70-200Hz upper bass and with a gently rising treble too.

One by-product of the lowish sensitivity is the well extended bass: -6dB down below 50Hz is low for this box size. Pair matching is good, and the grille has an almost negligible effect on the measured response. Distortion is low, particularly considering this speaker is working pretty hard for 96dB output. And the overall forward response set shows good driver acoustic integration on and off axis, especially round the critical crossover region.

SOUND QUALITY

The *Concert II* was not a roaring success with the panel, though it escaped serious censure and rated a little below average overall. The most common complaint was that the sound was rather bland, lacking in convincing dynamics and not very interesting to listen to.

The bass is slightly 'grumbly' and isolated, lacking impact and 'speed', while the extreme treble is also a little too pronounced subjectively – the adjective 'squeaky' crops up a couple of times in listeners' notes. The midband is clearly the best bit, decent coherence and balance confirming the good crossover network integration, though even here clarity and warmth could have been greater. One listener described the overall sound as 'saccharin', and certainly there is a slightly syrupy quality to the whole.

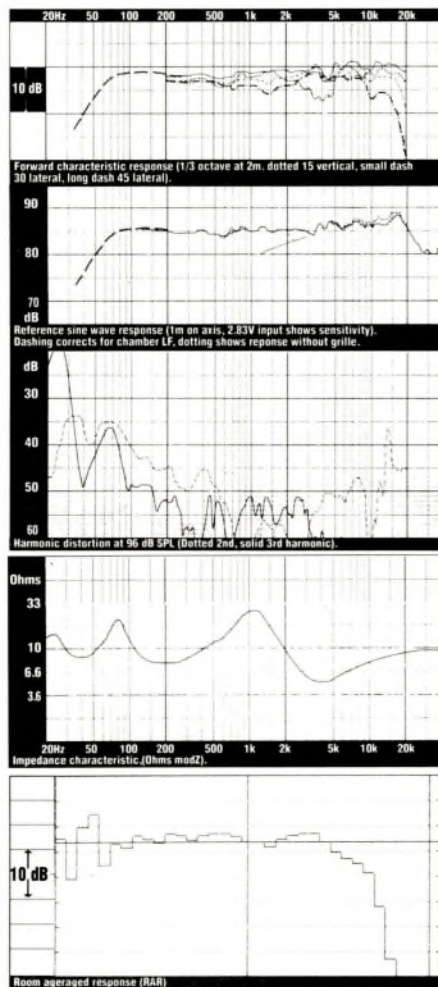
CONCLUSIONS

The *Concert II* certainly shows that Jamo knows how to build hi-fi loudspeakers. The

measurement set is generally pretty impressive and the construction to high standards, with fair engineering content considering the price level. But ultimately the sound quality left the panel slightly underwhelmed. The overall balance with its slightly heavy, ponderous upper bass balanced by a rising treble sounds just a little old fashioned by the standards of much of today's UK competition. But it is pretty, and does sound 'big' for a small box, even if the extra weight isn't necessarily quite in the right place.

TEST RESULTS

Size (height x width x depth)	41 x 24 x 25cm
Recommended amplifier power	30 – 100 watts
Recommended placement	stands, in clear space
Frequency response (± 3 dB, 2m)	55Hz – 20kHz
Low frequency rolloff (-6dB/1m)	48Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	fairly good
Typical price per pair inc VAT	£240



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One-time *enfant terrible* of loudspeaker design, Linn has recently started a range of comparatively conventional models, starting with the £359 *Nexus* reviewed (without any great enthusiasm) by AG in June '88, and continuing here with the broadly similar £259 *Helix*. It's a medium sized, two-unit design of conventional enough dimensions and solid enough construction. Black vinyl of passable quality is the only finish available.

Like *Nexus*, *Helix* breaks with earlier Linn traditions by using a neatly detailed slot-shaped plastic reflex loading port just below the bass/mid driver.

Two screw holes in the base enable the smart £70 matching MDF/steel stand to be securely fastened, tilting the loudspeaker back slightly, and then sited in reasonable proximity to a rear wall, but away from corners. Nine-18inches, but suck it and see is the formal recommendation, which sounds a trifle compromising, but works well enough in practice. The rear panel carries two sets of good quality terminals that are bridged on delivery but which enable bi-wire operation after simple modification – dealer referred, but not beyond a little commonsensical DIY.

The cabinet is built up from substantial 18mm panels with a 'figure-8' stiffener below the bass unit. The baffle is neatly if monochromatically trimmed for those who prefer to leave grilles off, while the grille forsakes the clever elastic/groove system (introduced on *Nexus* and since taken up by AR) in favour of a low cost if sensibly shaped moulded plastic frame.

The crossover is a simple affair, with 2nd-order slopes on each arm. Linn claims design responsibility for both drivers, and the 18mm mylar dome tweeter has a custom Linn faceplate, but both units are in fact manufactured by Tonegen in Japan. The bass unit has a 150mm polypropylene cone on a large

30mm voice coil.

LAB REPORT

Sensitivity approximates the 88dB/W claim, and bass is pretty well extended considering the enclosure size. The impedance stays well within the safe area for partnering amplifiers, and distortion is low throughout.

The response traces show some unevenness, but contained within 3dB limits on and off axis. Although room boundary reinforcement will help fill in the lower frequencies, there is a clear 3dB step at around 500Hz, and both anechoic and room responses confirm a slight excess in the 500Hz-1kHz octave. The crossover area shows fine drive unit integration, pair matching is close in broad energy terms, the small 2dB variations resembling the grille on/off traces, with no obvious preference here.

SOUND QUALITY

Auditioned close to a rear wall, and in fact mounted on *HBSI* stands for the sake of convenience, the listening panel warmed to the *Helix* sound, the majority rating it comfortably above average, albeit with one dissenter.

The consensus indicates a generally well balanced loudspeaker with nicely 'rounded' and articulate bass delivery, moderate levels of coloration and decent enough stereo performance for a wall-mount. There is some 'nasality' and also a tendency towards fierceness and untidiness, but the basic sound is honest and informative, with good 'speed'.

Auditioned subsequently on its own stand and with a little more rear space provided even more positive results, with good consistency across a broad listening area and with a wide range of material. The Linn sound in the censorious sense is well under control – tamed one might say – though some vestigial 'character' remains, which is almost entirely

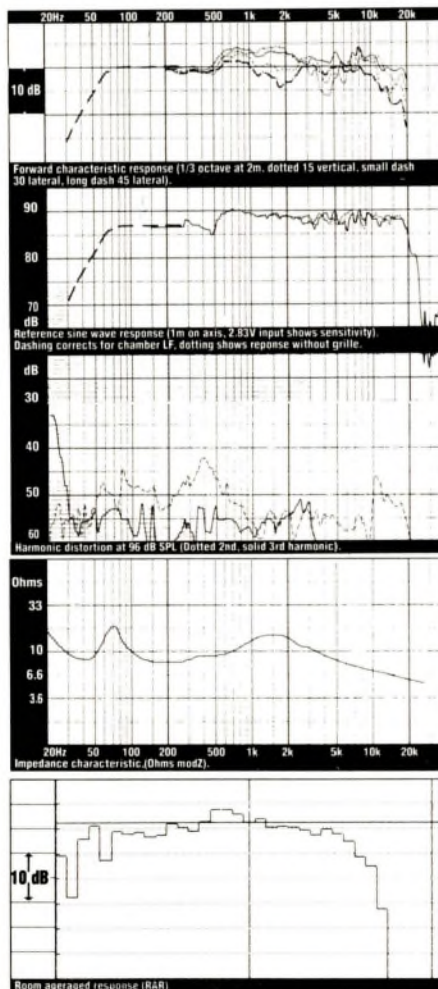
of a positive nature.

CONCLUSIONS

In all, *Helix* is a logical extension of Linn's evolving design philosophies, where the price compromises appear to have been very carefully chosen to retain mechanical integrity while appealing to a broadened section of the market. There may not be quite the youthful idealism of Linn's earlier designs, but there's still sufficient magic to warrant Recommendation for a package which is fully competitive and visually attractive to boot.

TEST RESULTS

Size (height x width x depth)	51 x 25.5 x 28cm
Recommended amplifier power	20 – 150 watts
Recommended placement	matching stands 12ins from rear wall
Frequency response (± 3 dB, 2m)	60Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	53Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	88dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	good
Typical price per pair inc VAT	£259 (stands £70 extra)



MISSION 761

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



Loudspeakers have been at the core of Mission's business since the company was founded, barely a decade ago. Even though much recent attention has been focused on *Cyrus* electronics, not to mention a natty line in personal computers, the loudspeaker range has not been forgotten. An updated 76-series range has been available overseas for a couple of months now, and is scheduled to appear on the home market by the time this review is published.

The 761 is the new baby of the range, and a natural successor to the famous 700/700LE and 70 models.

Priced at £120, it is about as basic a loudspeaker as it's possible to make, though it's nicely put together with good ingredients for all that. The simple two-way sealed box of small bookshelf dimensions is designed for rigid stand mounting quite close to a rear wall, and with drivers inverted to provide good phase integration for the seated listener. Construction, presentation and finish are to a high standard given the low cost of the speakers, albeit based on the obligatory 'black ash' vinyl.

The box itself is built in substantial 18mm stock - MDF for the baffle - which is half as thick again as the cabinetwork used in the 700LE. Proper socket/binders replace the irritating spring clips of its predecessor too. The front panel graphic is nicely restrained yet distinctly contemporary, while the grille is a neat and part chamfered plastic frame affair.

The drive unit complement looks much as before, though extensive revision is claimed. The main bass/mid unit has a 135mm doped paper cone in a 155mm frame, while the tweeter is a 19mm polyamide dome. The crossover is a minimalist, hardwired affair, integrated into the terminal block and spring tagged to the drivers.

LAB REPORT

Sensitivity rates about average at 87dB/W, while the bass extension is quite respectable under the circumstances. The impedance characteristic stays at a lowish 5ohms through much of the low frequency range. Pair matching held to within 1dB, which is Fairy Nuff for the price. The grille does of course adversely affect the response somewhat, but not to the point where it need be discarded out of hand. And for some inexplicable reason, we failed to take the distortion trace for the 761 - still, one missing out of 400 or so pencharts taken during this review project isn't bad going.

The basic 1m frequency response shows a distinct tendency towards the 'three-humped' characteristic - separately prominent in upper bass, midrange and treble. However, the situation seems not so severe across the listening window at the 2m measuring distance, and even less so on the room averaged response.

Nevertheless, the response through the lower treble region, 3-10kHz, is clearly somewhat depressed.

SOUND QUALITY

Though it's true to say that the verdicts were not unanimous, the panel was quite enthusiastic about the 761, on two separate presentations. Ultimately it's a small and inexpensively built loudspeaker with all that entails in lack of subtlety and sophistication. But it's also honest, articulate, lively, integrated, well (enough) balanced and essentially communicative - not to mention a bit 'hollow', 'boxy', small and 'splashy', slightly broadband upper bass 'thickened', and a bit coarse for some tastes.

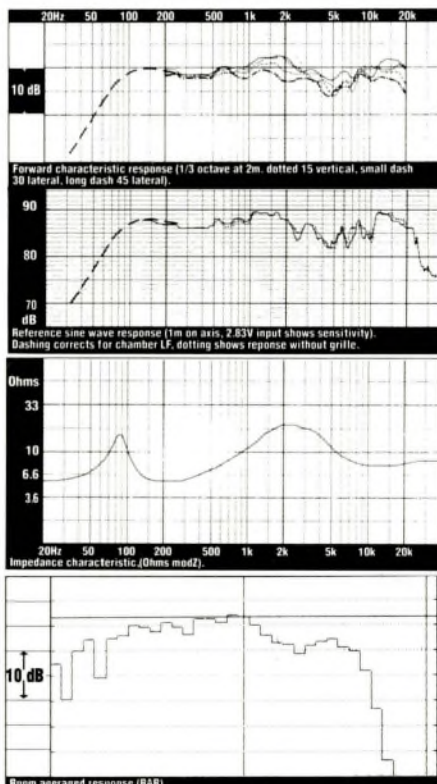
CONCLUSIONS

Bearing in mind the extremely competitive

£120 pricetag, the 761 obviously deserves a Best Buy rating, and is a worthy successor to the classic budget 700 model. Certainly it keeps Mission fully up to date in one of the most fiercely contended sectors of the loudspeaker market.

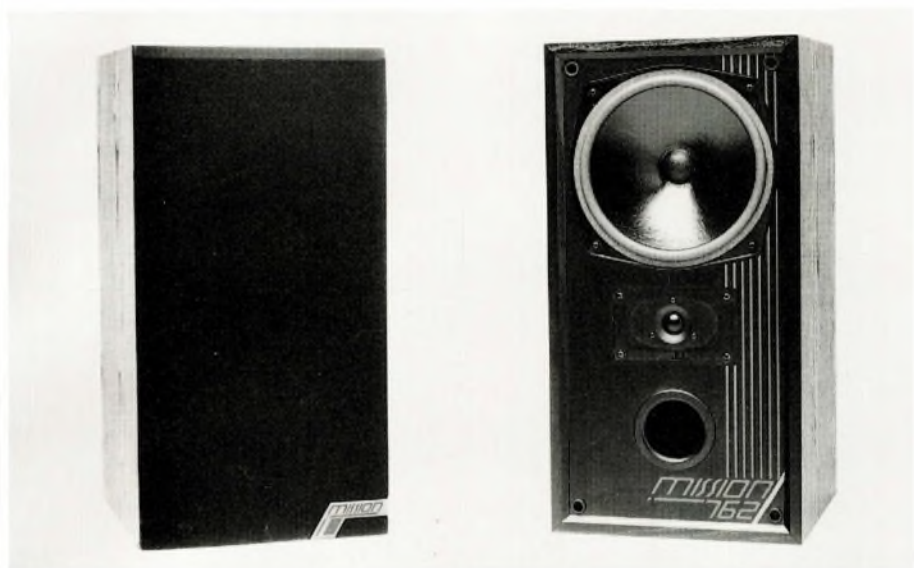
TEST RESULTS

Size (height x width x depth)	38 x 21 x 21cm
Recommended amplifier power	20 - 70 watts
Recommended placement	on stands near rear wall
Frequency response ($\pm 3\text{dB}$, 2m)	70Hz - 20kHz
Low frequency rolloff ($-6\text{dB}/1\text{m}$)	60Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	fairly good
Typical price per pair inc VAT	£120



MISSION 762

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



Mission's fortunes were originally based on its loudspeakers, though the company has been resting on these laurels for some time now, whilst concentrating on *Cyrus* electronics and personal computers. However, Autumn '88 saw the transatlantic launch of a new 76 series of five models, three of which we managed to get hold of, and two of which are included in this month's report. (The 763 will follow soon.) There's also keen anticipation of an imminent *Cyrus* speaker.

The £180 762 is successor to the 707, a large 'bookshelf-type' loudspeaker, which is some 3cm higher than its predecessor but probably maintains roughly the same enclosed volume due to the use of 18mm (instead of 12mm) cabinetwork – and 25mm high density for the baffle. Close to wall mounting on rigid stands is recommended, and vinyl 'walnut' is available as an alternative to the interminable 'black ash'. The styling is attractively modern and understated, with or without the plastic frame grille.

The enclosure is reflex-loaded with a large and well shaped port, and adopts Mission's established 'upside down' driver disposition. The propaganda claims refinements in cabinet construction and finish, in drive unit performance and power handling and in frequency response and bass extension over the 707, though we don't have any recent measurements on the 707 to confirm (or deny) the latter.

Certainly the construction and the constituents look healthy enough, though the drivers are clearly chosen from the economy end of someone's range. The main driver is a generous 175/200mm unit with a shallow doped pulp cone; the tweeter uses a 19mm plastiflex fabric dome and a short horn type flare, no doubt to help it reach the high sensitivity rating. The hardwired crossover uses 12dB/octave slopes at the rolloff points.

LAB REPORT

Compared to competitive models from other manufacturers, the 762 has an unusually high 91dB/W sensitivity – 4dB up on the 761, for example. Furthermore this is achieved without any sacrifice of what is a kind impedance characteristic, and with a bass extension that remains broadly comparable with competitors too.

We can't quite corroborate Mission's 55Hz-20kHz ± 2.5 dB claim, but the 1m reference response looks pretty well ordered, albeit with a 700Hz-1kHz 'bump', a mild overall downtilt and some unevenness in the treble. The grille is clearly well designed acoustically. Out at 2m the good driver integration is maintained across the listening window, though the family of responses is not quite as tidy as those for the 761. The same is true of the room averaged response, where the aforementioned bump is clearly shown and where some lower-mid forwardness is apparent. Distortion stays under good control.

SOUND QUALITY

The promising basic construction and lab results were not reflected in the listening test findings, sad to say, and the 762 was rated significantly below its cheaper 761 stablemate – on quality rather than loudness capability I hasten to add.

Part of the problem is that the balance is already on the bassy side, and this is further reinforced by the rear wall siting. One hesitates to contradict manufacturer recommendations, but free space siting certainly seemed the better option under our listening conditions. But beyond the rather 'thick', 'grumbly' balance, there was still persistent and almost universal complaint of significant midband 'hollow' and 'cuppy' coloration, obscuring clarity and transparency and compromising stereo detail. Furthermore, the

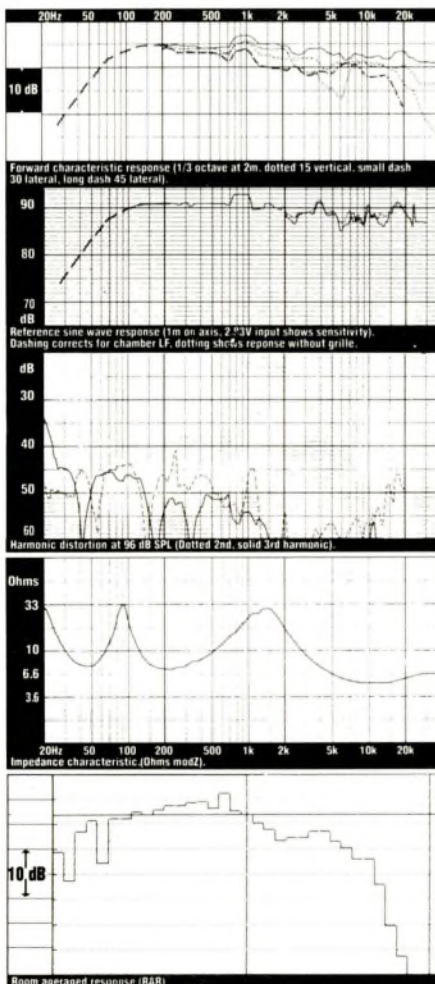
treble seemed a little detached.

CONCLUSIONS

On the surface the 762 offers a large box with apparently good engineering content and very high sensitivity with good power handling at a pretty modest price. But the mix proved sonically disappointingly coarse and unsubtle under our listening conditions.

TEST RESULTS

Size (height x width x depth)	50 x 25 x 27cm
Recommended amplifier power	10 – 100 watts
Recommended placement	on stand, experiment advised
Frequency response (± 3 dB, 2m)	65Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	91dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£180



MONITOR AUDIO R352/MD

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



Amongst a profusion of alternative Monitor Audio models costing from £300-£500 or thereabouts, there are little or large models, with enough different driver combinations, alignment configurations and cabinet finishes to satisfy every requirement and confuse every reviewer.

It was only twelve months ago that we went through the last MA identity crisis, when reviewing a 452 that turned out to be a 352/MD, during the company's frantic changeover to metal dome tweeters. In their infinite wisdom, MA chose to send in the same speaker this year, whilst I in my infinite stupidity/confusion/gullibility had already got through most of the test programme before realising the fact. I guess Monitor must be just as confused.

Reviewing the same loudspeaker twice twelve months apart does seem a bit of a waste of time, particularly when the more expensive and potentially more interesting new 1200 GOLD was held over to make room. But it does serve some useful purpose, in establishing correlating links between this and last year's subjective and objective findings.

For anyone who missed December '87's thrilling instalment (not to mention June '88's sequel on a very similar 452/MD), the 352 (MD or not) is big, and big on perceived value too. The enclosure is wood veneered top, bottom and sides, in any chosen veneer from a wide range, but the painted chipboard baffle gives the game away, so leaving the grille off becomes an aesthetically painful, if acoustically rewarding, experience.

The enclosure is reflex loaded, foam damped, braced and built from 18mm stock. The bass unit has an Elac built 150mm paper cone on a 200mm frame, while the tweeter is a SEAS 25mm aluminium dome device. 250mm MA S352 stands are available but

were not supplied; recommended siting is at least 2ft from room boundaries. The crossover is a simple first/second-order hard-wired network.

LAB REPORT

It is at least encouraging to find that the new and old measurement sets are as close as a genetic fingerprint – which not only confirms the consistency of our methodology but also of Monitor Audio's production. The 352/MD has good 89dB/W sensitivity without recourse to low impedance, though the bass extension is no greater than that of many smaller boxes. The pair match is fair and distortion pretty good. The grille could always be used for kindling.

The responses are generally balanced if a bit lumpy and uneven at both 1m and 2m, showing a slightly downtilted character but reasonable forward integration. The room response naturally differs from its predecessor – incidentally providing a useful comparison of the two rooms – and is pretty good too, barring some loss of energy around the presence region.

SOUND QUALITY

Bass heavy frequency responses invariably created negative reactions from the listening panel, and the 352 received unanimous criticism on this account – as indeed it did a year ago.

While the panel descriptions of both bass level and quality varied from the impolite to the downright rude, the reaction to the rest of the range was sufficiently positive to provide a decent overall rating. Above the 'hum-along-a' cabinet lies an articulate midrange with a natural, slightly distant vocal presentation that is nicely integrated with a clean, well damped treble. Stereo images were well formed.

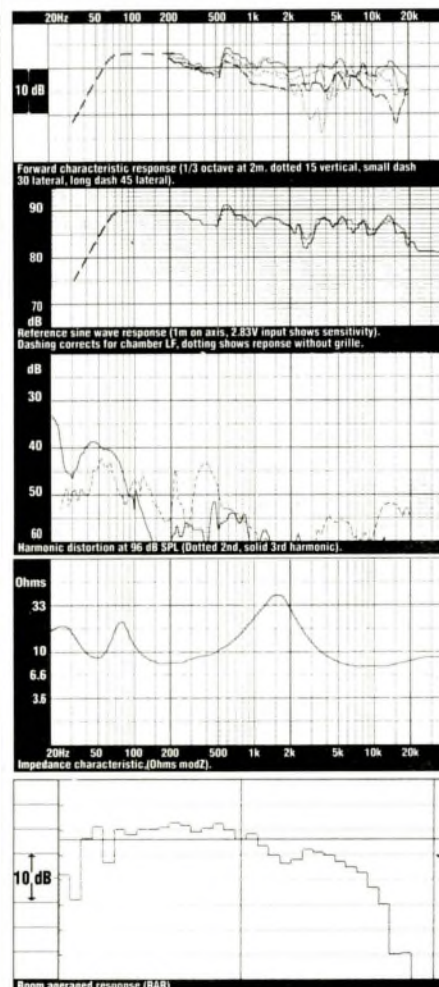
CONCLUSIONS

Although the generous box size at reasonable price makes the 352/MD a superficially attractive proposition, it is also probably responsible for its greatest sonic weakness – a resolutely heavy bass with limited definition. The rest of the range is good enough to ensure continued Recommendation, though prospective purchasers should certainly watch out for bottom end room and system compatibility.

TEST RESULTS

Size (height x width x depth)	64 x 25 x 32cm
Recommended amplifier power	15 – 100 watts
Recommended placement	stands in free space
Frequency response ($\pm 3\text{dB}$, 2m)	48Hz – 20kHz*
Low frequency rolloff ($-6\text{dB}/1\text{m}$)	45Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£300

* $\pm 5\text{dB}$ limits necessary



MONITOR AUDIO R852/GOLD MD

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

RECOMMENDED



The long established Monitor Audio brand has recently and very successfully been concentrating its efforts on 'middle market' loudspeakers, with a profusion of alternative models costing from £300-£500 or thereabouts, several of which are available in a wide range of real wood veneers.

The £450 *R852/GOLD MD* is the latest update on the 'luxury-finish bookshelf-size' theme, building on the already good reputation of the *R852/MD* (Recommended in *Choice*: June '88) by adding an anodised gold finish to the metal dome tweeter that Monitor Audio helped develop with driver manufacturers Elac and SEAS. The price premium of £50 seems a little steep (though this includes a bi-wire crossover), and the anodising process does increase hardness. Furthermore its by-product of surface porosity also permits the gold dyeing process which adds not a little hype - not that there's anything necessarily wrong with hype if it provides a little extra interest in the Rolex *Oyster* markets of the world.

I can't say this particular wood veneer is my personal favourite, but I have to acknowledge the cabinetwork is well made, veneered on five faces which include the baffle but not the back. The drivers are neatly mounted, so the unit looks rather better unclothed than with its acoustically unpromising grille in place. It also measures and sounds better that way and a sturdy sub-grille should ensure prying fingers don't damage the precious metal dome.

The 200mm bass unit, also made by Elac to MA design requirements, has a 150mm polypropylene cone with a broad nitrile surround. The crossover allows bi-wire connection to two sets of rear panel terminals. And the sealed-box enclosure uses 18mm chipboard with bitumenised damping pads for the sides, 18mm MDF for the baffle.

LAB REPORT

Sensitivity rates a shade below average, but the impedance characteristic is nice and kind and power handling is unlikely to be a problem.

The various anechoic response traces show a very marked similarity to those obtained last summer with the standard *852/MD*. Ironically the only clearly unambiguous difference is that the *GOLD*'s measured distortion is slightly poorer at high frequencies, though not so as to cause any unease. (The room responses are naturally not comparable, reflecting the differences in rooms rather than loudspeakers.)

Gold or not, the *852* measures pretty competently on- and off-axis, with a slight tendency to mid prominence and a treble 'edge' seen on the room averaged trace - a suggestion of the two-humped effect, notable on-axis at 2m with a mild crossover notch. The balance implies that siting with respect to walls should be fairly uncritical, even though the recommendation is for stand-mounting in free space.

SOUND QUALITY

The *852/GOLD MD* was well received by the panel, rating well above average overall, with few dissenters amongst the panelists on two separate presentations.

The basic sound is honest, clean, clear, detailed and informative, if a bit 'small' in scale. Picking the odd nit over the cosmetics, the slight mid forwardness and mild treble 'sting' were both audible, the former as a mild 'aw' coloration and some flattening of stereo perspectives; the latter by a rather obvious and attention-grabbing treble. This *852* is a bit of a hi-fi speaker in some senses, but the rare combination of communication and clarity is difficult to resist.

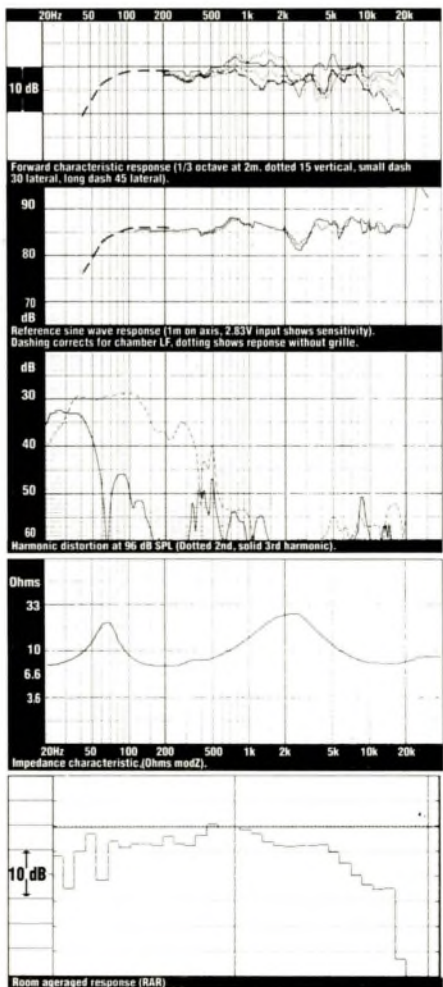
CONCLUSIONS

The *R852/GOLD MD* clearly deserves Recommendation for its fine combination of subjective performance and physical presentation at a realistic enough price. But whether it's worth £50 more than the 'silver' version is hard to judge without direct comparison, which was not possible in our test programme, but which may be available at your friendly local Monitor Audio dealer. And it may depend on the importance you attach to the bi-wire option.

TEST RESULTS

Size (height x width x depth)	45 x 25 x 26cm
Recommended amplifier power	20 - 100 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	50Hz - 20kHz*
Low frequency rolloff (-6dB/1m)	50Hz
Sensitivity (ref 2.83V-1W/8ohms: 1m)	86dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	good
Typical price per pair inc VAT	£450

* ± 5 dB limit necessary to accommodate crossover notch.



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BEST BUY



We were due to test one of Musical Fidelity's new loudspeakers this month, the *Reference 2*, but things didn't quite proceed as planned. First MF's courier company delivered *MC2*s instead of *Reference 2*s by mistake; when they did deliver the correct speakers they were in no fit state to be tested! Finally we ran out of time so were left with no alternative but run a reprint of the *MC2* review which was published in our June '88 issue. *Reference 2* will have to wait for another issue, by which time MF should also have their new *Reference 4* up and running.

The *MC2* is a development of the more expensive *MC4* model, the rigid 25litre 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.

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. The *MC2* is built in mirror image pairs, the tweeter being slightly offset from the centre line to spread diffraction effects.

LAB REPORT

The *MC2* 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 *MC2* 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 *MC2* 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 unfailingly 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.

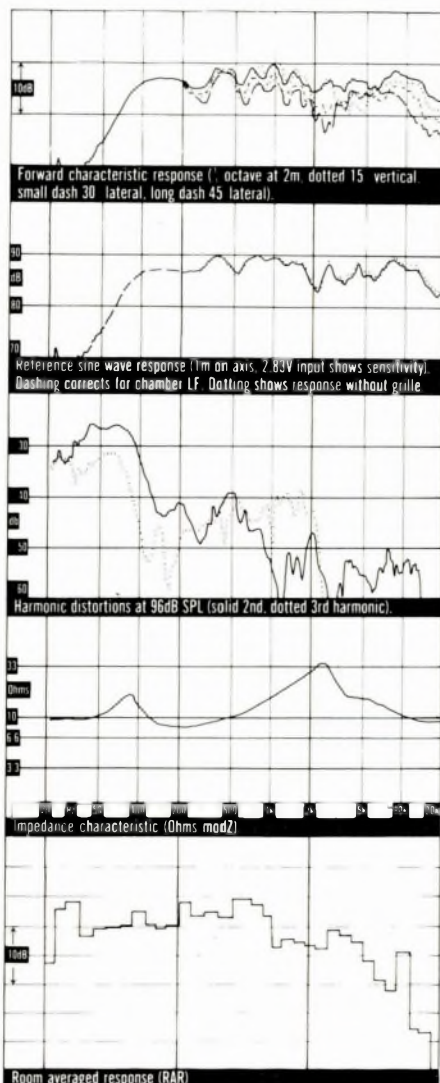
CONCLUSIONS

This is an exceptional and painstaking design which offers liveliness, clarity and articulation along with very fine LF resolution in the context of a slightly bright, light-weight 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 (± 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

Reprinted from issue no. 59 by Alvin Gold



OPUS 3 CAPELLA

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



Opus 3 is a strange brand name, but was presumably chosen to preserve identity with the (excellent) recordings made by the eponymous Swedish record label. Said recording engineers got dissatisfied with existing monitor loudspeakers and into mineral (specifically crushed marble in resin instead of crushed sawdust in glue) 'cabinet-work' some years back.

We received two models for review but only had space for one. To avoid further (spinal) disc compaction, we went for the smaller *Capellas*, realising too late that they are (a) packed in pairs, (b) have a rather specialist application and (c) cost the same as the larger, floorstanding and more practical *Chorus*.

Some of *Capella's* differences are best appreciated in the photograph. It's intended to be flush mounted amongst books or records in a bookcase - a situation which could not be achieved in this domestic situation without reducing the stereo width to 80cms. Nor do I know of any books whose spines tilt back at the angle whose tangent is 0.125, but perhaps that's being pedantic.

What we have here is a largish bookshelf size design that ought to be bookshelf sited - but make sure the shelving is up to the weight. It's a two-unit £500 system with a very large reflex tube/port, which pound (avoidupois) for pound (sterling) it's pretty good value, such is the density of the mineralwork.

The shape itself is quite attractive, if a shade amorphous with its chamfered edges and corners, but the surface is rough enough to give a sort of stove enamelled effect that is not particularly elegant (and falls well short of the 'piano finish' now available on the Avance concrete models). The aesthetics are a disaster area matched only by the way the ludicrous grille arrangement refused to sit

square before falling apart. Space precludes a blow by blow, but this speaker was clearly 'designed' by an engineer. Finish is fragile, in black, white or grey gloss paint, and a can of touch-up ought to be provided as a matter of course (along with colour co-ordination Rawlplugs for the grille holes). Conventional enough SEAS drivers comprise a 170/200mm polypropylene bass/mid unit and a 25mm polyamide dome tweeter, linked by a hard-wired second-order network.

LAB REPORT

Sensitivity is about average, and the impedance fairly benign, dropping to a 4.5ohm minimum at 10kHz. Distortion is notably low and the bass surprisingly well extended.

The basic 1m response shape looks very promising, slightly marred by some treble unevenness and the 10-15kHz sting in the tail, but more seriously by a significant difference between the pair - the unpublished half showing a crevasse between 2.5 and 6kHz. Which of the two samples was used for the room averaged response is anyone's guess, but this too shows some energy loss in this area. It is otherwise good, confirming good bass extension and mild mid prominence.

SOUND QUALITY

Although we were later advised that the *Capellas* should NOT be used on stands, they nevertheless acquitted themselves pretty well, stands and all, close to a rear wall, though the little extra boundary assistance from the recommended siting might help counter criticism of the slightly 'light' balance.

The treble 'sting' also attracted adverse comment, but the comparative lack of cabinet coloration was evident in the good clarity and 'hear through' detail. The sound is quite quick and articulate, with an open, slightly

'laid back' balance and a serious attempt at creating genuine dynamic range.

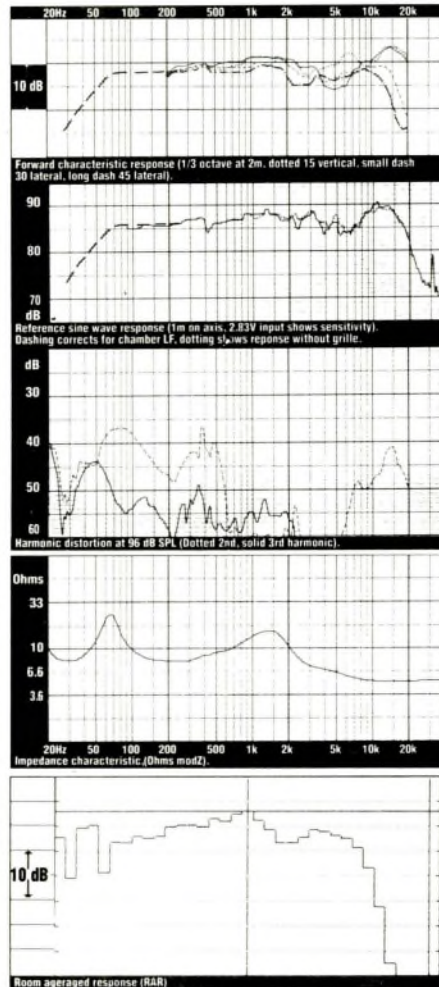
CONCLUSIONS

The mineral cabinet certainly helps the *Capella* sonically - to the point where one wonders whether the drivers might not be a limiting factor - and the design is clearly worth considering if the siting arrangements or aesthetics appeal. But there's ample room for further refinement in quality control and presentation at £500 a pair.

TEST RESULTS

Size (height x width x depth)	32 x 40.5 x 26(ave)cm
Recommended amplifier power	15 - 150 watts
Recommended placement	amongst books/records in bookcase
Frequency response (± 3 dB, 2m)	50Hz - 20kHz*
Low frequency roll off (-6dB/1m)	45Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	86.5dB
Impedance characteristic (ease of drive)	fairly good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£495

* ± 5 dB limits necessary to contain treble unevenness



ROGERS STUDIO 1a

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

RECOMMENDED



Although Rogers the brand and its eponymous founder parted company nearly fifteen years ago, the company has always stayed loyal to the 'BBC heritage' which was the foundation for success in the early '70s. This heritage, best known in the immortal *LS3/5a* miniature was based on several then very radical design precepts that have had a major influence on the development of the post war British hi-fi loudspeaker.

In many senses the \$565 *Studio 1a* is one of the purest examples of the type currently available, following in direct line of descent from the famous '2cu ft' BBC *LS5/6* monitors, while at the same time incorporating many technological advances from the intervening 20 years.

The latest refinement is the incorporation of an aluminium dome tweeter in place of fabric based types used hitherto. But the longstanding link with Celestion as tweeter manufacturer is maintained – to my knowledge Rogers is the first outsider to be permitted to purchase the Celestion dome.

It is difficult today to realise that the early *LS5/6* and Spendor *BC1* loudspeakers looked embarrassingly tiny compared to the competition (Tannoy, Lowther, Leak, KEF, etc.) when they were introduced. In contrast the *Studio 1A* now looks decidedly bulky, especially when the need for free space mounting and high quality stands is taken into account.

High standard wood veneer is available in black ash, teak and walnut on the sides, top and bottom, and the deliberate 'thin-wall', bitumen-damped construction of the carcass is retained, though now made of particle board not birch ply. The black finished 19mm MDF baffle incorporates a small chamfered port, and the hardboard grille frame is nicely shaped.

The 200mm Rogers bass/mid driver has a flared 150mm translucent polypropylene

cone, and a wide surround for good energy termination. The elaborate crossover network uses third-order slopes between the two drivers, converts the reflex system to third-order alignment, and allows bi-wiring.

LAB REPORT

We rate the sensitivity at around average, though it is difficult to be precise considering the shape of the 1m reference characteristic, and pretty good considering the good bass extension and kind impedance characteristic. The pair match is good, and distortion pretty well controlled – good in the midrange but worsening towards lower frequencies, as is the way with ported, 'thin wall' type designs.

The 1m response is a little strong from 60-300Hz and a little down in the presence band, with a little lumpiness, but a 2m distance is more realistic for a box of this size, and shows truly excellent on- and off-axis integration, albeit along a gently falling balance trend. This is confirmed in the fine room averaged response trace.

SOUND QUALITY

Experience across the whole test group shows that 'falling response' speakers seem to start at a slight disadvantage under our listening conditions and with the panel's average preferences.

The main complaint here was of the rather over-rich bass and 'laid back' presentation, but behind this rather pervasive character lies some very positive virtues – unusually good stereo imaging and fine neutrality, plus a notable freedom from unwelcome 'nasties' in the higher registers.

The *Studio 1a* does tend to lack 'bite' and 'attack', and doesn't have the clean, fast bass that some demand. But it's no slouch here either; it handles power pretty well and cre-

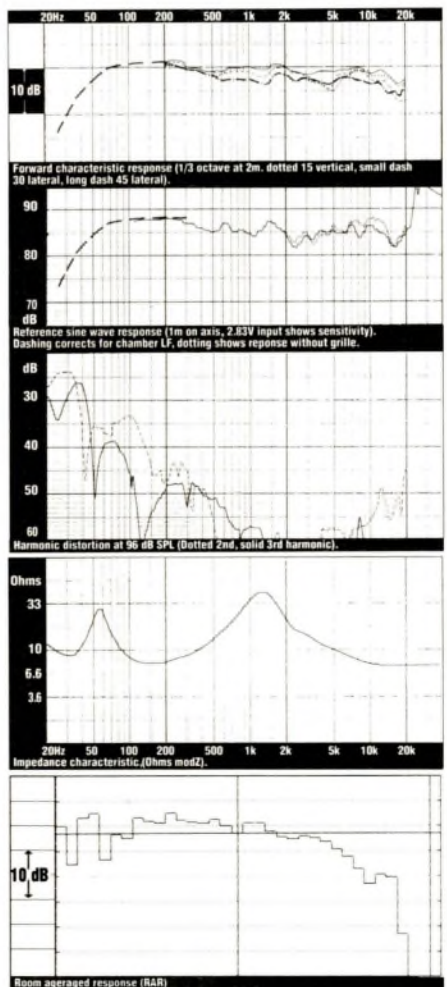
ates an unusually precise, transparent soundstage with the right material.

CONCLUSIONS

The *Studio 1a* deserves Recommendation on grounds of its fine engineering alone. It is not a loudspeaker for all listeners, rooms or systems, and is clearly better suited to larger rooms. But under favourable circumstances it delivers a fine performance in the 'classic BBC' tradition – a tradition which tends to polarise personal preferences.

TEST RESULTS

Size (height x width x depth)	63.5 x 30.5 x 30.5cm
Recommended amplifier power	20 – 150 watts
Recommended placement	on corner support stands in free space
Frequency response (± 3 dB, 2m)	40Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	36Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	excellent
Typical price per pair inc VAT	£565



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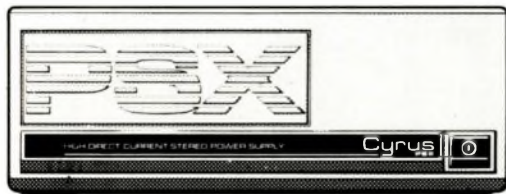
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RECOMMENDED



Royd loudspeakers, named after proprietor Joe Akroyd, is one of those classic little British companies which does its own thing, beholden to no-one and driven by one man's personal vision of what hi-fi ought to be about.

We've reviewed various models in *Choice* over the years, most of which have performed respectably well, albeit without breaking any new records. But the £230 *Eden* is a curious loudspeaker, in some senses the most curious in this 30-strong group. It's a miniature, yet it's also as heavy as models twice the size. The drive units are a little unconventional too.

Having got over the shock of trying to pick up a pair of these tiny speakers at the same time, it turns out that the cabinet walls of the rear reflex-loaded enclosures are mass-damped with heavy pieces of steel – magnet pole pieces no less, presumably surplus to requirements or available and suitable at low cost. You also get real wood veneer on four faces over 15mm stock, and a steel-brace between baffle and rear.

The Royd-built bass/mid driver is pretty unconventional too. To start with it has a 19mm voice coil, which is almost unheard of for bass/mid drivers but theoretically should increase the high frequency bandwidth and overall stiffness of the unit; it also has a very light, undamped paper cone, a profiled, skeletal basket behind the cone, and lots of fixing screws. The tweeter is a Royd-modified 19mm soft plastic dome from Vifa.

The grille is best left on for aesthetic reasons, and has a well chamfered frame. The standard model (as supplied) has a single pair of terminals, while an active version is available for the same price. Also available for £48 is a pair of external cross-overs for using the 'actives' in passive or bi-amp mode.

LAB REPORT

Given the variations in the 1m reference response it is difficult to specify sensitivity precisely, but assuming some wall assistance, a below average 85dB/W represents a practical assessment. Pair matching might have been closer at high frequencies. Distortion is reasonable enough given the box size, but taking the limited bass output into account our 96dB test level must be close to a working maximum.

The frequency responses show that bass is significantly curtailed, even with the assistance of the recommended back-to-wall sitting, and the region 1.5kHz-5kHz is also slightly depressed on-axis, though less so off the main axis. The room averaged response confirms the slightly forward midrange and reduced bass, but is reasonably smooth overall nonetheless.

SOUND QUALITY

To say the *Eden* rated a little below average overall would be true enough, but a woeful oversimplification. In two separate presentations the *Eden* split the panel completely, generating similar degrees of like and dislike with little equivocation.

On the negative side, the *Eden* has little bass worth speaking of, a somewhat 'boxy' midband, and a somewhat untidy and uneven treble. But on the positive side it is one of the fastest, most coherent and informative loudspeakers on the market – right up there with *Isobariks*, *Darii* and so on. It also worked particularly well when significantly over-angled inwards, which tended to ameliorate the treble 'sting' somewhat.

CONCLUSIONS

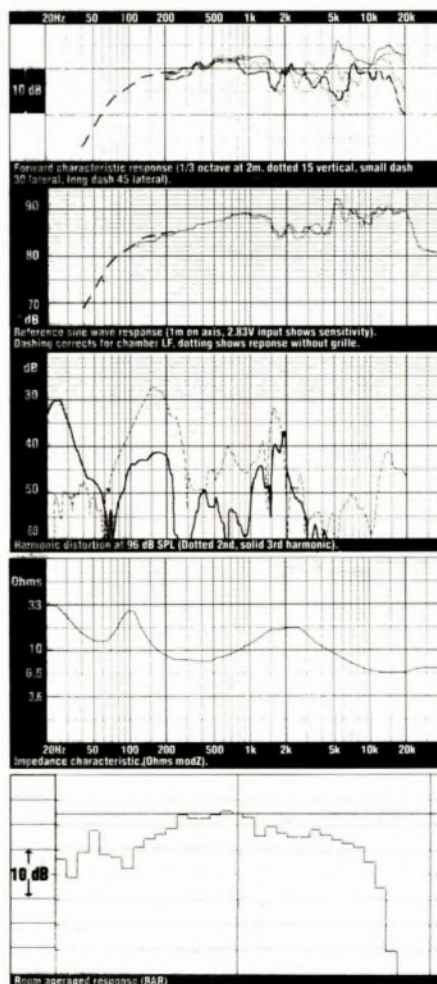
This is a loudspeaker for the committed. It won't suit the majority of systems or tastes,

but it is already threatening to become a minority cult, and well deserves that status. I admit some personal prejudice in acknowledging it's my sort of speaker, simply because it makes my hi-fi system sound more interesting and enjoyable than nearly all alternatives. I therefore feel Recommendation is fair, while acknowledging that the panel's collective opinions makes Best Buy status inappropriate. But those who can live with its vices – which are real enough – may well find themselves unable to live without its virtues.

TEST RESULTS

Size (height x width x depth)	31 x 20.5 x 18.5cm
Recommended amplifier power	20 – 70 watts
Recommended placement	on small rigid stands close to rear wall
Frequency response (± 3 dB, 2m)	150Hz – 20kHz*
Low frequency rolloff (-6 dB/1m)	85Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	fairly good
Typical price per pair inc VAT	£235

* ± 4 dB necessary to contain treble rise

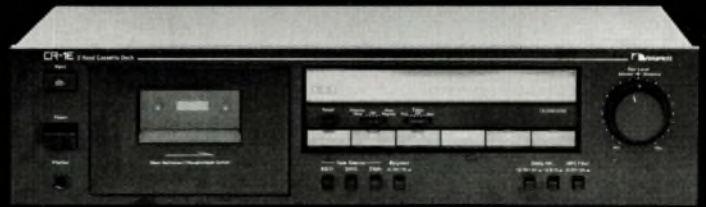


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Having successfully become established in the headbangin' market, Studio Power is now turning its attentions towards 'serious' hi-fi loudspeakers, with an 'audiophile' range spearheaded by the £140 *Sapphire* reviewed here.

Well that's the theory anyway; the practice is a little different. You'll notice we have published two different room response curves. The 'Mk1' refers to the original samples received for review, measured in the chamber and also initially auditioned. Then there are the second samples which panelist and Studio Power director Russell Kauffman brought along, in the wake of some dealer feedback on the originals and a little midnight oil burning. We auditioned these too, happily noting a significant improvement, but have published both room curves to provide some correlation with the originals measured in the chamber.

Both versions look identical on the surface, and consist of a simple, near miniature reflex-loaded box with bass/mid unit and tweeter. The modifications between the first and second samples include a reduction in the relative output level of the tweeter (very necessary, given the anechoic results), removal of the second-order network that rolled off the bass/mid unit, and a reduction in the amount of internal enclosure damping by 75 per cent.

Available in black or white vinyl, the solid little box is built from 15mm stock with natural wool damping fill. The grille has a very thick frame and is bound to cause some acoustic interference. Recommended placement is on a rigid stand near a rear wall. The loudspeakers themselves are sourced from Dantax in Denmark, but the drivers are actually made in Taiwan. Keeping up with the Jones's, the bass/mid driver has a 130mm aluminium cone, while the tweeter is a small

hard plastic dome with phase compensator.

LAB REPORT

Our slightly below average 85dB/W rating for sensitivity is a bit of a rough estimate, given the response, but the impedance is easily driven and distortion reasonable enough for the type.

However, the pair match is poor, and the basic frequency response of the original samples is pretty disastrous, particularly with the grille on; the 2m response shows indifferent integration and a 'three-humped' character. Close comparison of the room averaged responses suggests that the modifications have pulled down the treble peak by some 4dB and filled in a little around 2kHz and in the 200-500Hz region both of which is worthwhile, though there is still significant energy loss from 2-5kHz.

SOUND QUALITY

Given the frequency response, widespread complaints of a tinkly top end were inevitable, and the *Sapphire's* ratings low in consequence. The modifications did lead to some improvement, and in terms of 'speed' and dynamics the loudspeaker is potentially good for a small, inexpensive model. But the amelioration of the treble 'sting' also tended to reveal other unresolved coloration problems that mar a fundamentally lively sound further down the band.

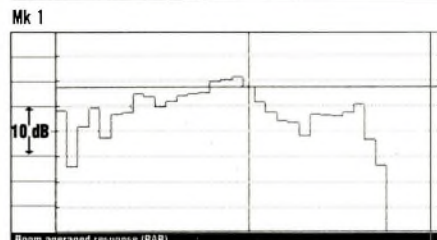
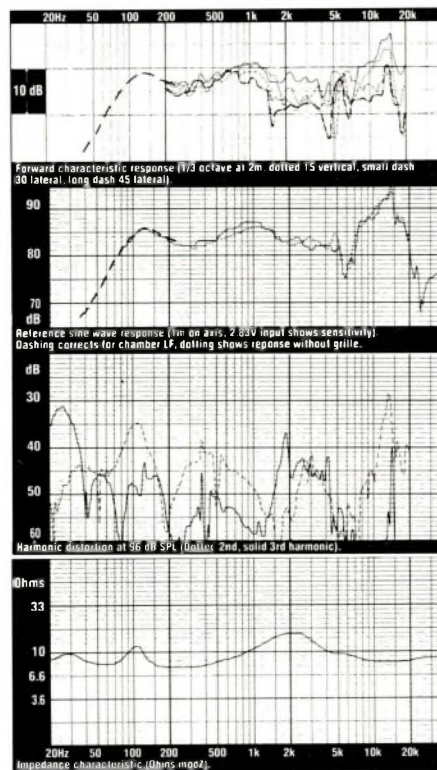
CONCLUSIONS

The *Sapphire* doesn't really make the grade for the price, even though it is moving in the right direction and shows some promise. Given a little further development (with the assistance of Russell's undoubtedly discriminating ears), that potential could well be realised.

TEST RESULTS

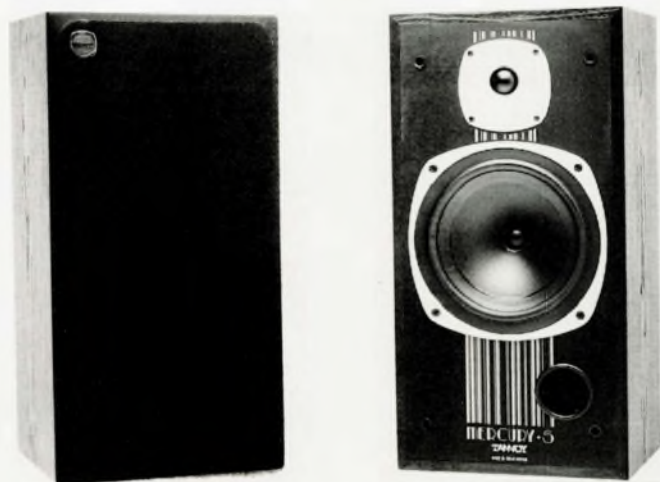
Size (height x width x depth)	30 x 20 x 19.5cm
Recommended amplifier power	20 - 70 watts
Recommended placement	on stands near rear wall
Frequency response (± 3 dB, 2m)	70Hz - 20kHz*
Low frequency rolloff (-6 dB/1m)	70Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	adequate
Typical price per pair inc VAT	£140

*original sample; ± 8 dB limits needed to accommodate treble unevenness



TANNOY MERCURY S

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



The name Tannoy goes back to the dawn of audio engineering, such that the capital T is often lost and the term has passed into everyday language. But the company Tannoy has never been in better health, holding a strong position in hi-fi and professional loudspeaker markets at home and abroad, and also linked with Goodmans and Mordaunt-Short in the TGI group.

The popularly priced *Planet* models have regularly done well in *Choice* – the baby new *Eclipse* rating Best Buy in the last Loudspeakers edition. The *Mercury* has long featured at the heart of this range, and now enters 1989 in *Mercury S* guise. And guise it certainly is, as anyone foolish enough to remove the discreetly anonymous black grille will quickly discover, dazzled by the glitzy gold decoration and graphics that clutter the baffle. The grille should clearly be retained on aesthetic grounds, never mind any acoustic compromise.

This minor lapse in taste apart, the *Mercury S* provides a generous size box for its £160 asking price. It's a ported design, built solidly enough though clearly within price constraints. The obligatory 'black ash' vinyl is at least nonobligatory in this case, with a 'walnut' print available as an alternative. As with previous *Mercurys*, the *S* version is designed for free space siting, at least 2ft from room boundaries and on a high quality stand.

The carcass is built up from braced 15mm stock, while the baffle is 18mm thick. Both units are built in-house, the bass driver a 'full size' 200mm unit with 165mm polyolefin cone and 25mm voice coil, and the treble a 25mm polyamide soft dome tweeter. A simple hard-wired crossover applies an overdamped second-order low pass to the bass/mid unit and feeds the tweeter via a second-order high pass.

LAB REPORT

The sensitivity is bang on the average at 87dB/W, while bass extension falls in line with expectations. The impedance graph shows gentle enough slopes, and minima of around 6ohms across much of the range. Distortion is acceptable, if unexceptional.

The frequency responses are flatter than most at this price level, show pair matching held within 1dB, and indicate that the grille is certainly better avoided. In view of the gaudy front baffle, perhaps a spray can of matt black paint might be supplied for audiophiles of sensitive sensibilities?

The response trend is generally flat within ± 2 dB and very well maintained and integrated off-axis. Just the one crossover notch may be seen at 15 per cent above the main axis, which indicates that highish stands are the best bet. This is further reinforced because the bass below 200Hz is a shade heavy, confirming the recommendation for free space siting. The room averaged response shows a fine flat balance all the way up to 2kHz, but then an odd discontinuity that is difficult to correlate with the anechoic traces.

SOUND QUALITY

Mercurys seem fated to do well in *Choice* listening tests, and the *S* certainly maintains the family tradition, rating comfortably above average overall, with generally positive comments from most listeners.

The (upper) bass was considered mildly excessive and obtrusive, and some 'boxiness' and occasional treble excess was also noted. But the basic sound is lively and dynamic, with good transparency and detail through the well integrated mid-to-treble part of the spectrum. Although loud, transient bass was handled without difficulty, there was occasional detail and dynamic 'clogging' on more

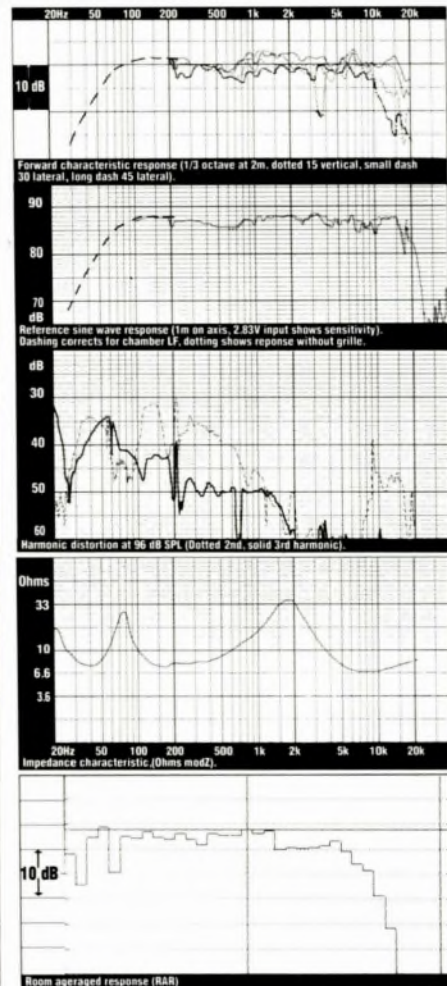
complex and subtle material played at a highish level.

CONCLUSIONS

Once again Tannoy has refined the *Mercury* package and come up with yet another Best Buy. There's nothing specifically obvious to distinguish the ingredients here from those in similar rival recipes, but the balance and compromises seem to be particularly well chosen to appeal to a broad spread of tastes. Do note that the *Mercury S* must be used well away from walls if it is to work properly.

TEST RESULTS

Size (height x width x depth)	49.5 x 25 x 21.5cm
Recommended amplifier power	10 – 80 watts
Recommended placement	on stands in free space
Frequency response (± 3 dB, 2m)	55Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	50Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	87dB
Impedance characteristic (ease of drive)	fairly good
Forward response uniformity	good
Typical price per pair inc VAT	£160



TANNOY DC2000

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RECOMMENDED



Besides having a proper name that has passed into the English language as a common noun, Tannoy has always been distinguished from the herd by one other factor. The famous 'dual concentric' (DC) drive unit was first introduced around the time I was born, and is still in use today. The current versions of the original DC drivers are particularly popular for professional monitoring purposes, and generate substantial sales amongst Japanese hi-fi enthusiasts, particularly the enormous horn-loaded £5,000 *Westminster*, but more conventional two-unit direct radiators like the *Planet* series have been the successful competitors in the UK.

Now Tannoy has undertaken a major redesign on the dual concentric principle to produce a 200mm version which is intended to combine the strengths of the principle with the subtlety attainable using the latest materials and production technology.

The DC driver combines the bass/mid driver and the tweeter on a common chassis, in Tannoy's case by mounting a horn tweeter down the throat of the bass/mid unit, using the cone flare as part of the horn loading. This has worthwhile advantages in creating an overall 'point source', and in integrating the output from the two drivers through the crossover region, avoiding the lobes and nulls created by conventionally spaced drivers.

The £300 *DC2000* reviewed here has a separate bass-only unit operating alongside the DC driver below 400Hz. For the price it is a generous size floorstanding model intended for free space siting, and equipped with its own spikes for good floor coupling and to avoid the cost of a special stand. Finish is the pandemic 'black ash' vinyl, at least for the present, and finish looks pretty good even on our early samples. The sealed box cabinet is built from 18mm stock, with internal bracing and damping.

The DC driver has a polyolefin bass/mid cone on a large diameter (42mm) voice coil, while the separately demountable tweeter has a deep drawn aluminium diaphragm with polyamide surround. The hardwired, bi-wirable crossover uses gentle rolloff rates and some fairly subtle tweaks.

LAB REPORT

This model has an unusually high sensitivity of 93dB/W, though this is partly due to the resolutely 4ohm, current hungry impedance, and partly due to bass extension that is ungenerous considering the box size. Distortion, particularly at mid frequencies is pretty low, and the pair match was close.

The 1m frequency response is generally flat and balanced over much of the range, though marred by 4dB 'bump' around 1.5kHz and a boost above 10kHz. The 2m response is rather more lumpy, though the DC principle ensures a smooth crossover transition. The room averaged response looks very promising, though the treble peak is still visible as a 'corner' in the rolloff.

SOUND QUALITY

The panel was well impressed by the *DC2000*'s dynamic and full-bodied sound. It's a bit warm, and occasionally clumsy on transients, but sounds powerful with plenty of headroom and good detail.

Some 'cuppy' coloration is quite noticeable on vocals, and the extreme HF is a little 'hard', but the overall balance remains pretty even, and good stereo soundstages are created. The bass end does 'sing along' a little, sounding powerful rather than extended and adding slight 'chestiness' to male voice. With the speakers on view one is apt to ascribe some 'horn' characteristics to the top end – tape hiss was certainly rather noticeable on FM – and the *DC2000* does seem to suit CD

rather better than vinyl.

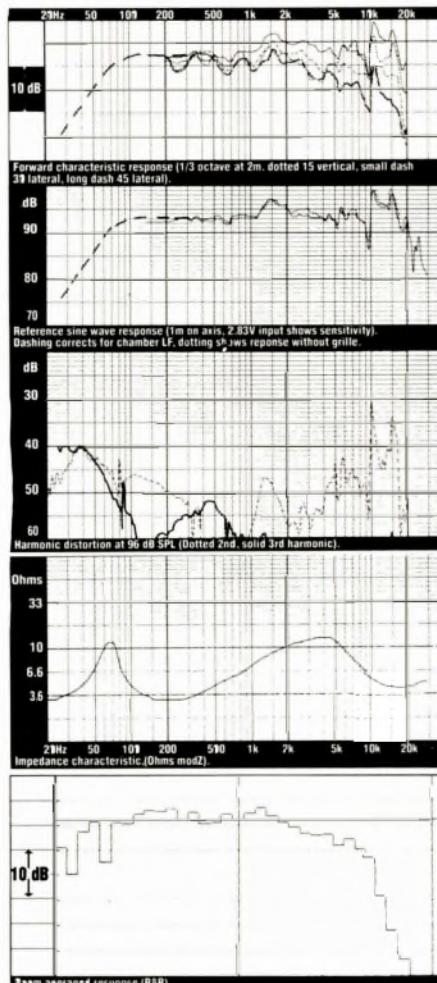
CONCLUSIONS

It's perhaps rather a pity that the sensitivity/extension trade-off has been tilted quite so far in the former's favour, though there's no denying the *2000*'s good dynamic performance. The measurements are impressive and the speaker certainly represents very good value for those who don't mind the little enough coloration in what is sonically a bit of an individualist.

TEST RESULTS

Size (height x width x depth)	68.5 x 26 x 27cm
Recommended amplifier power	10 – 100 watts
Recommended placement	on floor in free space
Frequency response (± 3 dB, 2m)	65Hz – 20kHz*
Low frequency rolloff (-6 dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	93dB
Impedance characteristic (ease of drive)	current hungry
Forward response uniformity	fairly good
Typical price per pair inc VAT	£300

* ± 5 dB limits needed to accommodate 10kHz 'glitch'



TDL MONITOR

TRANSDUCER DEVELOPMENTS LTD., PO BOX 98, HIGH WYCOMBE, BUCKS HP13 6LN. TEL: (0494) 441191.



Visiting my very first hi-fi show 20 years ago, I encountered some of the largest loudspeakers I had ever seen, and was so awestruck by the sounds they were producing that I can still visualise the scene today. Those were IMF transmission line loudspeakers, and these are TDL transmission line loudspeakers. So what's in a name? The same John Wright is the man behind the operation, even though he's become the UK's most successful specialist hi-fi drive unit manufacturer along the way.

£1,600 is a lot to pay for a pair of speakers, but you do at least get plenty of content here. To start with there are four drivers for each channel – bass, midrange, treble and 'super-treble'. Then if you take a crowbar and lever off the side of the cabinet (I speak figuratively of course) you'll find a convoluted, folded and precisely damped column that starts behind the bass unit, snaking and tapering up and down to end in a port next to the floor.

This is the 'transmission line', which theoretically should be infinitely long and closed at the end, providing ideal nulling termination of the back radiation. The practical line is more of resistive reflex system in actuality, with a touch of the tuned column thrown in for good measure. It allows some of the back radiation to be used to reinforce the low bass, while at the same time keeping the bass unit resonance really low. It also incidentally ensures the whole cabinet is really rigid – a major bonus for any large loudspeaker.

19mm MDF cabinetwork is clothed in walnut, rosewood or black real veneer, and the well chamfered MDF-frame grille should be left on for aesthetic reasons. The four drivers are all TDL/Elac made, consisting of a 30x20mm polystyrene/fibreglass bass unit operating up to 300Hz, thence to a 100mm

polypropylene cone midrange to 3.5kHz; followed by a 25mm magnesium/aluminium dome tweeter augmented (for distribution reasons) by a 19mm mylar supertweeter above 13kHz. The crossover is inevitably very complex; twin, heavyweight gold-plated terminals allow a bi-wire/amp option.

LAB REPORT

On our rating sensitivity is a rather below average 85dB/W, but with an easy enough impedance characteristic, prodigious power handling (note the low distortion), and of course exceptional bass extension.

The 1m reference response shows very good balance, marred by a 5dB bass 'bump' centred on 70Hz and some (partly grille-induced) 'glitches' around the mid/treble crossover region. The 2m set is remarkably good for such a large baffle, with slight loss of energy around 2-4kHz. The only 'glitch' is at 15 per cent above the axis – of concern only to those who indulge in unusual practices whilst hanging from chandeliers. The room averaged response, however, does indicate a rather over-heavy low bass, plus a curious 8kHz peak in the treble – shades of the triple hump pattern here.

SOUND QUALITY

I don't know how successful we were at presenting the TDL 'blind', because I had to help get it on the stand, but I think the favourable panel response remains valid. The *Monitor* was not without its critics, but the effortless and extended bass was much appreciated, adding impressive 'scale' on classical programme if a bit 'loose' and 'heavy' for best rock reproduction.

Space and detail are convincingly portrayed in a soundfield that is impressively solid, stable and coherent. However, the mild but isolated treble brightness was a minor

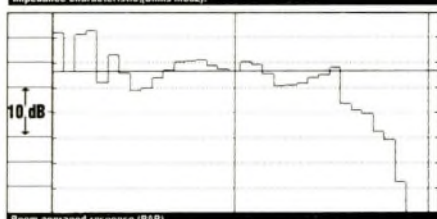
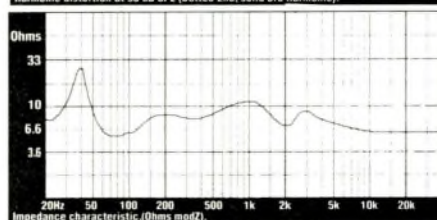
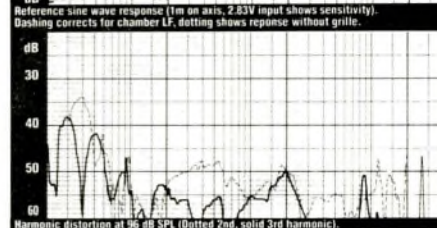
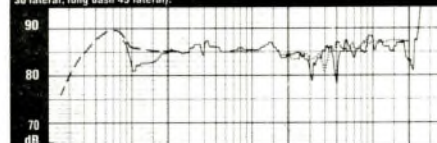
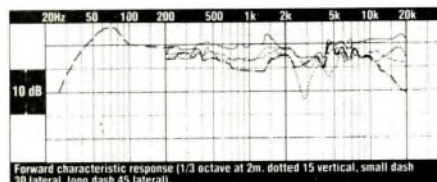
source of irritation and there was criticism of a certain lack of 'life' at lower levels. CD seems to suit the *Monitor* rather better than vinyl.

CONCLUSIONS

The *Monitor* will not be to every taste, and will suit only those with large rooms and fat wallets. But it delivers objective and subjective performance, alongside sufficient build quality and engineering content to fully justify an admittedly high price, and should be particularly favoured by classical CD fans.

TEST RESULTS

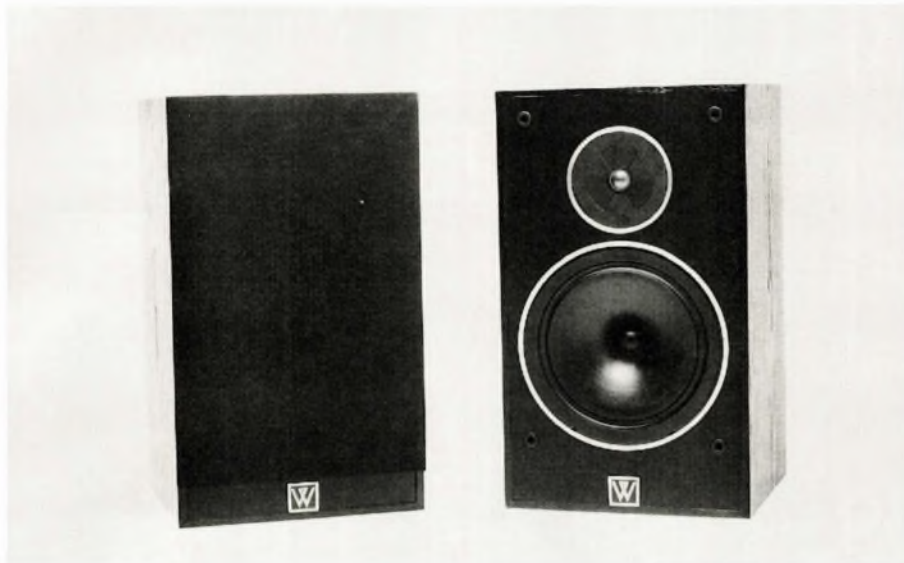
Size (height x width x depth)	118.5 x 30 x 47cm
Recommended amplifier power	25 – 250 watts
Recommended placement	on matching stands, min. 0.5m from boundaries
Frequency response (± 3 dB, 2m)	35Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	28Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	85dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	very good
Typical price per pair inc VAT	£1600



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BEST BUY



Wharfedale is still the best known name in British hi-fi loudspeakers, even though the company has suffered more than its fair share of changes during the 'eighties. Late '87 saw a management buyout, and late '88 the new team held a press conference to give a pretty convincing account of the progress that had been made.

The good news is that there is only one new Wharfedale model for Autumn 1988 – far better to concentrate all efforts on one model and do that properly than conduct an annual relaunch of a complete range, incidentally alienating one's dealers by leaving last year's models unsold on the shelves. The risk of course is neatly summed up in the cliché about eggs and baskets...

The *Mk2 505* is a vital basket of eggs too, situated on pole position for the serious hi-fi loudspeaker market as a largish 'bookshelf' model priced at £170. The sketchy manual is not specific to this model and makes no sitting recommendations, but Wharfedale reckons a compromise position a foot out from a rear wall is about right, and this matches the measurements well.

It's naturally a two-unit design, and the basic constituents suggest pretty good value for money. Not only is the slightly squat and shallow enclosure generous in size, but it's also built in substantial 18mm stock – chipboard for the carcass, MDF for the baffle – and has an internal plywood brace. Finish is the usual adequate vinyl 'black ash' but an attractive red mahogany veneer is also available at a premium price.

It's basically a sealed box, the low frequency alignment slightly 'doctored' to produce a third-order rolloff. The drivers are both high tech devices: the bass/mid is a 'full size' unit with 165mm MFHP (mineral filled homopolymer) cone on 200mm frame, using a 4-layer wound 26mm voice coil; the 20mm

treble unit has an aluminium dome and ferrofluid damping.

LAB REPORT

Sensitivity measures around 86-87dB, which used to be considered average but which is now slipping a little below. It's adequate enough nevertheless. The impedance characteristic is on the low side overall, dipping to around 4ohms at 10kHz. Low frequencies show respectable enough extension, with a comparatively gentle overall rolloff that should be nicely assisted by siting near a rear wall.

Though somewhat uneven, the bulk of the 1m reference response is comfortably contained within close ± 2 dB limits across the bulk of the range. However, pair matching might have been closer – there was an occasional sideways shift in the stereo image – and the thick and unrebated grille is best left off. At least the tweeter dome is protected from probing fingers by its own little grille.

The off-axis response set shows good control, though the comparative directivity of the bass/mid unit at the top of its range is obvious, and there's a mild crossover notch above the main axis. The room averaged response confirms the decent forward balance integration. Distortion appears to be adequate.

SOUND QUALITY

The *505.2* was auditioned twice by the panel, and rated solidly above average on both occasions, which is impressive for the price. The most common criticism was of a lack of scale and true bass extension – a factor marginally improved when the speaker is moved closer to the wall – but also some lack of definition and authority at the low end. But there was also consistent praise for good detail and delicacy, a nice 'openness' and an attractive

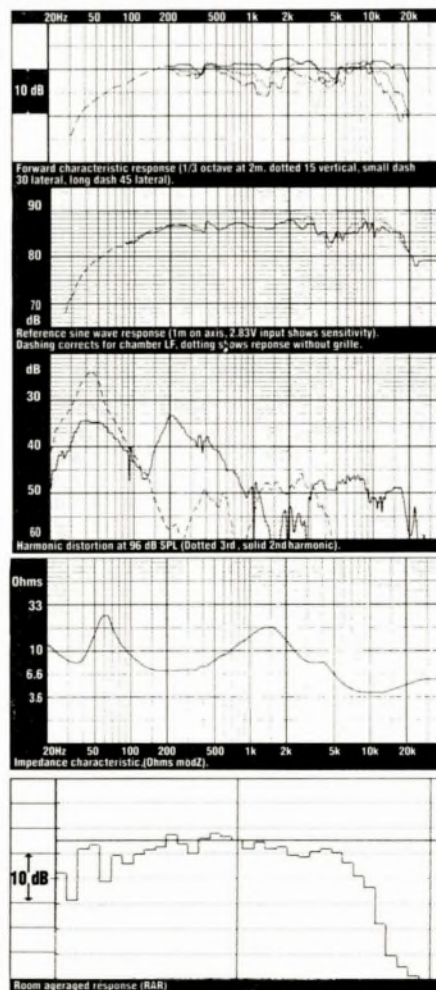
'lightness of touch'. Ultimately the *505.2* is musically enjoyable and tolerably convincing, accepting the fact that it still sounds like a loudspeaker.

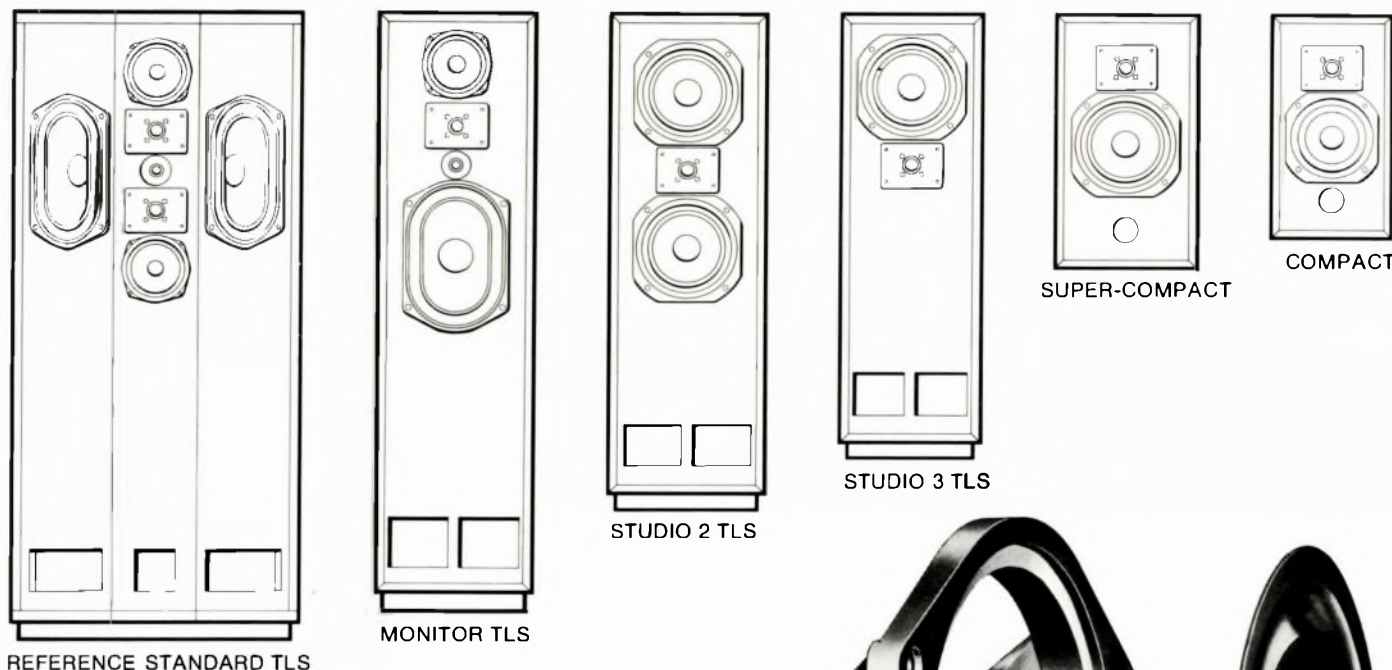
CONCLUSIONS

You don't find hi-fi perfection in a £170 loudspeaker, but you can find a well judged set of compromises plus a package which offers sound engineering at a sensible price. Given the positive reactions of our listening panel, a Best Buy rating seems entirely appropriate.

TEST RESULTS

Size (height x width x depth)	44 x 25.5 x 24cm
Recommended amplifier power	20 – 80 watts
Recommended placement	on stands 1ft from wall
Frequency response (± 3 dB, 2m)	70Hz – 20kHz
Low frequency rolloff (-6 dB/1m)	55Hz
Sensitivity (ref 2.83V-1W/8ohms; 1m)	86dB
Impedance characteristic (ease of drive)	adequate
Forward response uniformity	fairly good
Typical price per pair inc VAT	£169





bass obbligato...

Developing a driver for optimum performance under transmission-line loading requires lateral thinking. The TDL bi-radial unit has the power handling to withstand this acoustic environment, yet the speed to provide more articulate bass. As John Borwick remarked in 'Gramophone', "the effect with programme material containing really low frequencies is impressive and musically rewarding", whilst "the bass had a tightness which added definition all the way up the scale...". Also reporting on the TDL Monitor, Martin Colloms in 'Hi-Fi News' stated that "the bass remained clean at full power, and well differentiated from the mid and treble. Cathedral organ could be reproduced at impressive levels, with fine weight accorded to the pedal registration; but by contrast, its reggae performance was not to be sneezed at." In conclusion, he suggested that "if extended bass is important to you, then you owe it to yourself to hear this speaker".



TDL
ELECTRONICS

transmission line speakers

Transducer Developments Limited

PO Box 98 High Wycombe Bucks HP13 6LN England Tel: (0494) 41191 Telex: 838050TDL-G Fax: (0494) 461803

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LOUDSPEAKERS TECH TALK

Listening and lab test procedures covering these latest reviews.

Although both the reviewer and the listening room have changed (again!), much of the methodology originated over a decade by Martin Colloms remains largely intact. The same technical tests were carried out in the same anechoic chamber, ensuring reasonable continuity between the new reviews and those from the past. The room measurements too employed the same apparatus and computer averaging technique.

Comparison between the same loudspeaker measured in the current listening room and those used previously confirms that the differences are slight across the bulk of the audio range, though there are inevitable contrasts at the low frequency end where main room modes come into play.

THE LISTENING TESTS

The 'blind' listening tests occupied four days, with about five listeners jockeying for the best seat. Some 40 separate presentations of about half an hour each allowed room for a number of repeats and some sifting experimentation. The programme was split evenly between vinyl and compact disc sources and selected to provide a broad range of music. The panel was also selected with some care, in the hopes of providing a range of different tastes rather than pursuing a single philosophy.

Care was taken to 'normalise' the relative volume of each loudspeaker as far as possible to compensate for different sensitivities, given that frequency balance differences are not adjustable and unavoidably get in the way.

Choice of ancillary components inevitably influences the type of sound, possibly by even more than the room itself. The original plan had been to alternate two different amplifier systems and loudspeaker cables, one from the CD source (Marantz CD75) and the other from vinyl (a Naim-modified Linn Sondek on OL Skyline Ultra table), so as to satisfy a range of tastes. But then I couldn't get hold of the second amplifier set because the lender was out of the country, so we ended up using my tried and

trusted Naim pre- and power amplifiers, with their own cable.

While some were perfectly happy with this arrangement – I for one would not welcome four hard days listening with anything else – others found the sound somewhat unfamiliar and a little disconcerting in stereo terms. The Naims do not create the delicate airy transparency of some rivals, though they more than compensate in my view with their superior grip and dynamic integrity.

Before the listening started it was necessary to make certain decisions. The first one was to leave the grilles on. Not because the speakers sound better that way – usually the reverse in fact – but simply because most people use them that way, outside the worshipful company of audiophreaks. For similar reasons, and to avoid introducing another variable, we also decided not to use bi-wiring (where applicable).

Save for the odd floorstanding model, all the speakers were used on Heybrook HBS1 stands for the blind listening tests, simply because these are as close as anything to an industry standard. These were 'floor-keyed' into crosshead screws at two positions: as close as practical to a rear wall for 'wall mount' models, and 1-1.5m away from room boundaries for 'free space' designs. As far as possible the loudspeakers rested directly on the upturned spikes, but Bluetack was used for models with small footprints that didn't span the spikes.

The main listening programme consisted of the following extracts: *Who knows where the time goes?* (The Best of Sandy Denny, Island CDSD100); *Fionnghuala* (The Best of the Bothy Band, Mulligan LUN041); Vaughan Williams, *Mass in G minor* (Christ Church Cathedral Choir/Stephen Darlington, Nimbus N15083); Sibelius, *Symphony No6* (VPO/Maazel, Decca D7D4); Vivaldi, *Le Quattro Stagioni* (The English Concert/Pinnock, Archiv 400 045-2); Black Uhuru, *Youth cf Eglinton* (Red, ILPS 9625).

My particular thanks go to Chris Bryant, who supervised

(and carried out) most of the measurements, Martin Colloms, Jason Kennedy (the listening test operator), Dan Houston (who proved that even quite short people can lift TDL Monitors singlehanded), and to the patient and persevering listening panel: Derek Hughes (Spendor), Peter Comeau (Heybrook), Richard Ross (Rogers), David Amey (Celef), Daniel (Harbeth) and Russell Kauffman (Studio Power).

LAB TEST PROGRAMME

For the sixth 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 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 one 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 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.

Sensitivity and power rating

From the reference curve, a mean midband sensitivity figure was recorded, corresponding to the sound pressure at one 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 distortion, 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.



LOUDSPEAKERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Paul Messenger runs through the findings of the latest loudspeaker tests, with summaries on the best of the bunch.

Having cheerily waved goodbye to 29 pairs of loudspeakers, returning gratefully to the futon to rest a slipped disc, I am required to ruminate on The Big Picture, and describe the current status quo as I see it.

First, one cannot fail to be impressed at the way stiff competition at the sharp end of the market continues to tighten up the performance and presentation of the two-unit 'bookshelf size' loudspeaker. Even within this apparent stereotype there is wide variation in size, shape and performance – not to mention suitability to different systems and siting.

However, there's no doubt the loudspeaker industry does suffer from 'rangeitis' – the need to produce a full range of models to meet specific price points and size expectations. With the odd exception (eg Tannoy) such ranges tend to be a mixed bag of good and indifferent. One wonders whether a 'one model at a time' approach might not result in more hits and fewer misses.

'Black ash' vinyl finish seems to be today's most common denominator. This at least has restraint on its side, and is usually rather less offensive than other attempts to imitate tree wood. But if Castle can put real wood around a decent size £170 box, surely some of the bigger

manufacturers could offer the same?

If the cabinets are getting a bit boring, the graphics are doing a good job in keeping the product looking sharp. But the grille is all too often treated as an irritating afterthought – which it probably is as far as the development engineers are concerned. Granted 'naked' operation is fine for the lab or some domestic environments. But not, I suspect for the majority, both on aesthetic and protection grounds. A shiny silver button that makes noise has a magnetic attraction to the probing digits of the under-fives – once dented, a metal dome becomes a replacement job.

My other niggle is to do with speaker placement. Although some manufacturers certainly do consider room interaction when starting to design a loudspeaker, in many cases this shares afterthought status with the grille.

Trying to establish where to site loudspeakers ahead of the listening tests was far from easy. Many of the booklets that were packed with the loudspeakers turned out to be 'range manuals', not model-specific, usually containing a few paragraphs of generalised homilies to do with placement. Much of the content is valid enough, but it's not

particularly helpful to the owner or dealer trying to get the best out of a particular model.

On the subject of placement, one could also criticise the tendency to create 'compromise' designs which work 'equally well' (for which read equally unwell) with or without rear wall reinforcement. Placement is a crucial aspect of speaker performance, and the difference between a wall-mount and a free-space sound is fundamental. In a sense the former attempts to 'drive' the room (by no means always successfully), while the latter tries to pretend the room doesn't exist (sometimes with equally dismal results). Though proponents of both sides claim rectitude, the marketplace shows each has its constituency, just as there is pluralism amongst amplifiers and turntables.

Seeing as how the majority of people allow domestic decor to dictate the siting of the speakers, leaving just a little flexibility available to tweak the sonics, I feel the question "where are you going to put them?" actually has more relevance than "which do you like the sound of?"

Having got that off my chest, I should admit a personal preference in favour of wall-mounted speakers, though I hope that by choosing a number of 'free-spacers' for the panel the overall results of this review doesn't show significant bias.

That said, bias and opinion are an inevitable element in any reviewing process – it's naive to pretend otherwise. The observant reader will doubtless note shifts in emphasis between yrs ttry and previous incumbents, simply because each listener has his/her own priorities in hi fi and music reproduction. For myself, a firm and fast bottom end matters more than a transparent stereo soundstage (even though it's nice to have both), though I know others who would place those characteristics in reverse order. Given that there are probably twenty such specific qualities that one could identify or dream

up given time, it's hardly surprising that one man's meat can turn out to be another's two veg.

To take a very pertinent example, I experimented with several alternative loudspeaker cables, both for interest and specifically to check out the 'bi-wiring' option that is increasingly available on even modestly priced models. I had both Mission *Cyrus* (solid core) and Hitachi *SSX-104E LC-OFC* in bi-wire configurations, but went quickly back to my single-wire Naim cable. The others had offered more top-end sweetness and possibly less coloration, but also seemed to rob the music of significant energy and zest. But I guess others feel differently about such things...

If loudspeaker cabling introduces one sort of variable, loudspeaker stands introduce another factor which is probably even more important, yet no better understood. Certainly some loudspeakers (eg Celestion) seem to prefer central pillar stands, whereas others (eg Heybrook) seem to prefer a lighter, open frame, just as some will sound better with spikes, others with Blu-tack coupling. And of course the coupling of the stand to the floor gets tangled up in the proceedings too, depending on whether it's wood or concrete, solid or suspended, and so on. The number of possible variables soon approaches infinity, with ad hoc experimentation the only solution.

Looking at current loudspeaker talking points, there is still a regrettable tendency to hype new technology as though a quick fix was the Paracetamol of all ills. History has invariably shown otherwise.

Metal dome tweeters have the dangerous look of becoming a fad about them – and certainly a good metal dome, sensitively used, can produce fine results. But it doesn't take long before someone twigs that a nasty metal dome applied any-old-how can



A lot of speaker for the money – the Tannoy Mercury S.

sell loudspeakers – and with fatter profit margins. All that glisters . . .

A good loudspeaker is ultimately the one that lets you enjoy and discover your music, whatever its technological content. We do our best to dig below the surface of the designs, and try our hardest to conduct sensible and valid listening tests. But you are the person paying out the money, and you are going to have to live with the consequences for the next few years. So shouldn't you also take an active part in the decision making process too?

BEST BUYS & RECOMMENDATIONS

The 29 new reviews in this issue build on a background of hundreds of previously tested models, many of 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 we have just had to do our best to correlate standards and opinions between the different reviewers involved.

One source of concern – and the reason for a nice round number like twenty nine – is that we opened 32 pairs of loudspeakers before finding 30 that work on both channels. And three-quarters of the way through the test programme we discovered another pair that had been manufactured with a vital component missing, forcing abandonment of that review.

Admittedly the two silent samples could probably have been fixed in seconds if we'd had the correct tools to hand (many designs use bolts designed specifically for power tool operation these days), and the faulty-but-working examples were in fact a simple enough dealer fix. But a from-the-box failure rate of 6-10 per cent (depending on interpretation) is not impressive.

The latest project has thrown up some four new additions to our Best Buy accolade, plus eleven new Recommended models. This is a slightly higher 'hit rate' than last time around, which might suggest that PM is a bit softer than AG. But the

difference is attributable to the higher average price of this group. Last June's sample became budget-oriented in order to hold back upmarket models for July's special 'high end' edition, *The Collection*.

UNDER £100

There are no new under £100 Best Buys for this issue – which is hardly surprising since no under-£100 models were received for review. The £100 price point has been a millstone around the hi-fi loudspeaker industry's neck for some years now, imposing cost constraints that inevitably reflect in the performance, but it would appear the psychological price barrier is now well and truly broken.

That said, there are still some artful miniatures around that we have tested in the past, which do provide a reasonable facsimile of hi-fi performance. They

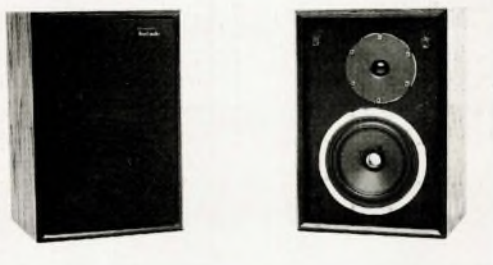
higher prices.

Sony's UK-made *APM10* more than comfortably made the grade subjectively in the 1988 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 too, and include the *£85 Mordaunt-Short MS10II*, *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



The poor man's Darius, Royd's rock solid Eden.

invariably benefit from mounting near a rear wall, and in many cases wall brackets will be a cost effective alternative to rigid floor stands – these little boxes often work better at or above seated listener head height.

Best Buy ratings for the *£80 Goodmans Maxim II* and *Wharfedale Delta 30* and the *£100 Sony APM10* continue from previous editions. AG waxed very enthusiastic over the *Delta 30* last summer; despite marginal build quality, the tweeter sounds comparatively civilised and the sound fundamentally musical.

The *Maxim* is the true miniature which has persistently succeeded in our tests, where its more fashionable Wharfedale *Diamond* rival has never shone. But bear in mind that no miniature can really rival the slightly bigger models that are available at only marginally

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 three new Best Buys in this sector, starting with the latest baby *Mission 761*. This *£120* model is a real lulu, stepping firmly into the illustrious footprints of the Best Buy *70* and *700LE* models. Like its forebears it can sound a shade rough around the edges, but it's also honest, articulate, lively – and above all communicative.

The *£160 Tannoy Mercury S* steps confidently into the limelight vacated by its predecessor. It's a surprisingly refined free-standing model with good transparency and detail, and appeals to a wide range of tastes.

Although the new *£169 Wharfedale 505.2* doesn't manage to sound any bigger than its pricetag suggests, it is still a decent sized box that can sound as delicate and 'open' as models costing twice as much.

From earlier editions, 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 *£140 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. And from the same stable comes the classical/CD oriented *Rotel RL850 II* (£130).

The new model to achieve Recommended status is the *£180 Celef Cirrus*, this famous brand reappearing on the UK market after an absence of several years. It's a shade small, and could have measured smoother, but *Cirrus* is usefully uncritical of siting, delivering a consistently good balance with nice imaging and transparency and only mild coloration.

Ongoing Recommendations include the *£125 JPW PI*, and its *£145 F2* brother. Both provide plenty of well finished box for the money, while our sound quality assessments have varied somewhat over the years, though still comfortably justifying Recommendation.

The *Celestion DL8* (£199) is a model which handsomely endorses the trend towards metal tweeter diaphragms, and provides good bass extension besides, though a touch of 'boxiness' suggests the cabinet could be better controlled.

Medium size models that benefit from some rear wall assistance, include the lively *Heybrook HBI* (£189), and the more laid-back *Castle Durham* (£199), plus the smaller *Mordaunt-Short MS100* (£189). The tiny *Castle Clyde* (£149), however, prefers free space siting.

Continued over the page



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£200-£300

The £250 *Heybrook HB100* is the new Best Buy in this middle price category. It's a particularly good example of a speaker that convincingly benefits from wall siting, managing to sound impressively open and uncongested with fine subjective 'speed'. It may not be smooth or sweet enough to suit all listeners, but it does show real singleminded commitment to a specific ideal.

From the last edition and also included in this issue, the *Musical Fidelity MC-2* (£299) is meticulously designed to give a marvellously well integrated, coherent and 'fast' sound, and is a

Recommended a year ago, AG persuaded us to up the £300 *Monitor Audio R352/MD* to *BB* status last summer, but full reassessment places it back amongst the *Rs*. It's a big wood veneer box for the money, with nice detail and some transparency. But the bass does tend to try and take over and spoil things, given half a chance.

Survivors from earlier projects include the £210 *JPW AP3* and *Sony APM22ES* (£250).

£300-£1000

Above £300 we withdraw the Best Buy category with its emphasis on value for money, but there are many highly recommended

tweeter but in a three-way pulp cone combination. The mix is a little larger than life sonically, with a touch of incipient 'boom'n'tizz', but is essentially open and articulate with a good sense of scale.

In some senses the Canadian *Energy 22 Pro Monitor* (£600) combines many of the better sonic characteristics of the other two – much of the precision of a two-way monitor in a notably punchy package – but the presentation is very nondescript at the price.

Ongoing compact Recommendations from previous editions include the *Linn Sara* (£749), *Technics RX50* (£500), *Castle Pembroke* (£309) and *Spica TC-50* (though we've yet to audition the current version which has new drivers and, we're told, sounds even better. Larger models – no less sensitive to careful stand mounting and siting – include the *Rogers LS71* (£399), *KEF 104i2* (£849, and better used without the optional *KUBE* equaliser), *Spendor SP2* (£450) and *SP1* (£680), *JBL 60T* (£399), *Yamaha NS1000* (£900), *Ariston QLN1 Mk 2* (£350), *B&W DM1600* (£399), *Musical Fidelity MC-4* (£499) and *Mission Argonaut* (£500).

OVER £1000

At these exalted prices designs differ enormously, and opinions by nearly as much. No model should be purchased without careful prior assessment by the individual concerned.

There are two newcomers to our upmarket Recommendations, and they could hardly present a greater contrast. In the last loudspeaker issue the *AE1* caught AG's attention, and now the £1138

Acoustic Energy AE2 has repeated the trick, with convincing 'blind listening' approbation. It's still a small loudspeaker, despite the price, but it does create an exceptional combination of delicacy and dynamics with firm control and good stereo.

Price per cubic foot, the £1,600 *TDL Monitor* looks an exceedingly good deal, and certainly provides bass extension and solidity well beyond the norm, yet with much of the stereo precision and delicacy of smaller monitors.

Many Recommendations from previous test programmes are still available. Such loudspeakers are rarely actually replaced, but tend instead to evolve and be gently refined whilst keeping their own particular character.

Even the cluster of 'conventional' dynamic models show greater variation than the complete population of under £1,000 loudspeakers, the abovementioned two being joined by the £1,150 *Mordaunt-Short MS442*, *Spendor SA3* (£1,400/2,208), and *KEF 107* (£1,890).

Panel (dipole) speakers operate quite differently, stereotypically sacrificing some bass extension and impact for a sweet and transparent midband. Leading examples include the *Quad ESL63* (£1,538), *Magneplanar MG2.5R* (£1,897) and *MGIIIa* (£2,650), *Apogee Calliper* (£2,550) and *Scintilla* (£4,990).

Then there are hybrids, like the *SD Acoustics SD1* (£1,050) and the *Celestion SL600* (£1,470). And last but not least and most different of them all is the full range horn-loaded *Tannoy Westminster* (£3,400).



The *Heybrook HB100*, a convincing wall mount loudspeaker.

persuasive advocate of the metal-dome approach to tweeter construction.

There's quite a clutch of new Recommended models, starting with the £235 back-to-the-wall near-miniature *Royd Eden*. It has no bass at all worth speaking of, but is so articulate and informative in the midband that I willingly forgive the slightly 'pitty' treble. It's an oddball, that you'll love or hate – no equivocation here – and is probably set to become a cult.

The £259 *Linn Helix* may not be quite sure of the best place to stand, but it presents arms very prettily on its little monopod foot. It sounds well balanced if a trifle fierce, but with a nicely rounded and articulate bass delivery.

The *Tannoy DC2000* is particularly good value at £300; being floorstanding, there's no need to find another £50 for a stand – and it's so sensitive you could probably drive it direct from a CD player! The unique new dual-concentric driver doesn't give the cleanest, sweetest sound, but it's a lively and engaging performer with loads of headroom.

models nonetheless. These fully justify their high 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 investigated if available.

From the latest tests, brand new Recommended models start with the £450 *Monitor Audio MA852/GOLD MD* – essentially a refined version of the £400 *852/MD* which achieved similar status last summer. It's a sophisticated compact, on the surface and under the skin, and sounds clear and communicative, if a shade strong in the treble.

Three new Recommendations cluster around the £600 mark, yet show wide diversity. The *Rogers Studio 1a* is a classic example of the BBC monitor tradition, updated by the latest metal dome tweeter technology. Tonally accurate with fine stereo and transparency, the balance can sound a bit 'heavy' under some circumstances.

The £600 *Canton 60 Karat* comes from an entirely different tradition, again using a high tech



A representative from the 'big is beautiful' school, the *Tannoy Westminster*.

When fine design has classic looks and

"has a glass-like clarity and transparency, which lends support to near holographic image quality. The bass is not merely deep, it is highly tuneful and has an unusually open, free breathing quality. It really moved air . . . and provided a positive sense of drive and foundation. Well informed design listening and ambitious pricing are the key ingredients of this articulate and dynamic loudspeaker."

Alvin Gold, Hi-Fi Answers



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CHOOSING AND USING . . . PERSONAL CD PLAYERS

Jason Kennedy outlines the pros and cons of the 'walkable' CD player and details the test procedure used.

Writing anything about personal stereos is difficult without the word *Walkman* cropping up. The name, like Hoover and vacuum cleaners, has become synonymous with the medium. And now the imaginative Sony Corp has come up with yet another catchy name for the variety of personal found in this test – *Discman* – which may have the same effect in time, but it's hard to tell. It really depends on the success of the format, which will never be as cheap as the cassette playing alternative even if the software becomes similarly priced.

The CD personal is the digital equivalent of a *Walkman*, being a miniature portable compact disc player. Transport controls are generally more sophisticated – all but one of these machines incorporate skip/scan and have a variety of repeat modes, ie one track, the whole disc, or in random order. They are not quite as sophisticated as domestic CD players (well most of them aren't) but revolutionary by portable standards, featuring elapsed and remaining time displays and track programming.

Unlike *Walkmen*, line output sockets are a common feature and these machines are obviously potential substitutes for a standard domestic CD player, most models coming complete with a mains adaptor and appropriate interconnect cable. One model in this month's group even has infra red remote control. However, personals don't compete that well on sound quality for money grounds; only a few surpassed the £150 domestic CD player used as a sound quality reference during our listening tests, but they take up considerably less space, they're portable, and look tasty to boot.

Their flexibility also means that in-car use is quite practical, most companies offering the option of power connections to a cigarette lighter and audio connection via a dummy cassette

to a normal in-car cassette player.

When it comes to home use, placement of sockets is a criterion to consider. If you don't want wires sprouting star-like from each side of the machine go for one with the line out and power in sockets at the rear – luckily most are made like this, but not all.

One model tested this month, the Kenwood, even has a digital output so that serious enthusiasts can connect it up to a high quality Digital-to-Analogue converter (DAC) housed in a separate box. Somehow I can't see audiophiles spending this much on a personal to use it in the home and it's probably more appropriate to the steadily growing digital amplifier market.

All the weights quoted are dry, ie without batteries where batteries are removable.

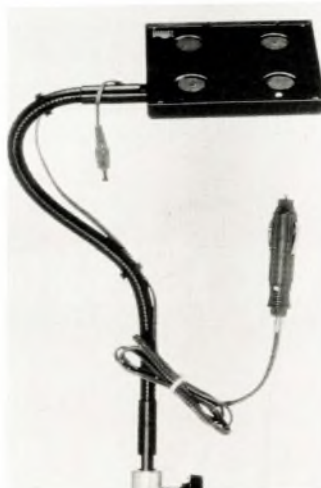
Discmen average a good 100grams heavier than *Walkmen*, which makes a difference if the thing is in your pocket. Likewise, sizes are quoted for the smallest possible; many of the mid-priced models like the Sanyo have separate clip-on battery packs which increase overall size.

TEST PROCEDURE

All the units were tested using mains adaptors and listened to in three stages. The first stage involved a reference interconnect cable and CD player, the Toshiba *XP-9318* (connected with the same type of lead) playing through an Audio Innovations *500 Series* integrated amplifier driving Snell *Type Js* on Pirate stands via Audionote cable. Six tracks were played at the same volume and used to make A/B comparisons. For the second stage we replaced the interconnect cable with the one that came with the player, or a Sony one if not, and played some of the previous as well as some new tracks at a generally higher volume. Finally, the headphones (or more usually 'earphones')

were tried and compared with Aiwa *HP-X8s* for reference purposes.

The first stage, because of the interconnect and comparative element, was perhaps the most revealing. Whilst being good value for money the reference Toshiba isn't a stunning player when compared to more costly domestic models, and we would have hoped most of the personals to be of a similar or better standard. This didn't turn out to



Adaptors for using CD personals in cars are readily available. Sony even manufactures a shock-resisting platform for its players.

be entirely the case and only the £250-plus models really gave the *XP-9318* a run for its money, while just two models excelled to the extent that a better reference would have been useful.

Pushing up the sound levels revealed the degree to which music was being distorted. Due to the very similar nature of the largely inexpensive bandwidth limited earphones that are sold as part of these packages, the way they reproduce sound doesn't vary a great deal; rather they reveal within their means what the player is telling them. An upgrade is often advisable if you fancy hearing the low frequency element of the music and the Aiwa *HP-X8s* were used

to give a better idea of the signal quality coming out of the headphone socket. Although the Aiwas don't represent the state of the art they are reasonably good and compact.

The compact discs used in the test included:

Hi-Fi Choice/Decca Autumn release highlights
Flim and the BB's – *Further adventures cf. . . .* (DMP)
Rush – *Signals* (Mercury)
Michael Hedges – *Strings of Steel* (Wyndham Hill)
Frank Zappa – *Specialised Digital Audio Gratification* (EMI)
Was (Not Was) – *What Up, Dog?* (Fontana)
Laurie Anderson – *Mister Heartbreak* (Warner)

LAB TESTS

The lab tests were carried out with the help of Alvin Gold using his test equipment and coffee. Most of the measurements have been carried out in previous *Choice* CD player tests and we would point anyone interested in their purpose and implications to a back issue for a technical explanation. The wideband white noise sweep hasn't been used by us before and gives some idea of the way a player's filters cope with noise above 20kHz. Another white noise plot was made using much higher resolution and staying within the audio band, but this turned out to be too messy to print. However, it gave a good idea of how players dealt with a signal that resembles music a lot more than the single tone used for the frequency response. Where dramatic effects were noticed we have mentioned this in the lab report of the appropriate machine.

CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

For brief summaries of the ten machines tested here please turn to the Personal Stereos section of the *Directory*. It's near the back, after headphones.

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GOODMANS GCD-10

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If you gauge personal stereos by the amount of accessories that a particular model has then the Goodmans *GCD-10* is the unit for you. At less than half the price of the OTT Toshiba model this Korean sourced machine sports nearly as many extras, most of which are potentially useful. What it costs is £119.95, the cheapest we've come across, and what you get is a mains adaptor, a carrying case with two straps, an audio interconnect and a cuddly toy, oh and something else... ah, yes, a CD player.

As with the Philips model it betrays its price with its bulky, plastic construction — price seems to be inversely related to volume on the personal stereo market and this one is hardly pocket sized.

The usual buttons are laid out on the front edge of the machine, which while not as good as having the major ones on the top, is quite adequate and even rational for portable use. Playback features are reasonable if not up to the standard of the more expensive machines, there being two repeat modes and a programme/memory function.

One can get the thing moving with the supplied mains adaptor or by fitting six AA cells, which if they are of the appropriate variety, can be recharged in situ. Socket layout is not very well oriented to domestic use, the appropriate holes being on the right hand side rather than the back. The headphones are cheap supra-aurals of the type found on inexpensive personal cassette players, 'nuff said.

When subjected to the boogie factor test, not I hasten to add the one used for setting up a *Sondek*, it took fairly severe knocks without much complaint, and in this respect is well suited to street life.

LAB REPORT

In a similar fashion to the other cheaper player in this test the Goodmans managed to produce a healthier frequency response from its headphone output than its line, which would seem to dispute the pain encountered when listening with 'phones — there don't appear to be any high frequency notches so it must be noise. This possibility is upheld by the wideband plot which shows quite high levels of noise beyond 20kHz due to overly gentle filtering; the eventual noise floor is okay but it's up to 30kHz before it gets there. On the figures front both signal to noise and linearity are very poor, the worst encountered and indicative of the large amounts of noise heard on audition.

SOUND QUALITY

When it came to domestic listening tests, the *GCD-10* got off to a rather poor start by producing a high frequency tone whilst in standby mode. This, thankfully, seems to disappear when play is started. This operation itself causing a low level low frequency thump to belch from the speakers! This is almost definitely a sample fault, or it should be.

Once the slightly noisy transport is up and

running it manages to reproduce the discs with some credibility, although the critical ear finds it a little wearing. Acoustic instruments tend to lose their colour and depth, leading to a slightly lightweight feel. The player differentiates between instruments quite well but could be stronger with respect to three dimensionality. Using the Goodmans interconnect doesn't seem to improve things a great deal, and attempting higher levels is not all that advisable, as underlying distortion becomes that much more obvious — this has a lot of the characteristics of a first generation player. Listening to the *Hi-Fi Choice* sampler, one's attention is best focused on the rhythms and melodies rather than fidelity to the original. This criticism may seem a bit harsh but so is the sound being emitted by the loudspeakers — this is one of the weaker players in the group.

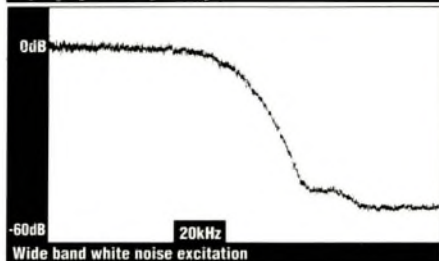
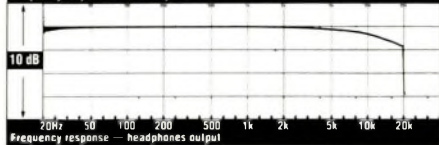
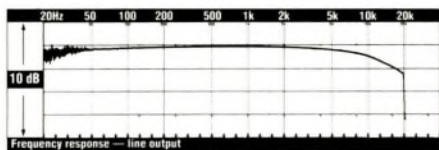
Headphone listening is plagued by a constant, high pitched whine which makes in depth listening somewhat prohibitive — another sample fault?

CONCLUSIONS

This player is nothing if not competitively priced which should ensure its place in and probably at the forefront of the market, but the unpalatable amounts of noise encountered in both listening and lab tests make it hard to recommend.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	54dB	68dB	52dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, -80dB			-63dB
Signal-to-noise 1kHz/0dB ref	-69/67dB with/without emphasis		
Size	13.5 x 3.7 x 18cm		
Weight	478g		
Price	£119.95		



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RECOMMENDED



The *DPC-77* is one macho machine. I mean, it's positively bad – the personal CD personification of a black '78 Corvette Stingray. The Sony *D-150* almost looks cute beside this monster. But looks aren't everything and Kenwood has put together a competitive product in the *DPC-77*, one that has pretensions (indicated by the existence of a digital output) to being a serious domestic alternative. Now where can I get a *Black Box* at extremely short notice?

Build quality appears to be at least of Sony quality, being made up in the same metal lid and base, plastic filling fashion. It is a little longer than the *D-150* and quite a bit thicker, the extra length being filled with a comprehensive – even complicated – array of buttons. Much like a domestic machine the *DPC-77* features separate search and track skip controls, but unlike a domestic player it also has a high filter and key lock which works in play mode only – the on/off switch guarding against accidental start up whilst not in use. And of course it has the full complement of display and memory functions, making a total of ten buttons to play with.

It's not too short on the accessories front either, the most novel being the in-car adaptor, a pseudo cassette type which transfers information via a 'tape head' to your in-car cassette deck. Other companies can provide these as an extra but such a useful device is welcomed as part of the package. Socketry is neatly laid out with the one for headphones unusually placed on the front, the power in,

line out and, digital output (a 3.5mm mono jack) are grouped at the back.

Unusually, there aren't any headphones supplied with this machine, which may seem a little cheapskate, but no phones is often better than some of the real cheapies that get thrown in with some personal stereos. With luck, you'll buy cans of reasonable quality – which is less likely to happen if you have an alternative.

LAB REPORT

Immunity to shock is good, better than the other pricey models we've tested, and in the same league as the big plastic cheapies.

The '77 turned in test results which are commensurate with its price by personal standards at least. The frequency response is reasonably respectable and THD as good as we could measure on our test rig. Harmonic distortion is a bit uneven, not too good at the extremes but acceptable in the lower mid-range and thus hopefully adequate elsewhere. The broadband response, which isn't shown, is one of the more even examples encountered. It's far from flat but not disturbingly so.

SOUND QUALITY

The *DPC-77* turns out to be one of the machines that is good enough to be hard to criticise without a superior reference, a category that the reference Toshiba doesn't really fit into. The most appealing characteristic is a clean and delicate treble, devoid of grain or sibi-

lance. Though the sound doesn't breathe in the way the best analogue front-ends can, the *DPC-77* nonetheless sounds essentially accurate if missing the harmonic element of notes. Bass is unusually extended and tight, which is particularly helpful in describing notes completely and rendering ambience effectively.

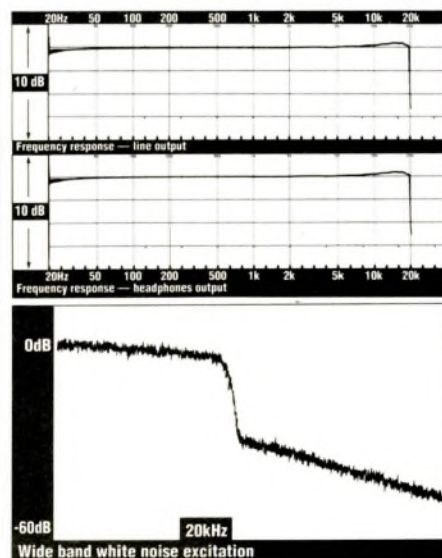
The standard is maintained with the Kenwood's own stranded interconnect which cuts very high frequencies a bit but otherwise works adequately at revealing what the player can extract from the disc. The machine also works just as well at high sound levels, failing to harden or sound grainy in the usual manner, whilst revealing the variations in disc quality and recordings. Using the reference headphones revealed a similar standard of output, one which is eminently listenable and containing fair bandwidth, subtlety and dynamics.

CONCLUSIONS

Kenwood has come up with a serious contender in the *DPC-77* which not only looks and 'feels' very nice but sounds good as well. Unfortunately, a *Black Box* wasn't available to try out the digital output but it's logical to predict that using one would produce healthy results. Not cheap, but it inspires confidence and can be firmly Recommended.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	52dB	70dB	50dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, -80dB			-76dB
Signal-to-noise 1kHz/0dB ref			-89/87dB
Size		12.8 x 3.5 x 14.5cm	
Weight		750g	
Price		£270	



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At £129.95 the Philips *D6800* is one of the least expensive examples of the personal CD player art that we could unearth. It's a bulky, mostly plastic player that betrays its price by its light weight if nothing else. The appearance is quite smart and the design reminiscent of the Ford Sierra – aerodynamic rounded edges and a recessed display. The test model came in a gun metal grey, but if you've had enough of all this machismo then check out the white version. Its various accessories include a matching and passably constructed carrying pouch and nylon shoulder strap. Fortunately both have the crucial 'digital' logo on them which just about saves it from looking like a handbag.

The primary transport controls on the *D6800* are laid out in a fairly logical fashion and give a healthy tactile response when used. The 'open' button releases a catch on the lid which moves up a little and then has to be prised up from that point, not inconvenient but less helpful than most others. There is even an introscan function which is uncommon on any personal CD player let alone a cheapie, and it enables you to go straight into play mode when it gets to the right track.

Another capability which Philips is keen to point out is its readiness for the three-inch CD, an asset if the breed survives. However, the success of this medium would appear to be in the balance as many if not most CD singles these days seem to be of the five-inch variety.

To get this machine rolling you'll have to buy six AA batteries and, or, a 9volt DC transformer as neither is included with the player. The power socket as well as the line output are located at the rear of the unit which makes it convenient for domestic use, and it's also the only machine to have twin headphone sockets – a rather cosy feature!

LAB REPORT

It's interesting to note the difference in frequency response created by the line and headphone outputs – the latter being marginally flatter overall, but hardly as even as that from the 'phones socket. Some experimentation would therefore be worthwhile to work out which is the better sounding output. The wideband white noise response shows a gentle downward slope in the audio domain and smooth filtering above that. The noise floor could be a bit lower and this may relate to the aggressive top end found on audition. THD is also a little unhealthy as is high frequency crosstalk.

The *D6800*'s resistance to shock is quite good as it takes a fair jolt to get it to stall. However, using the play or stop buttons sends a painful buzz through the 'phones – I assume this is a sample fault, but you have been warned.

SOUND QUALITY

Using reference cable and the system, the Philips sounded okay at the start of the program – perhaps a little glassy in the strings

but essentially fluent and musical with reasonable colour to instruments. However, as one worked through the tracks a certain hardness became apparent, tending to not only wear on the ear but also mask detail and information. There is definitely not the clarity that the reference displays and one is not encouraged to prolong listening.

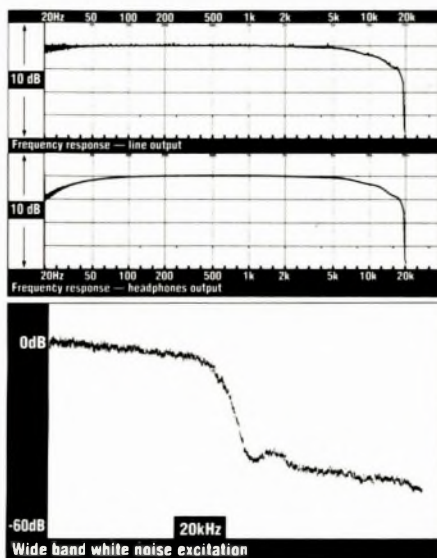
Using a stranded interconnect (Philips doesn't supply one) tamed the rather aggressive top end slightly and added some weight and power to the lower octaves, making it a sweeter sounding machine. However, it's still not that informative, nor does it have the crisp top end of dearer players, and in the long run it can be a bit of an ear bender so perhaps owners of revealing or bright systems should steer clear. The headphones tended to exacerbate the harshness, and despite a shade more bass extension than the in-ear jobs they are amongst the least enjoyable headphones in the group. A change to something smoother is almost a necessity.

CONCLUSIONS

Philips has put together a competitively priced and reasonably attractive player in the *D6800*, but its sonic performance is somewhat marred by a rather grainy top end which some might find hard to live with.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	69dB	67dB	45dB
Total harmonic dist, 315Hz/0dB			0.23%
Linearity, –80dB			–79dB
Signal-to-noise 1kHz/0dB ref			–95/92dB
Size			13 x 4 x 17.5cm
Weight			516g
Price			£130



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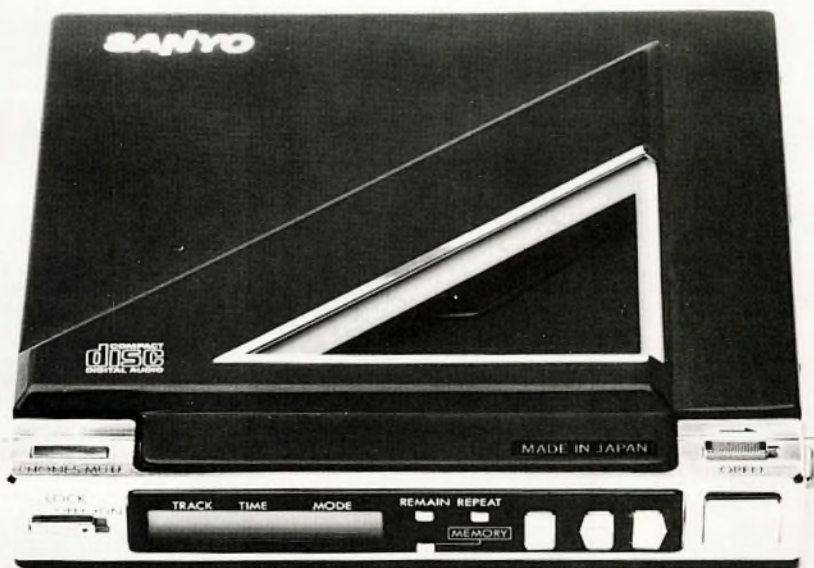
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SANYO CP12

SANYO MARUBINI UK LTD., SANYO HOUSE, OTTERSPOOL WAY, WATFORD, HERTS. TEL: (0923) 46363.

RECOMMENDED



At £259 the Sanyo *CP12* is one of the dearer machines in the test group, and it's also one of the few to feature chrome styling, making a change from the ubiquitous matt black, although flying in the face of convention as far as '80s fashion goes. When stripped of battery packs the *CP12* is a slim and attractive object, and like the better Sonys the case is almost completely metal and has three rubber feet – a logical departure from the norm. Build quality is as one might expect at the price – solid and reasonably robust by personal standards at least.

Switching is quite nice although the programming buttons are a little on the wee side and the sliding lid catch isn't very groovy, nor is it particularly easy to use. One unusual function is a 'phones mute button which works, as one might expect, for as long as it's depressed, a function that used to appear on personal cassette players but one that would seem unnecessary where a pause button is available. There's also a lock which renders the controls ineffective, thus not vulnerable to accidental knocks in a pocket or bag.

Another feature is the remote control device which has a short lead and a pen clip so it can hang out in your buttonhole or act as a naff tie clip. And when you think about it, remote control on a portable isn't as ridiculous as it may at first appear. Next to the Toshiba this is the only player to come with remote as an accessory rather than the usual option.

It's comprehensively kitted out with power

supplies, including a hefty rechargeable pack, a switchable six or twelve AA battery pack (six should last three and a half hours) and a mains adaptor. The socket layout is rational enough and the earphones are of the type that Sony calls Fontopid, the derivation of which is somewhat obscure but they're the small in-ear strapless type.

Immunity to shock is about average, only jolts or fast movement causing any problems with the laser transport – good enough for walking or driving.

LAB REPORT

The frequency plots reveal fair consistency between the two outputs and a small rolloff at both extremes, neither being particularly obvious on audition. On closer inspection, using white noise, a general downward tilt is revealed which seems more in line with the player's audible character. The wideband plot indicates fairly sharp filtering above the audio band and noise levels out slightly higher than others, which could create problems where it matters.

SOUND QUALITY

This is one of the players that doesn't do as well with the solid core interconnect as it does with the stranded stuff. With the former it tends to make violins sound slightly steely but presents music in a coherent and rhythmic fashion. Cymbals tend to be emphasised and lower frequencies can sound overblown by comparison – looking at the rolled off fre-

quency response for the reference machine one suspects that the Sanyo is merely revealing more at that end of the spectrum.

Moving on to the Sony interconnect (this 'review' sample had several bits and pieces missing, including the lead) the *CP12* becomes more and more enjoyable. It manages to present music in a fluent yet enthusiastic manner that makes it that much more entertaining, not through adding some form of euphony of its own but by revealing what's on the disc. It managed to discover dimension and depth that had previously been masked.

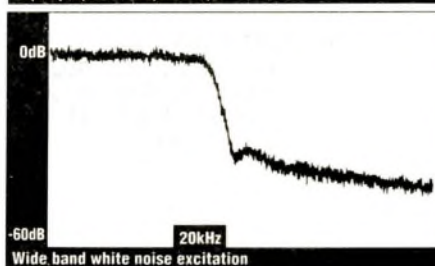
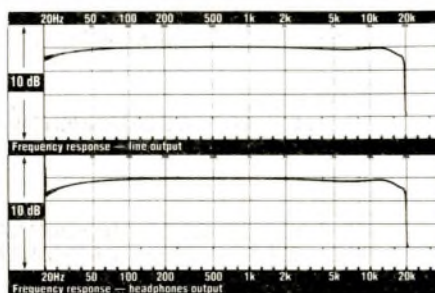
The earphones performed in much the same way as those on the Sony machines, their drawbacks being very limited, low frequency extension and a distinct lack of acoustic ambience – in other words a somewhat flat sound. Their strengths include letting through a fair amount of information and doing so in a reasonably undistorted manner, though personally I would avoid prolonged exposure.

CONCLUSIONS

This Sanyo is sonically amongst the more enjoyable players in this test group, capable of revealing the musical aspect of discs in an interesting and entertaining fashion. This, coupled with good build quality, makes the *CP12* an enthusiastically Recommended machine.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	85dB	76dB	54dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, –80dB			+11dB
Signal-to-noise 1kHz/0dB ref	–87/87dB with/without emphasis		
Size	12.5 x 2 x 12.7cm		
Weight	380g		
Price	£259		





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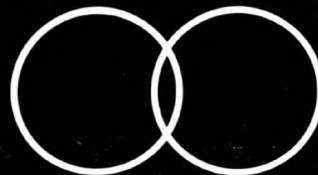
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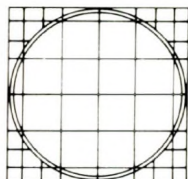
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SONY D-20

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RECOMMENDED



The *D-20* is the simplest and least expensive *Discman* that Sony produces. Priced at £150 its main concessions to price are less metal and more plastic, and a slightly less lavish selection of accessories. However, it's still a good looking machine of not too gargantuan proportions, in fact it's about the same size as the *D-40*. It has a rubber strap but not a carrying case, yet the unit itself looks pretty durable so this shouldn't be a problem. The other omission from the standard Sony accessory pack is a rechargeable battery but you can of course fit your own.

The *D-20* features relatively simple controls, omitting programming facilities but including three repeat modes and skip/scan, which cuts the button count by one and makes the beast that much more friendly. It doesn't have an on/off switch and automatically shuts down when stop is pressed, which is okay as long as you don't accidentally knock the play button whilst a disc is inserted. Although the disc hold function will stop this – if it's used.

To get the *D-20* on the road one can either adopt the mains adaptor or purchase four AA batteries which fit in a compartment under the disc lid. Unlike some other models this player doesn't have a recharging capability so you'll need to get a separate device if you want to cut running costs.

Socket layout is neat and well suited to both domestic and personal use. There is even a socket for the optional remote control. However, this unit costs an extra £30

and controls the transport but not the volume. The earphones are folding in-ear types of the sort that direct the sound forwards rather than into the ear. Surprisingly, Sony hasn't thought of a name for this variation on the theme, but it does plaster the turbo legend around quite liberally. One of the advantages that the bulkier 'Discmen' have over their neater stablemates is good immunity to shock, the *D-20* being no different, taking fairly severe jolts quite happily.

LAB REPORT

The frequency response shows little deviation between outputs which is a good sign and indicates a sharp rise in the very high frequencies, something that wasn't really born out on audition or the white noise plot (that's too messy to print but shows sharply filtered HF). The wideband plot shows rather shallow filtering and quite high levels of noise just above 20kHz.

SOUND QUALITY

The relative budget price of this player is reflected in the sound quality but not to the extent that afflicts other budget models. The very top end sounds like it's been deliberately rolled off to cut out the 'grittiness' that I find so obnoxious in cheap CD players – a good move. The sound's still a little hard and wearing with the custom interconnect, but a fair sense of timing is noticeable with notes being allowed something close to their full decay and attack. It does tend to muddle

information on certain material but remains in control with other discs, which may reflect disc quality, although it's not in the same class as the *D-40*.

Given its own stranded cable, and listened to without comparison, things improve to an extent, though there's still a certain crudeness to the sound which discourages pumping up the volume. Musically this machine fails to involve in the way that better ones do, which is partly a character of the medium. But there are degrees, and the *D-20* can get a little boring at times. However, it's clear cut and capable of presenting a reasonably wide sound stage and given a softer more sympathetic system would probably be quite enjoyable.

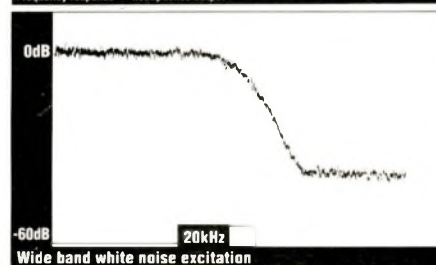
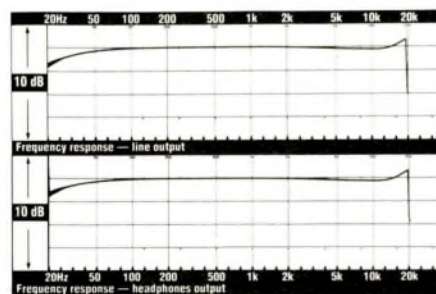
The earphones reveal the slight coarseness of the machine but do a reasonable job of conveying the musical essence of a given disc, though 'phones with better LF extension do it more justice. An old copy of Rush's *Signals* sounds quite oppressive and hard but the jaunty DMP disc is pleasant if a bit dry.

CONCLUSIONS

The *D-20* is by far and away the most durable low cost player in this group. It's positively listenable compared to one of the real cheapies and very nearly makes the Best Buy grade, but not quite. See what you think.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	77dB	74dB	49dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, -80dB			-77.5dB
Signal-to-noise 1kHz/0dB ref			-94/89dB
Size			13.8 x 3.8 x 15cm
Weight			450g
Price			£150



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SONY D-40

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

RECOMMENDED



At £200 the *D-40* is Sony's mid priced *Discman* and concedes the compactness of the dearer models – it's still not quite in the Philips ballpark but will take up some bag space. It doesn't have the almost cult appeal of models like the *D-150* and *D-88* but is still essentially a Sony product with good attention to detail and ergonomics. There's also an FM/AM radio variant called the *DT-40* which should prove successful. This particular sample is white which makes a change, and drew one admirer, in the form of the author's girlfriend who took quite a fancy to it. Alternative colours will certainly do sales figures no harm whatsoever. It's built mostly in plastic with metal lid and base – in fact it looks tougher than most but wouldn't take kindly to abrasive surfaces.

The usual seven control keys are featured, with fairly comprehensive programming, search and repeat functions – most everything that one could cope with on the Northern Line in the rush hour and a few that one couldn't. Unlike other players the *D-40* doesn't go a bundle on accessories, limiting itself to a wetsuit-like pouch which covers the transport controls, but has markings embossed on the outside to allow their use. It even has a window for the display, making it marginally weatherproof, but somewhat illogically leaves openings for the line out/power in jacks! There's also a matching rubber strap and a connector for domestic use.

On the alternating current front we have a mains adaptor, a rechargeable battery and a

slide-in battery case (four AAs) to keep the thing going when you forget to recharge it – an expensive error. As with the other large-ish players the *D-40* shows good immunity to shock, a fair jolt will cause it to momentarily cut out, but it's far less sensitive than its more expensive brethren. The earphones are the same as those found on the *150* and *20* – folding in-ear types that fire the sound towards the front of the head rather than into the ear.

LAB REPORT

An interesting variation can be seen in the frequency responses for the two outputs – that of the headphones being significantly down in the bass, which probably makes sense given that most dynamic headphones (whose own frequency responses must resemble the alps) are unable to plumb such depths. The other results are all pretty mediocre, separation being about par except for at higher frequencies, while the high resolution white noise plot shows a distinctly mid weak trend which could explain certain of the characteristics noticed on audition.

SOUND QUALITY

The first comparative test revealed some hardness in the sound and a slight preference for frequencies around the hi-hat domain, but it shows good bandwidth and presents music in a coherent and informative manner. Both ends of the frequency range are improved over the *D-20* with more power

and solidity in the bass and less grain in the treble. Comparatively there is some loss of stereo width and openness but this only crops up on certain discs.

Using the Sony interconnect sweetens up the treble slightly and makes the *D-40*, on violin for instance, sound 'classically digital' – hard, dry and lacking in ambience. However, the bass guitar and saxophone on the DMP disc are very appealing and as listening continues the sound becomes more attractive and involving, even three dimensionality seemed to improve. One has to conclude that the slightly euphonic stranded cable is preferable with less than perfect players; it smooths over the glitches and adds some much needed warmth.

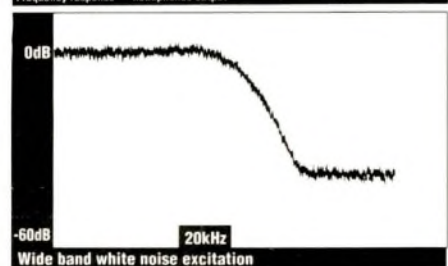
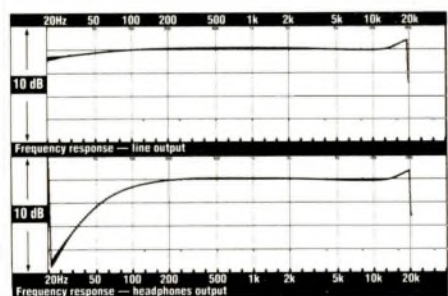
The earphones have the usual lightweight balance and give a tuneful if somewhat distorted version of the truth. The sound has a distinctly in-head nature when compared with the Aiwa *X8* but is quite enduring, even enjoyable.

CONCLUSIONS

The *D-40* at £200 is a mid priced machine that doesn't compromise sound quality too badly. It's bulkier and perhaps less sexy than other Sonys but is a sensibly made alternative and deserves Recommendation.

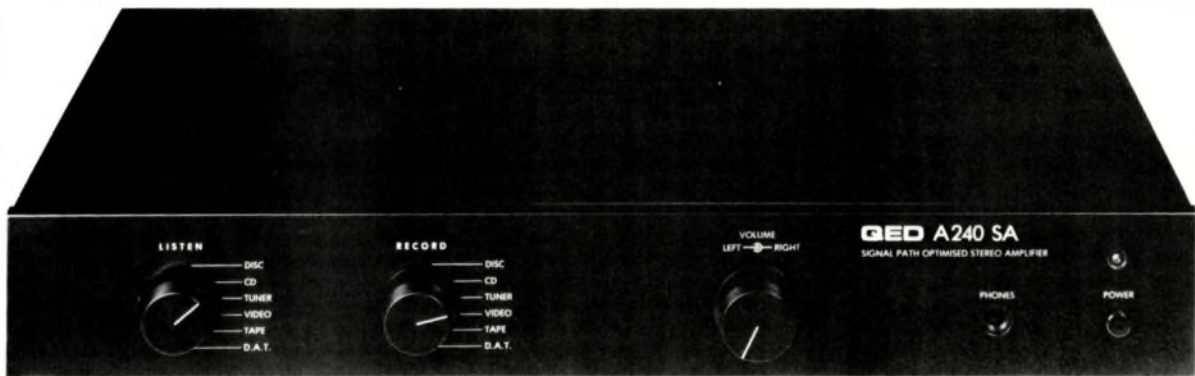
TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	68dB	68dB	47dB
Total harmonic dist. 315Hz/0dB			<0.1%
Linearity, –80dB			–76dB
Signal-to-noise 1kHz/0dB ref	–93/88dB with/without emphasis		
Size	13.6 x 3.7 x 14.7cm		
Weight	480g		
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SONY D-88

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



I have always admired the standard of industrial design applied to Sony products, especially the non hi-fi ones like video cameras and *Walkmans* (this year's range includes some very delectable models), and it looks as if Sony's turned its aesthetically critical eye to personal CD players or *Discmans*. The *D-88* is a particularly desirable piece of yuppie jewellery, without its battery pack it's little more than 9cm square and very cute.

The more mathematically inclined amongst you may have noticed that a standard compact disc is in fact 12cm in diameter, however, these cunning orientals have got around this by leaving a slot in the machine. But where the *Soundburger* failed the *D-88* succeeds. What at? Well being a cult object at least!

This does, of course, have some pitfalls when it comes to the *Discman* function as you can hardly play standard size discs with the machine in your pocket. But because of the adjustable disc drive you can play three-inch CDs whilst on the move, these being completely enclosed within the player.

The controls and display are both apparently simple affairs, the latter showing track and the four repeat modes only. However, the track numbers are probably more legible than those on any of the other machines. Additional goodies found in the large shiny box include a well made carrying case and a clip on rechargeable battery pack which increases the walkable machine's size by

about 2cm one way but does its looks no harm at all.

Socket layout is a bit messy and there's no line out as such, the headphone point suffices. There is even a socket marked remote for which Sony produces a £30 control device. The earphones are fairly expensive in-ear Fontopid types designed to be worn with the cable around the back of the neck – less messy, if initially a bit of a fiddle. The jack plug is gold plated although the socket on the machine is not. The *D-88*'s immunity to vibration is pretty poor but is just about good enough for walking.

LAB REPORT

As there isn't a line output as such; the frequency response is for the 'phones output and describes rather a hefty emphasis of higher frequencies, at least by CD standards. The same effects can be seen on both the wide and higher resolution audio band plots, the former revealing rather a high noise floor. Harmonic distortion is also rather poor – in fact it's diabolical by even personal CD standards and its effects must be masked by some sort of filtering.

SOUND QUALITY

Using the reference lead and making comparisons with the domestic machine the *D-88* tended to sound shallow and lacking in substance. Violins could sound a bit thin and scratchy and the drum on the DMP disc didn't maintain its decay that well. On the

plus side it seems a jaunty and fairly dynamic player which assists vocal intelligibility and made a better job out of the Zappa track than others. Rush also sounded better which is perhaps a bad sign as this is generally a nasty disc.

Using the Sony interconnect sweetens things up quite significantly, and although clarity and definition get worse the sound becomes more palatable if less natural. Cymbals are more obvious and lower frequencies seem to be relatively restricted which has a tendency to make the less smooth discs a little wearing in the long run. But the better ones like Michael Hedges are enjoyable and listenable even at higher levels.

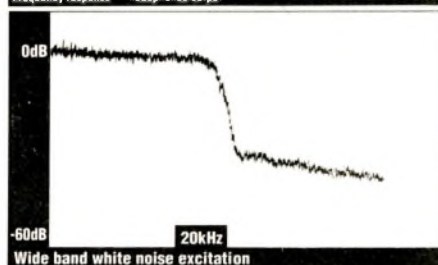
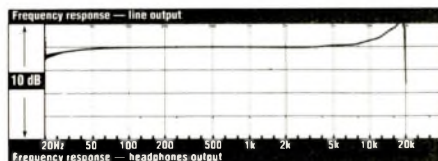
The earphones make an acceptable if not terribly accurate or natural job out of the output, certain instruments being noticeably distorted although others can be reasonably convincing. Only when the reference phones are tried does the lack of lower octaves become dramatically obvious. They are essentially okay as very small transducers go, but cans with a bit more LF extension would make nastier discs more acceptable.

CONCLUSIONS

Undoubtedly the cutest and most fashionable player in the bunch, the *D-88* is not quite so desirable as a domestic CD player, its size and mechanics/electronics inevitably compromising its sonic capabilities. However, it's far from unlistenable and only my audiophile roots restrain me from recommending it.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	56dB	57dB	55dB
Total harmonic dist, 315Hz/0dB			0.75%
Linearity, -80dB			-81dB
Signal-to-noise 1kHz/0dB ref	-75/73dB with/without emphasis		
Size	9.4 x 3 x 9.8cm		
Weight	300g		
Price	£300		



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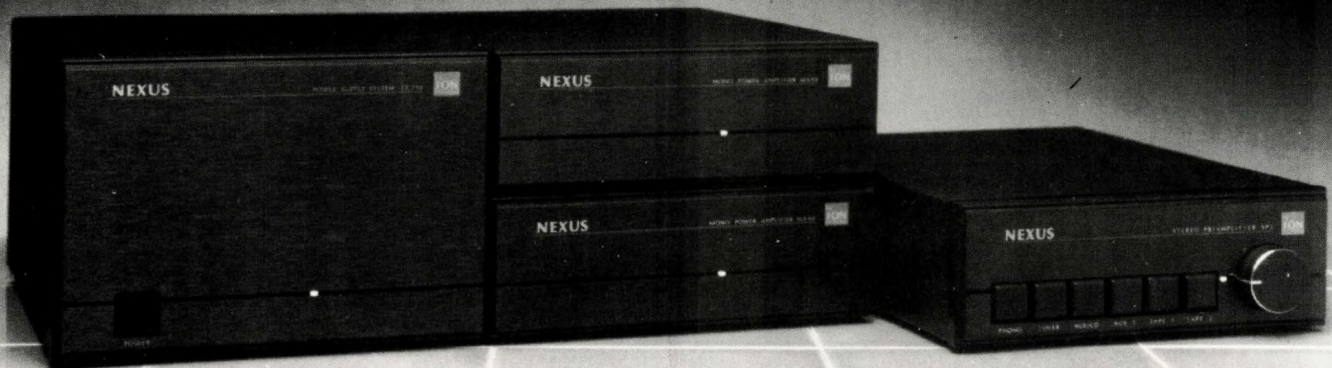


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SONY D-150

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Although the Sony *D-150* shares its hefty £300 price tag with the gem-like *D-88* it's fundamentally Sony's top personal CD player, or *Discman* as Sony calls them (it's unlikely to become as synonymous as *Walkman* but quite catchy all the same). Whereas with the *D-88* you're paying for miniaturisation and tastefulness, with the *D-150* you get a very neat package built with sound quality firmly in mind.

Build quality is, as one expects, exemplary. The, nearly, all metal shell will obviously wear well and continue to look good as it does so, that's assuming you don't drop it on the pavement without its protective case. The volume control could be a little less recessed perhaps, but then that might make it vulnerable to accidental adjustment when used as a portable. I for one, would rather fiddle around rather than risk an ear-blasting.

Despite the usual six button quota the *D-150* has more than its fair share of features including five repeat functions, 21 track random memory and an illuminated display when externally powered. This last effect being very pretty and potentially handy in the car for instance.

On the power supply front it's comprehensively equipped, the included alternatives being rechargeable batteries, a clip-on battery pack (six AAs) and a mains adaptor. Also available is a lead for plugging into a car's cigarette lighter (of use to the GL owners of this world if no one else). Another optional

extra is a plug-in remote control, which is surprisingly useful if the player is in a pocket.

The headphones are an in-ear sub species which sit in the ear at a right angle and fire the sound forward. These are quite common with conventional personals and account for the very noisy people on public transport! They aren't particularly comfortable and do tend to let in external noise but nonetheless seem to be quite popular. Immunity to external shock isn't particularly good, the laser tending to skip if the machine is only slightly jerked – it will put up with casual strolling but may falter slightly if bouncing in a pocket.

LAB REPORT

The *D-150* didn't perform as well as one might have expected in the lab tests, the most obvious example being the remarkably uneven frequency response created by the line output, suggesting that the machine developed a fault between listening and testing. The headphone output ironically looks a lot more civilised. The wideband response is perhaps more obviously related to its sonic behaviour, the very low noise floor and steep but not vicious filtering effects are theoretically good.

SOUND QUALITY

In the context of a system the *D-150* is a smooth operator, and is one of the most open and enjoyable personal CD players that I've heard. Given what is available at the price on

the domestic scene this is what one would hope for, but it ain't always delivered. However, this *Discman* came up with the goods, even showing the reference a few things, notably in the area of acoustic ambience and sweetness of treble. The latter perhaps is not an indication of absolute fidelity to the disc but an attempt at making your average silver disc a more listenable music source. It tends to subtly colour material with a sophisticated sheen, which doesn't mask much in the way of detail but tends to soften high frequency edges just a shade – a bit like vintage valve amps – well, almost.

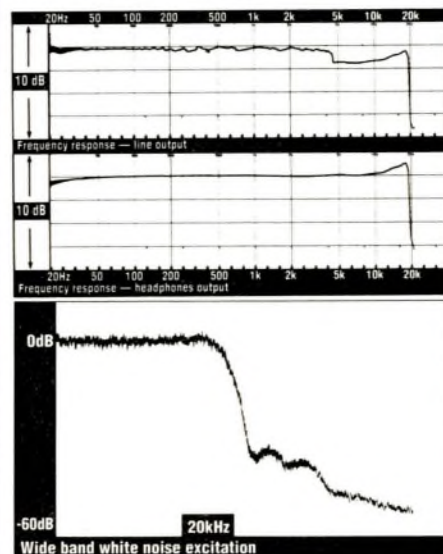
Using the Sony interconnect one lost some of the tightness in the bass and some of the air from the treble, but plenty of detail could still be heard, Laurie Anderson's vocals maintaining good depth and image. The *Turbo* earphones sound better than expected; admittedly they lack much of the lower end of the frequency range but they still sound fairly natural and open, bettering the reference Aiwas on classical material.

CONCLUSIONS

The *D-150* is, alongside the Kenwood, one of the most enjoyable machines we found. It is informative and sweet and looks attractive to boot, and despite the high price a Recommendation is the least it deserves.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	62dB	62dB	42dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, –80dB			–79dB
Signal-to-noise 1kHz/0dB ref			–94/92dB
Size			12.6 x 2.1 x 13.5cm
Weight			420g
Price			£300



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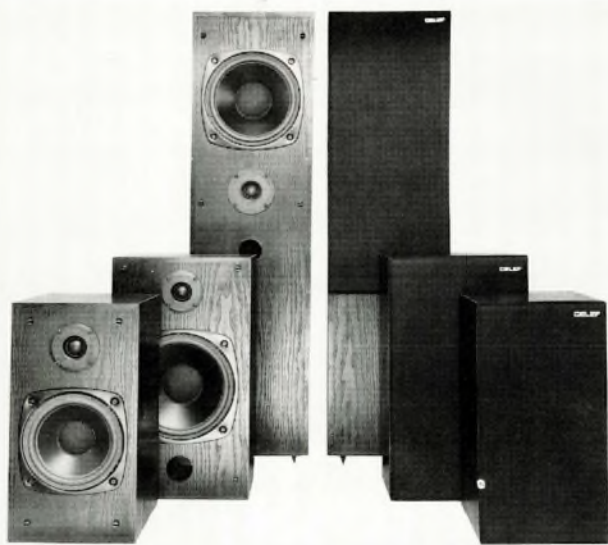
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TOSHIBA XR-9458

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Toshiba's budget priced CD players fared quite well in the last *Choice* review, and because of its diminutive size and Best Buy status the XR-9318 was used as a reference in this test. The personal XR-9458 (at least some consistency in numbering there) is an attractive and fairly compact little player that comes with a barrage of accessories including a totally OTT plinth for domestic use which houses the mains adaptor and, get this, an infra red remote sensor. Of course, there's a remote to go with it, in fact there are two, one for portable use which is relatively simple, and an infra red one with a ten digit keypad.

Build quality is commensurate with price – the finish on the lid is a sort of subtle Hammerite, which is appealing but probably not all that hardy. Outdoor users should adopt the tough plastic case that is included in the package. The various control keys give a pleasing soft click when used, and alongside the usual transport controls there are three buttons for programming and changing the display. (It's remarkable how the analogue generations managed to survive without knowing elapsed and remaining time!)

To run this baby you can either use the adaptor/plinth, the supplied rechargeable batteries or a pair of AAs, though I shouldn't imagine they would last long. Socket layout is limited by the plinth, and the line out is on the side rather than the back. However, the supplied interconnect has a right angled plug attached so the wire isn't too obvious in the

domestic situation. The earphones are in-ear types with ergonomically designed cable and foam covers, which at least look better than average. The XR-9458 proved fairly sensitive to knocks and jolts but coped ably with more gentle movement – a cruiser, not a chaser.

LAB REPORT

We were unable to get a frequency response from the line output so the 'phones version has to suffice. Usually the two are similar and this one describes a subtle low frequency hump, which is a little odd. The unshown high definition plot reveals a general downward trend which should subdue higher frequencies. The wideband response is at least neat and smoothly filtered even if the noise floor is high, perhaps accounting for the slightly aggressive nature of the machine.

The crosstalk result reflects a trend seen with a lot of the other models, which is an inability to cope at higher frequencies. This does not necessarily indicate bad modulation of one channel by the other but can be related to distortion. The personal CD as a species seems to be more than usually prone to high frequency distortion and the HF crosstalk figure may well be an indication of the extent to which a particular player is affected.

SOUND QUALITY

Compared with its domestic brother the XR-9318, this portable makes a fairly good impression. It can sound a little gritty at

times but has an open yet solid quality that gives music clarity and form. Certainly one of the better players in the group, the Toshiba is particularly nice to use, its heavy base stabilizing it when the controls are pressed.

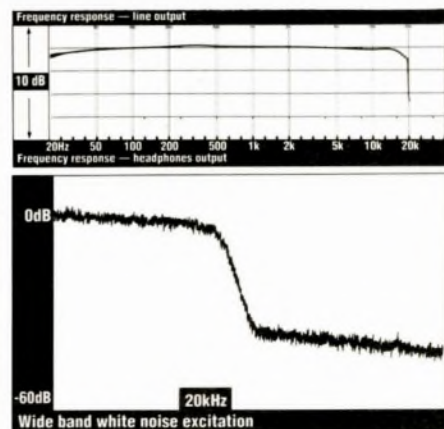
Swapping interconnect for the stranded Toshiba stuff smoothed over the nasties in the top end, leaving a dynamic and perhaps too exciting rendition of the disc. Some sense of organisation is lost and this is particularly obvious at higher levels, when the music is somehow more exciting and lively than it should be. It does do some things well though – the bass is quite appealing and after a spot of lunch some Laurie Anderson went down nicely. The earphones behaved in a similar manner to those found on the Sony D-88 – they are fairly revealing in the mid and high frequencies but not entirely natural or undistorted. They do reveal the slightly wearing nature of the beast but also prove rewarding if a sympathetic disc is played.

CONCLUSIONS

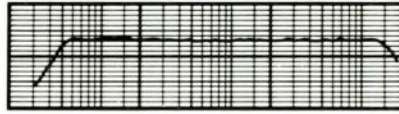
The Toshiba is an attractive and comprehensively equipped machine and whilst it is by no means poor at reproducing the digits on a compact disc it does seem less able than other similarly priced players. That said, if gadgets appeal to you it's hard to beat and therefore makes the worth considering grade.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	76dB	74dB	51dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, -80dB			-66dB
Signal-to-noise 1kHz/0dB ref	-83/80dB with/without emphasis		
Size	12.6 x 2.4 x 12.9cm		
Weight	460g		
Price	£250		



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XENON CDP-03

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Xenon is a relatively new name on the UK hi-fi scene and the *CDP-03* is the first of its products to be reviewed in *Choice*. The brand is being distributed in this country by a new company made up of ex-Ortofon employees and somewhat confusingly named Zenonlec. However, the manufacturer is a Scandinavian company called Nesco and the player itself is inevitably made in the Far East – Japan in fact.

Priced somewhere in the middle of the bunch at £179 the *CDP-03* is quite chunky and heavy in its battery-free state, its weight encouraging confidence in build quality and giving a considerable perceived value advantage over some of the cheaper plastic models. The buttons, however, resemble those found on the legendary Sinclair *ZX81* home computer and anyone familiar with that particular machine may be put off. But worry not, these touch pads are quite easy to use and have the option of giving a reassuring 'peep' to confirm status. They also make sense in the context of a portable music source, as it's more difficult to accidentally knock a button when the machine is in your pocket or bag.

Other unusual elements in this player include a 'high filter' for 'overbearingly harsh or strident programs' which acts as a crude tone control, programmable memory and a volume dependent line output which had to be pushed to the maximum to match the 2.1volts of the domestic Toshiba used for reference purposes.

The headphones supplied are of the tiny

in-ear variety that are so popular with *Walkman* users, supposedly for their discreetness rather than sound quality.

Using the *CDP-03* as a portable sound source one can see why the word 'jogman' has never become popular. It will put up with the gentle movement that might be created by walking but tends to stall if exposed to violent movement.

LAB REPORT

Most of the figures produced by this machine are respectable in context until you look at those for crosstalk which are pretty low at the extremes and distinctly uneven, which could well be indicative of serious musical distortion. The wideband spectrogram also reveals quite high levels of noise above 20kHz which can adversely affect signals in the audio band. Filtering, however, is quite gentle. The frequency response is hard to criticise and matches up well.

SOUND QUALITY

Using the custom interconnect and making comparisons with the reference a slight softening of transients occurs on classical material and some detail is lost, low frequency notes not having quite the edge that they could. It is reasonably revealing however, and easily shows up the differences in disc sound quality. The sound has a tendency to be a little lightweight, lacking in power and substance on some tracks. Changing over to the stranded interconnect from

one of the Sony machines (Xenon don't supply one) produces a more solid and meaty sound. The top end still seems a shade restricted but it manages to convey the timbre and body of instruments to a reasonably convincing degree. Complex tracks have a tendency to sound muddled when the volume is pushed up and the notes of Michael Hedges' guitar lose a little (more) of their acoustic envelope.

The *CDP-03* is amongst the less aggressive, essentially polite sounding machines and gives up some high frequency 'air' in order to hide nasties which it may be less able to control.

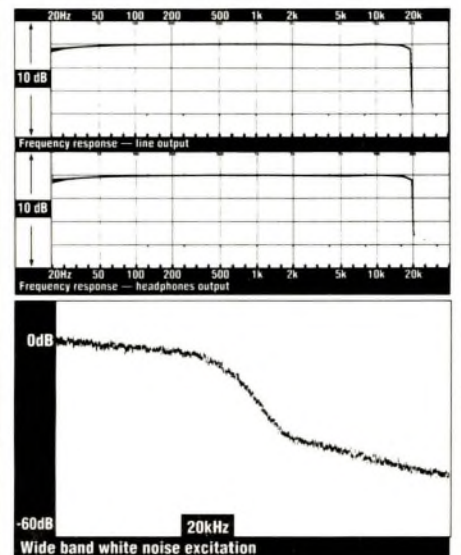
Using the in-ear 'phones the sound is perhaps not surprisingly a touch anaemic and tends towards abrasiveness on occasions, but is essentially tuneful and natural despite the lack of lower octaves. The *HP-X8s* sound distinctly unnatural by comparison when using acoustic material, though they are more impressive with rock music.

CONCLUSIONS

A reasonably well built and attractive machine, the Xenon *CDP-03* is slightly hampered by its unusual controls and mediocre sound quality. However, the price is competitive, and used in a budget system the shortcomings would be all but unnoticeable so it must be worth considering.

TEST RESULTS

	20Hz	1kHz	20kHz
Stereo separation	39dB	71dB	46dB
Total harmonic dist, 315Hz/0dB			<0.1%
Linearity, -80dB			-79dB
Signal-to-noise 1kHz/0dB ref			-91/91dB
Size	12.6 x 2.7 x 12.6cm		
Weight without batteries	560g		
Price	£179		



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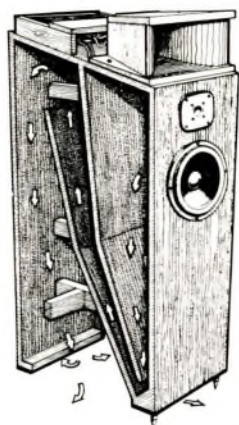
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GLOSSARY

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 combina-

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

FARAD: Measure of capacitance.

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

FARAD: Measure of capacitance.

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

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

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

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

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

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

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

HF: High frequency.

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

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

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

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

IEC: An international standards body.

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

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

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

KILO (k): prefix meaning one thousand.

LED: Light Emitting Diode; an indicator light.

LF: Low frequency.

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

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

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

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

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

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

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

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

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

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

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

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

magnetic coding on a tape.

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

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

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

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

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

NOISE: Random unwanted low level signals.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

THD: Total harmonic distortion.

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

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

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

TRANSIENT: Signal of very short duration.

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

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

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

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

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

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

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

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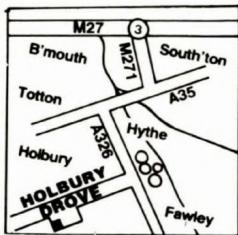
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THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Aristo *RD90 Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories – ie a cassette deck rated 'excellent' in sound quality will not usually offer

the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!)

The Comments column contains a potted summary based on the original review, emphasising the salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and it is best to refer to the original review for this, of which more later.

The next column(s) varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability, for instance arm matching figures are given with the cartridges which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the Directory are those found in the Value column, the *As* and *Bs* denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price

limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – ie cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

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

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system. Furthermore the vinyl repertoire is still the cheapest, largest and most varied.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence. It is worth remembering that though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

There is some debate about the best form of fixing, however, adjustable spikes through to the

floor proper or seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed.

Most decent quality turntables are fairly immune to feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

THE DIRECTORY

TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality

improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. **Lab performance** summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of mechanically compatible cartridges (see cartridge listings).

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S-MCS £695/£412	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	60
Ariston Q-Deck £150	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
Dual CS503-1 £114	Poor Average	Slated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,000	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook T12 turntable & arm £279/£249	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Kuzma Stabi/Stogi £575/£349	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis £345	Good+ Good+	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	60
Manticore Mantra £300/£330 (Arm)	Good+ Good+	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coil
NAD 5120 £90	Average Average—	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
Omega Point Silver/Black £895/£295	Good Good+	An 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) sounded nicely 'musical' in a balanced and coherent manner	Integrated turntable, manual, 11.5g	BB	48
Revox B291 £660	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
Source/Odyssey RP1 From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
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 QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average—	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
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
Thorens TD316 £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
Thorens TD320 £319	Good+ Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis, 7g (available without arm)	R	48

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THE DIRECTORY

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston RD90 Superior £900	Good + Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
Audio Labor Konstant £2,560	Good + + Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
Goldmund Studio £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	60
Michell Synchro £265	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense	Manual, belt drive, suspended motor unit	R	55
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Turntable £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set up, the price (necessarily) includes stand	Manual, belt drive subchassis, stand, 33 $\frac{1}{3}$ rpm		60
Oracle Delphi III £1450	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service – but very expensive	Manual, belt drive, subchassis	R	60
Oxford Acoustics Crystal Reference £1955	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R	60
Pink Triangle PT 100 £539	Very Good Very Good	A substantial improvement on its predecessor, the 100's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £655	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	60
SEE Revolver £135	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
Thorens TD160S Mk IV £225	Average Average +	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average +	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities such as ability to accommodate 12 inch arm compensate	Manual, belt, suspended motor unit, 78rpm, pitch control		55
Townshend Rock £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £395	Good + + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Decca International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48/Summary
Eminent Technology £960	Good + Good + +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good +	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Very expensive but with a performance that merits recommendation	12g	R	48
Linn LV Plus £129	Good + Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £429	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Manticore (Logic) Datum 2 £140	Very Good Good + +	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'untidy'	15g	R	48/Coll
Mission Mechanic £700	Good Good +	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £65	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £90	Good + + Good + +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
SME 3009 Series IIIS £165	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £229	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £291	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1206	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good + + Good + +	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

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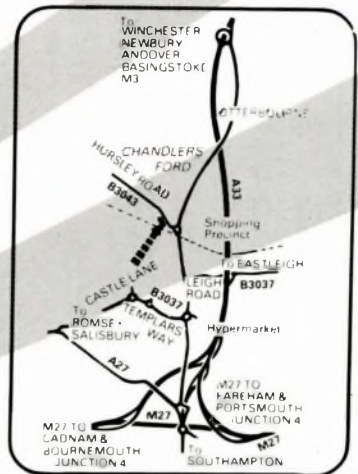
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Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries).

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average+ Average+	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
A&R E77Mg £47	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laic back sound, with good 'scale'	3-8g Normal, MM	R	48
A&R P77Mg £57	Average+ Average+	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal, MM		38
ADC TRX II £69.60	Average Average+	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal, MM		38 (Summary)
Audionote IO2VDH £795	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity'. But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer), MC		43
Audioquest MC5 £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose 'overall performance was very good for the price'	6-16g Normal, MM		43
Audio Technica AT95E £14.95	Average- Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal, MM		43
Audio Technica AT3200XEI £42.95	Average+ Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal, MC	R	43
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low, MC	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricy product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal, MM		43
Audio Technica ATF50CC £100	Average+ Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low, MC	BB	54
Audio Technica AT33ML £238.95	Average+ Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low, MC		43
Audio Technica ATOC7 £245	Good+ Good+	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average+ Very Good	Tonal colours were reproduced faithfully while stereo images were clearly isolated and focused despite contributing to a thoroughly integrated whole. Slightly less transparent than more costly MCs	6-14g Low, MC	R	60
Azden YM10VE £12.50	Average Average-	A good tracker. Sounds rather bunched-up but not totally incoherent – for very basic systems only	5-15g Normal, MM		54
Azden GM1E £30	Average- Average-	Of academic interest only, this high o/p MC is seriously flawed in sonic terms	8-18g Low/normal, MC		54
Azden GMP5L £99	Average+ Average+	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low, MC	R	54
B&O MMC5 £21	Average+ Average	Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £33	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £75	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p, MC	R	48/Coil
Clear Audio Gamma £285	Average Average+	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average+ Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Pradikat £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g MC		Coil
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
Denon DL110 £60	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £80	Average+ Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low, MC		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
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, MC		48

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THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector DV XX-1 £360	Good Good+	The XX-1 embodies a power and solidity rarely encountered amongst the breed, nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems	7-17g Normal, MC		60
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average+	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal, MM	R	48
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal, MM	BB	54
Goldring G1020 £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal, MM		43
Goldring G1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model – no great actress	8-16g Normal, MM		48
Goldring Eroica L £91	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low, MC	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal, MC		43
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low, MC		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery – consider this model	5-10g Normal, MM		48
Grado XTE + I £20	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Grado XF3E + £45	Average- Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Highphonic MCA3 £360	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
Kiseki Blue Silver Spot £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low, MC		54
Kiseki Purpleheart Sapphire £695	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1595	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £3500	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble fizz. Listen before deciding	6-18g Low, MC	R	48/Coll
Koetsu Red £896	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low, MC	R	48/Coll
Koetsu Red Signature £1300	Good Excellent	Technically this cartridge suffers no faults whilst on a subjective level it offers rare musical insight	10-21g Low, MC	R	60
Linn Basik £19.50	Average- Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal, MM	BB	48/Systems
Linn K9 £69	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coll
Linn Asaka £279	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coll
Linn Karma £435	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	48/Coll
Linn Troika £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coll
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal, MM		48
London Super Gold £248	Average- Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal, MM	R	48/Coll
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low, MC		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £298	Average+ Good+	Warm and detailed sound – packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low, MC	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low, MC		Collection
NAD 9100 £12	Average- Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal, MM	BB	38
NAD 9200 £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal, MM		28
Nagaoka MM4 £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

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THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Nagaoka MP11 Boron £38	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP10SB £40	Average Average +	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal, MM	R	54
Nagaoka MP11 Gold £45	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka MP11 Gold SB £70	Average - Average	Excessive price loading for a blob of aluminium	2-6g Normal, MM		54
Ortofon OM5E £12	Average - Average -	The OM10 is a hi-fi cartridge - the OM5E is not	5-16g Normal, MM		43
Ortofon VMS5E II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal, MM		38 (Summary)
Ortofon OM10 £15	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon VMS 10E II £21	Average - Average -	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal, MM		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal, MM		48
Ortofon OM20 £45	Average Average +	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon VMS30E II £52	Average + Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal, MM		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon OM40 £75	Average Average +	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolved	5-15g Normal, MC		48
Ortofon MC20 Super £139	Average + Good +	An "inviting" sound quality, polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	48/Coll
Ortofon MC30 Super £199	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll
Ortofon MC3000 £800	Good Excellent	Quite simply, the most accurate transcription device yet created - not one for the faint hearted	6-16g V Low, MC	R	60
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega RB100 £38	Average Average +	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal, MM	R	48
Shure M92E £15	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £26	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £24	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £32	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £44	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £45	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £195	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Supex SM100E £115	Average Average +	Delivers as much musical information as many moving coils - the bass in particular having an attractive bounce	6-15g Normal, MM		38
Supex SD900IV £350	Average + Good +	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low, MC		48/Coll
Supex SD901IV £375	Average + Good +	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price tag	8-18g Normal, MC	R	48
Supex SDX2000 £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, MC		48
Van den Hul MC10 £699	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
Van den Hul MC One £799	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60

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THE 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
Acoustic Research AR-04 £160	Very Good Good	A powerful, well equipped model precisely tailored to UK standards. Performance is close to the class winners	40W, MM/MC, 5 inputs, hdph, tone controls	BB	62
A&R Arcam Alpha £150	Average+ Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation	5 inputs hdph MM/MC tone controls 30W		50
A&R Arcam Delta 60 £250	Very Good Fair	Our first pre-production review sample was not up to expectations but better ones have arrived since. It gave a solid technical performance	55W, MM/MC, 5 inputs, hdph		62
A&R Arcam Delta 90 £330	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey	70W MM/MC 5 inputs tone controls		50
Albarray M408 II £649 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
Albarray M1008 II £899	Very Good Good	A larger version of the similarly styled M408II, fairly good all round but only of average quality for the price	80W, monoblok		62
Aria Acoustics Aria 12 £299	Poor Very Good	A plain looking valve power amp that's something of a wolf in sheep's clothing giving many dearer amps a run for their money	12W	BB	63
Audio Innovations Series 300 £339	Poor Good++	Something of an anomaly the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system	10W, MM, 6 inputs	BB	63
Audio Innovations Series 1000/2nd Audio Amplifier £1199/1999	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
Audio Research SP9 £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound	5 inputs, MM/MC	R	60
Audio Research SP8 £1998	Very Good Good+	The sound from this valve preamp was good enough to do justice to the finest ancillaries	5 inputs MM		39
Audio Research M100 £2850 each	Good+ Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them	100W	R	60
Audio Research SP11 II £5350	Very Good Excellent	Current state of the valve preamp art. A reference point	Straight line MM/MC Disc + phase invert	R	60
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000A £350	Very Good Good	A long running and high dependable classic, versatile and consistent via all inputs	50W, MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000P £495	Excellent Very Good	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Beard Audio CA35/P35mkII £595/£795	Fair+ Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/MC, 4 inputs	R	63
Beard 506 £1195	Good+ Good+	A versatile valve preamp – the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/MC		50
Beard M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Burmester 838 £1490	Very Good Good	A disc-only minimalist preamp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing	MC only, MM option		Collection
Burmester 846 £1599	Very Good Good+	Usually coupled with the 838 this high-level preamp provides many and versatile input facilities	6 inputs		Collection
Burmester 850 £3995	Good+ Good	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range	100W		Collection
Cambridge Audio P40 £200	Good Good+	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability	5 inputs 40W MM/MC straight line	BB	50
Cambridge Audio C75 £279	Good+ Good+	Whilst not quite on par with its A75 companion this preamp provided excellent stereo imagery but was a touch "heavy" in character	MM/MC disc	R	50
Cambridge Audio P55 £290	Very Good Very Good	A grown up P40, the P55 suffers slight noise on the moving coil input but offers great sound for the money	55W, MM/MC, 5 inputs, hdph	BB	62
Cambridge Audio A75 £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies	100W	R	50
Cello Audio Suite £5280	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Conrad Johnson PV7 £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money	5 inputs, MM disc		57
Conrad Johnson MV50 £1795	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson PV5 £2010	Good+ Good+	The PV5 is a classy sounding valve preamp, and natural partner to the MV50	5 inputs MM		Collection
Conrad Johnson Motif MC-8 £2500	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
Conrad Johnson Premier Three £3775	Good+ Very Good	The Three is a musically accurate and graceful preamp which proved versatile on a wide range of inputs	5 inputs MM/MC	R	Collection
Conrad Johnson Premier Four £3900	Good+ Very Good	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations	100W		Collection
Copland Pre and power amps £649 each	Good+ Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear	3 inputs MM, 12W		50

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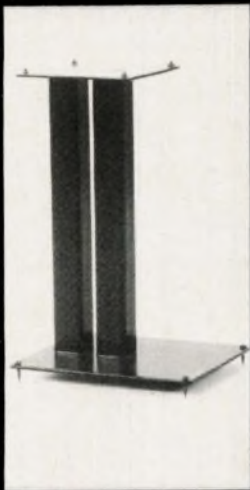
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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Counterpoint SA7 £747	Average + Good	Simple valve Californian preamp offering inspiring transparency for the price	4 inputs straight line MM/MC		Collection
Counterpoint SA12 £1250	Good + Good +	A real power-house power amp, beefy and load-tolerant although like the SA7 a trifle untidy at frequency extremes	100W		Collection
Creek 4040 £145	Average + Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance	4 inputs MM 12W	R	50
Creek CAS 4040 II £160	Good Good	The Mk II has no problems and is a fine all rounder	30W, MM, 4 inputs, tone controls	BB	62
Creek CAS 4140 £219	Good + Good	Redesigned for '88, this is a fine allrounder with good moving coil input, plain presentation	40W MM/MC 3 line inputs	BB	62
Croft Micro £150	Average + Good	A real upsetter, this excellent valve preamp put the cat among the pigeons proving good sounds can be made at budget price levels	4 inputs MM straight line	R	Collection
Croft Super Micro A £500	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £730	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
DBX CX3/DX3 £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4-channel surround		56
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA 250 II £125	Good Fair	Despite a claimed increase in power this competent model now slips behind the competition on sound quality grounds	30W, MM, hdph, tone controls		62
Denon POA-6600 £1,000/pair	Excellent Excellent	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3 £1000	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
E.A.R. 802/509mkII £920/£1550	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
E.A.R. £3,000/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £360/£340	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Goldmund Mimesis 6 £2,500	Very Good Very Good	Small and discrete for those who'd rather not flaunt it, this is no powerhouse but sounds subtle, delicate and refined	80W stereo power amp		60
Grant G60AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 41 8ohms	R	57
Hafler DH120 kit form £295	Fair	We didn't build one; see below	60W		44
Hafler DH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harman Kardon 640 Vxi £225	Good + Good	Moderately priced but built to HK's high standards; good value and good load tolerance	50W MM, 5 line inputs tone controls		56
Harman Kardon PM645Vxi £300	Very Good Good	Fits in well with the Harman Kardon series, giving a competent all round performance at a fair price	75W, MM/MC, 5 inputs, hdph, tone controls		62
Harman Kardon 655 Vxi £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls		56
Harman Kardon PM665Vxi £699	Good Good	A versatile and meaty amplifier with high current capability, but sound quality lags behind certain home grown alternatives	150W MM/MC tone controls (switchable)		60
Hitachi HA-006 £120	Very Good Fair	Despite reasonable lab test results this did not make the grade on sound quality	55W, MM, 4 inputs, hdph, tone controls		62
Hitachi HA007 £150	Good + Fair	Decent but unexceptional performance and sound quality, plus good facilities; represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
Inca Tech Dirk £215	Good + Good +	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
Inca Tech Claymore £345	Good + Good +	Limited facilities but a strong, clear, well-focused sound results in auspicious Choice debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
ITL MA-80 £150	Good Good	A promising start for this young company, the MA-80 gave a fine sound with CD but was less wonderful on the moving coil input	30W, MM/MC, 5 inputs	R	62
Jadis JP30/JA30 £6,790	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
JVC AX-222 £110	Good Fair	Not very impressive, JVC need to pull their socks up if their budget amplifiers are to score	35W, MM, 4 inputs, hdph, tone controls		62
Kelvin Labs Junior/J30 £295/£295	Good Good	Their heart is in the right place but the class A Junior combination is a bit expensive for what you get	20W, MM/MC, 5 inputs		62
Kenwood KA-550D £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
Krell PAM5 £1589	Very Good Good	Superbly built, the Pam 5 preamp gave good definition throughout the frequency range with a good measure of excitement	MM/MC		50
Krell KSA50 Mk2 £2540	Very Good Good +	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W		50
Le Tube £585	Good + Good	If moving coil sensitivity is not required then this preamplifier will offer a clean view with very good stereo	3 inputs MM	R	44
LFD £2,995 +	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components (cartridge, power amp)	MC (with care), passive line extra	R	60
Linn LK2 £440	Good + Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition. Latest version, the LK2.75, not yet tested	5 inputs MM/MC	*	50
Linn LK1 £459	Good + Fair	This preamp was marginally less successful than the LK2 but the pair (of Linn's) worked well together and are well worth considering. Recent modifications as yet unchecked	60W	*	50

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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Luxman LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 80W, MM/MC tone controls		57
Magnum A100 £1995 pair	Good+ + Good+	Given their massive power rating a pair of A100's make a fine stereo power amp, ideal for high levels and with a wide dynamic range for digital programme	320W		50
Marantz PM25 £125	Good Fair	Soft and sweet like the rest of the range, the PM25 is inoffensive and undemanding	25W, MM, 5 inputs, hdph, tone controls		62
Marantz PM35 £170	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality: well equipped and versatile	45W MM/MC 3 line inputs tone controls		56
Marantz PM45 £200	Good+ Fair	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls		50
Marantz PM94 £1,000	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/MC tone controls (switchable)		60
Meridian 201/205 £550/£395 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/—	62
Mission Cyrus One £180	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built - however, the headphone socket will only take a 3.5mm jack	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Mission Cyrus PSX £200	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
Mission Cyrus Two £300	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Again, only 3.5mm headphone socket	50W, MM/MC, 5 inputs, hdph, straight line	R	62
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all rounder	50W, MM/MC, 6 inputs, hdph, tone controls	R	62
Musical Fidelity A1 £249	Good Good+	Fine ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	BB	56
Musical Fidelity B200 £299	Very Good Good+	Running cooler than other MF's, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/MC 4 line inputs straight line	BB	62
Musical Fidelity Pre 3/P140 £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
Musical Fidelity A100 £439	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs straight line	R	62
Musical Fidelity P170 £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity MVT Mk 3 £1199	Very Good Very Good	The MVT preamp was "strong in its class", providing competition for £1500-plus amplifier systems, now rivalled by the MF3B	MM/MC 5 inputs	R	50
Musical Fidelity P270 £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
Musical Fidelity MVX £2,000	Very Good Excellent	Soundwise this preamp tops Musical Fidelity on terms with much more expensive exotics, with top class transparency, focus and dynamics	MM/MC, phase invert	R	60
Musical Fidelity A370 £2199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
NAD 3020e £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	R	50
NAD 3220PE £140	Good Fair	Like the 3020E but with more peak power and loudness thanks to the 'power envelope'	20W, MM, 5 inputs, hdph		62
NAD 2200 £339	Good+ + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
Naim NAIT 2 £322	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-c£8,000	Very Good Good	A consistent and coherent series of "building blocks" for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/MC etc	R	60
Nakamichi CA-5E £750	Very Good Good	A fine lab performance and high build quality but rather disappointing sound quality for a preamp of this price	MM/MC, 6 inputs, hdph, tone controls		62
Nakamichi PA-5E £1150	Very Good Good	A strong sound in several respects but one which ultimately failed to satisfy	100W		62
Nakamichi CA7E/PA7E £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
Nuance £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail, suited to some tastes but not top drawer	4 inputs MC		50
Oakley Image £425	Poor Very Good	An interesting valve preamp from Yugoslavia, the Image on first impression needs a bit of tweaking to warrant Choice commendation but is a nice product nonetheless	MM, 5 inputs straight line		63
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/MC, 4 inputs, battery supply	R	62
Pioneer A333 £149	Very Good Fair	A rather average but nonetheless competent performer that is pleasant enough	55W, MM, 5 inputs, hdph, tone controls		62
Philips FA860 £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
Philips FA960 £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56

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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
QED A240 CD II £169	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £219	Good+ + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	62
Quad 34 £289	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Quad 405 £349	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Quicksilver Mono £1495	Good Good+	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblok 4/8ohms		57
Radford SC25 £862	Very Good Very Good	A very fair price for a solid, well built valve preamp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
Radford MA75 £977	Good Very Good	A fine quality valve monoblok with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monobloks	R	57
Radford STA25 Renaissance £1115	Good Good+	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
Revox B250 £1128	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Robertson Forty Ten £987	Very Good Good	Here is a neat little power amp (60W) you can fit and forget; it proved most satisfying over long listening sessions	60W		Collection
Rose RV-23 £370	Average Very Good	A very attractive little British valve preamp with a sound that was rich, colourful and reasonably sharp via the CD input but was less impressive on disc	MM, 4 inputs, straight line		63
Rotel RA810A £100	Very Good Fair	As a cut price RA820A this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA820A £130	Good+ + Good	This A version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
Rotel RB/RC850 £140/£119	Good+ + Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/MC 4 line inputs tone controls	BB	62
Rotel RA820BX3 £160	Very Good Good	The latest upgrade is not that impressive, but the BX remains a fine amplifier and now has a moving coil disc input	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Rotel RA870BX £325	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/MC 7 line inputs tone controls	R	56
Sansui AU-G11X £139	Good+ Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls		50
Sansui AU-G30X £199	Good+ + Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls hdph		50
Sansui B2301 £1880	Very Good Good+	Rating better than the preamp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Collection
Sansui C2301 £2306	Excellent Good	Sansui's flagship preamp did not really rate well given its price, but is not short on features	All facilities		Collection
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
Sony TAF 700ES £500	Good+ + Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
Sumo Nine + £1200	Very Good Excellent	Macho styling of this class A stereo power amp conceals a sonic subtlety that is exceptional for the price, limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Tannoy SR-840 £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)		50
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var. loudness		56
YBA 2 pre & pwr £1395/£1695	Good+ + V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62

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THE DIRECTORY

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	
Acoustic Energy AE2 £1138	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work.	39 x 23.5 x 29.5cm heavy stands in free space	88.5dB/W 45Hz	R	This
Alexander Aurora £350	Average Good—	The unusual metal case and slim shape of this grown up miniature provide welcome diversity. It sounds pretty good too	42.5 x 14 x 19cm matching stands in free space	85dB/W 55Hz		This
Apogee Caliper £2550	n/a Very Good	Near state of the art performance, not materially worse than bigger Apogees, just less bass. Rich, subtle and slightly dull, with a clear, articulate midband, but uncommonly system fussy.	122.5 x 71 x 10cm ex. rear foot, free standing, away from walls	n/a n/a	R	60
Apogee Scintilla £4990	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/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 £260	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "bailly" character though lacking weight... a bit	38 x 23 x 28cm rear wall shelf or 40cm stands	88dB/W 55Hz		59
A&R Arcam One Plus £359	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/W 60Hz		59
AR 112 £120	Average Average—	Nicely presented and engineered, but sounds a bit small and boxy without true coherence.	36 x 19 x 18.5cm stands near rear wall	87dB/W 75Hz		This
AR 132 £180	Average+ Average—	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear wall	87dB/W 50Hz		This
Ariston Image £185	Good Average	Good engineering content at a reasonable price, the Image delivers fine stereo with low coloration, but sounded too bassy under our listening conditions	42 x 22 x 27cm stands in free space	87dB/W 55Hz		This
Ariston QLN1 Mk 2 £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	59
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average+ Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average+ Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
Avance Concrete 2000 £970	Below Average Below Average	Very low cabinet talk, but the system sounds terminally uneven - lumpy bass and over-forward midband dominate	86.5 x 29.2 x 43cm clear of walls	94dB/W 40Hz		60
B&W DM560 £200	Average+ Average—	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/W 55Hz		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	59
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/W 70Hz		59
Bose 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		59
Boston A4011 £110	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Canton 60 Karat £600	Average+ Good	Looks a bit of a throwback designwise, but is nicely presented and has a lively, dynamic and generous sound	58 x 31.5 x 31cm stands in open space	90dB/W 48Hz	R	This
Castle Clyde £149	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 £199	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 £309	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
Castle Warwick £169	Good Average—	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear wall	88dB/W 50Hz		This
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/W 60Hz	R	This
Celestion DL6 Series Two £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		59
Celestion DL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/W 60Hz	R	59
Celestion SL12Si £580	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear of walls	85dB/W 50Hz		This
Celestion SL700 £1349 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/W 45Hz		60

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THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/W	R	60
Chameleon 500 £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		59
dbx 1000 £450	Average— Average—	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
Energy 22 Pro Monitor £600	Good Good	Presentation is a bit rough for the price, but this Canadian entrant is an impressive sonic allrounder that will appeal to most listeners	62.5 x 27 x 30cm stands in free space	87dB/W 40Hz	R	This
Gale 301 £280	Average Average+	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £700	Average+ Average+	Clean but rich and powerful bass; stereo focus was not a strong point, but it is worth considering. (Recent revisions not yet checked)	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz	*	46
Goodmans Maxim Two £80	Average+ Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/W 85Hz	BB	59
Goodmans Point 3 £90	Average+ Average—	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/high stand near wall	90dB/W 80Hz	R	53
Goodmans Point 7 £170	Average+ Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	89dB/W 47Hz		53
Harbeth LS3/5A £300	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/W 60Hz		This
Harbeth HL Compact From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	91.5dB/W 65Hz		59
Heybrook Point Five £129	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		59
Heybrook HB1 £189	Good Average+	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
Heybrook HB100 £250	Average+ Good	Well matched for wall sitting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/W 50Hz	BB	This
Heybrook HB200 £369	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/W 55Hz		This
Infinity RS2000 £140	Good Good+	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	59
Infinity Kappa £650	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/W 35Hz		This
Jamo Concert 2 £240	Good Average—	A thoroughly respectable 'bookshelf' performer that needs free space sitting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/W 48Hz		This
JBL L 60T £399	Good+ Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL L80T £559	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
JBL 18Ti £599	Good+ Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. Try the cheaper L20T	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
JBL 250Ti £3599	Good+ Good+	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
JPW P1 £125	Good Average+	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/W 60Hz	R	59
JPW AP2 £145	Good Average+	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	R	53
JPW AP3 £210	Good Average+	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
KEF R102 £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect, what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
KEF 103/3 £630	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £849 (£948)	Very Good Good+ +	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/W 50Hz	R	60
KEF 107 £1890	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	60
Linn Helix £259	Average+ Good	Attractive presentation is coupled with an attractively lively sound which is more neutral if less committed than earlier Linn loudspeakers	51 x 25.5 x 28cm stands 1ft from rear wall	88dB/W 53Hz	R	This
Linn Nexus £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		59
Linn Sara £749	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before	43 x 34.4 x 26.5cm stand mounting, near wall	88dB/W 50Hz	R	60
Magneplanar SMGa £675	Average— Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MG2.SR £1897		Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/W 35Hz	R	60
Magneplanar MG11a £2650	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz	R	46
Marantz LD20 DMS £150	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/W 55Hz		53
MB Quart 390 £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/W 60Hz		59
Meridian M30 £725	Average+ Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70 II £100	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 761 £120	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement – should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/W 60Hz	BB	This

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Mission 700LE £140	Good Average	Mission re-submitted this popular model and again got positive review – which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	59
Mission 762 £180	Average Average—	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/W 55Hz		This
Mission R737 Renaissance £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition – wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		59
Mission Argonaut £500	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cm floor-standing near wall	91dB/W 40Hz	R	60
Monitor Audio R100 £159	Average+ Average—	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46
Monitor Audio R352/MD £300	Average+ Good	A good value large box that sounds more engaging than subtle, providing a good compromise between bandwidth and sensitivity	64 x 25 x 32cm stands in free space	89dB/W 45Hz	R	This
Monitor Audio R452/MD £399	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz		59
Monitor Audio R852/MD £399	Good+ Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good – an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	59
Monitor Audio R852/Gold MD £450	Good Good	Luxury build and 'high tech' tweeter or not, this compact model offers good refinement and detail on an open soundstage	45 x 25 x 26cm stands in free space	86dB/W 50Hz	R	This
Mordaunt Short MS10 II £90	Average Average—	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
Mordaunt Short MS100 £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
Mordaunt Short 45Ti £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unsubtle	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
Mordaunt Short MS300 £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46
Mordaunt Short 442 £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/W 40Hz	R	60
Musical Fidelity MC-2 £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear, the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	This
Musical Fidelity MC-4 £499	Very Good+ Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	59
Opus 3 Capella £495	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in bookcase	86.5dB/W 45Hz		This
Quad ESL-63 £1538	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/W 34Hz	R	60
Rogers LS7t £399	Good+ Good+	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	59
Rogers Studio 1a £565	Very Good Good—	The classic BBC monitor style sound sensitively updated – transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/W 36Hz	R	This
Roksan Darius £1265	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
Rotel RL850 II £130	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	59
Royd A7 Series 11 £99	Average+ Average	Lively clear sound, good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/W 75Hz	R	53
Royd A25 £100	Average+ Average—	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
Royd Eden £235	Average Average+	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to rear wall	87dB/W 85Hz	R	This
SD Acoustics SD1 £1050	Average Good	A large scale, airy and unusually detailed system with excellent dynamics. Balance is light and bright, and can upset some systems/listeners	123.5 x 38.2 x 31.9cm free standing, away from walls	90dB/W 50Hz	R	60
Sony APM 10ES £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	59
Sony APM 22ES £249	Good+ Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
Sony APM 66ES £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		59
Spendor Prelude II £345	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
Spendor SP2 £450	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	59
Spendor SP1 £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	60
Spendor SA3 Passive £1400	— Good+	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
Spendor SA3 Active £2708	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
Spica TC-50 £595	Average+ Good	These American wedge-shaped-cabinet speakers were detailed and clear. However, we've not heard the current version with new drive units	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R*	59
Spica Angelus £1195	Good Average	A little bass shy and soft in the bass and lower mid, the Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm free standing away from walls	86.5dB/W 50Hz		60
Studio Power Sapphire £130	Poor Average—	Balance difficulties are improving, though still prevent the potential of this interesting metal-cone new miniature from being fully realised	30 x 20 x 19.5cm stands near rear wall	85dB/W 70Hz		This
Tannoy Eclipse £120	Average+ Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	59
Tannoy Mercury S £160	Good Good	A fine budget allrounder in the now established Mercury tradition, good balance and reasonable refinement will ensure wide appeal	49.5 x 25 x 21.5cm stands in free space	87dB/W 50Hz	BB	This
Tannoy DC2000 £300	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/W 55Hz	R	This

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Tannoy Westminster £3400	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few puckets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.) 28Hz	R	Coll
TDL Monitor £1600	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/W 28Hz	R	This
Technics SBC 250 £130	Average+ Average-	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average+	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale Delta 30 £79	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB	59
Wharfedale Delta 50 £99	Average+ Average-	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
Wharfedale Diamond 111 £99	Below Average Average-	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz		59
Wharfedale Super Diamond £139	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 50S/2 £169	Average Average-	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/W 55Hz	BB	This
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		59
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R	46

* rating refers to original, tested model.

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal - at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.) There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price. All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
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 XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard - a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-52 £249	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-6 £350	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Denon DR-M07 £125	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	BB	52
Denon DR-M10HX £180	Good Good	Very well laid out, a sensible range of features and smooth cam-operated transport. Replay-only sound quality suspect, but the deck is successful as a recorder - clean, precise but slightly 'grainy'	Dolby B, C HX Pro, memory counter, bias adjust	R	63
Denon DR-M12HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good+	This deck will slot into many high grade systems without disgracing itself - or the cassette medium. Very presentable high resolution sound with good stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	R	60
Denon DR-M34HR £320	Very Good Good+	Prerecorded cassettes sounded grey and dull, but this may have been a sample fault. As a recorder, the DR-M34 is refined and detailed - and good value	Dolby B, C, HX Pro, 3 Head, manual tape calibration, memory counter		63
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, R tape alignment adjust, remote control, 3 Head	R	60
Dual CC8010 £110	Average Average+	The only limitation worth noting is a slight opaqueness; the Dual otherwise sounds stable and effective. An excellent low-cost design	Dolby B & C, microphone input	BB	63
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Hitachi D-003 £130	Average- Average-	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £180	Average- Poor	This double 'dubbing' deck proved a mixed bag - good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
JVC TD-V711 £380	Very Good Excellent	This is a complex recorder which is built on the back of some important ideas with audiophile roots. It has a (mostly) superb technical performance and is very capable, if not always strictly accurate	Dolby b, C, HX Pro, 3 Head, variable bias, track search, 3 line inputs	R	63
JVC TD-W222 £150	Below Average Below Average	Well endowed but somewhat user-hostile twin deck. Sound quality is very tape dependent, but offers tolerable stability with considerable loss of resolution and scrappy musical presentation.	Dual deck, auto reverse, Dolby B/C		63

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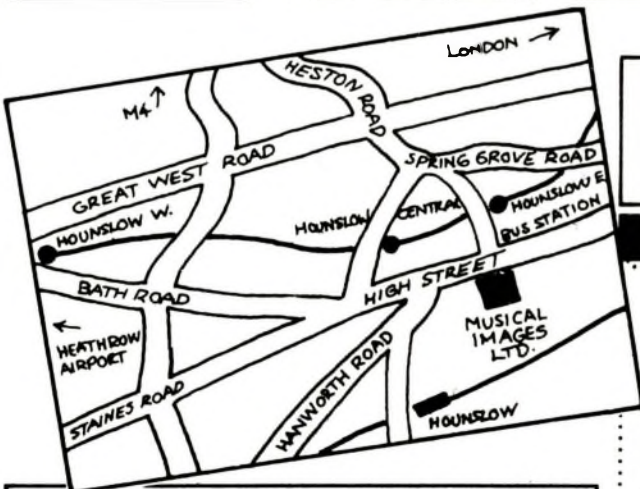
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THE DIRECTORY

CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Kenwood KX-440HX £140	Average + Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		63
Kenwood KX-660HX £170	Good Good	Well designed control system with useful search aids. Sound quality is positive and detailed	Dolby B, C, HX Pro, track & blank search, intro scan, bias adjust	R	63
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, lessy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
Marantz SD-35 £160	Good Good +	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	R	52
Marantz SD-45II £200	Good + Good +	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent snuittling piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
NAD 6300 £649.95	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical - and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good +	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good +	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good + Very Good +	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Onkyo TA-2120 £120	Average + Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring - the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/ side repeat	R	63
Onkyo TA 2130 £140	Average + Average +	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust		52
Philips FC566 £179	Average + Average +	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable - with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-443 £180	Average Good	Structurally sound and subtly musical recorder. Sophisticated, mildly damped sound quality	Dolby B & C, fine bias adjust, track search	R	63
Pioneer CT-737 £300	Average - Average -	Interesting design and a pleasure to use with rather too many rough edges to really work properly	Dolby B, C, HX Pro, 3 Head, bias adjust, memory counter		63
Proton AD-200 £140	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unrelenting hardness and an almost total lack of detail	Dolby B & C		57
Proton AD-300 £200	Average - Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
Revox B215 £1461	Good Average +	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
SAE C102 £549	Average + Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sony TC-FX 150 £90	Average + Average +	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C		52
Sony TC-W300 £150	Poor Poor	Deeply unimpressive and messy sounding deck with bloated quality and poor pitch integrity. Dubbing performance substandard	Dual deck, Dolby B & C		63
Sony TC-RX50 £180	Average - Poor	Terminal inability to play at a steady pitch, or (on prerecorded material) in tune spoiled this simple but otherwise attractive design	Auto-reverse, Dolby B/C/HX Pro		63
Sony (WMD6C) ProWalkman £249	Good + Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-RX60ES £250	Average Average	For once a stable sounding auto-reverse deck but sound quality is rather 'dirty' and compressed, especially with Dolby C	Auto-reverse, Dolby B/C/HX Pro, auto tape recognition		63
Sony TC-RX80ES £350	Average + Good	Clean, powerful and detailed sound, especially without Dolby C. Stable pitch - but prerecorded cassettes sounded disappointing	Auto reverse, Dolby B/C/HX Pro, bias/ level adjust	R	63
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	60
Tandberg 3014A £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
Teac V-250 £89	Average Average	Ultra-basic design which works quite well. Lack of pitch integrity is the main shortcoming, but it wasn't always noticeable	Dolby B	R	63
Teac V-270C £109	Average - Average -	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac R-515 £299	Average + Average +	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
Teac V-870 £399	Good + Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
Teac V-970X £495	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

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics RS-T230 £160	Average— Average	Satisfactory with prerecorded material but otherwise unexceptional, the main features of this deck are its excellent user interface and value for money	Dual deck, Dolby B/C		63
Technics RS-B355 £140	Good Good	Good sound let down by inadequate meters and poor prerecorded replay only sound quality	Dolby B, C, microphone inputs, cue and review	R	63
Technics RS-B505 £160	Average+ Average+	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57
Technics RS-B605 £180	Good Average+	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx		57
Technics RS-T330R £200	Average+ Average+	One of the very few dual cassette decks with any real pretensions to audio quality, the RS-T330 is a considerable success musically as well as being a pleasure to use	Dual deck, Dolby B & C	R	63
Technics RS-B705 £250	Average Average—	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Technics RS-T80R £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52
Yamaha KX-200 £140	Good— Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	R	52
Yamaha KX-300 £150	Average+ Average—	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with "play trim", bias adjust, remote control		57
Yamaha KX-400 £200	Good Good+	A highly commercial package with every widgee 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 counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES – but with an inferior front panel design	Track ID and search, remote	R	63
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Pioneer D-1000 n/a	Excellent Excellent	Fine, clear, colourful and consistent sounding deck. The Pioneer is lavishly (uneconomically?) constructed and equipped. It shows what is possible, but will probably never go on sale	Many search and memory facilities	R	63
Sony DTC-M100 £799	Very Good Very Good	Clean, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Mid-width, alpha-numeric display, remote, optical interfaces	R	63
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving

than top quality vinyl replay.

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. Sound quality variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good+ Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming		58
ADC CO 2000E £330	Good+ Fair+	One of the slimmest players in the business but nothing special inside. Nice ergonomics but overpriced	Remote, timeshared 16 bit		64
Aiwa DX-M45 £149	Fair Fair	Outdown Philips technology, but results are quite good for this British made machine	Manual	R	64
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Aiwa XC-007 £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imaging. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Arcam Delta Black Box £249	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straightforward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphone socket etc.	R	58
Cambridge Audio CD2 £650	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
dbx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD 610 £200	Good+ Fair+	Lots of Denon player for the money, well equipped with good all round performance	Remote, versatile programming 2x 0/S	BB	64
Denon DCD 810 £250	Very Good Fair+	A good value allrounder bettered on sheet value by the 610 and 910, power volume could sound better	Remote, digital output, programming	R	64
Denon DCD 910 £300	Very Good Fair+	A well equipped deck of impressive appearance and solid sonic and lab performance	Remote volume, programming, 8x 0/S	BB	64
Denon DCD-1500II £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented.	Track entry/volume remote, menu display etc.	R	60
Denon DCD 1700 £650	Good+ Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphone socket, programmable	R	58
Denon DCD-3300 £1200	Good+ + Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphone		51
Dual CD 1030 RC £170	Fair Fair	An up and down performance on test but it is hard to deny the overall value for a machine that includes remote control at this price	Remote, headphone socket, 2x 0/S, timeshared 16 bit	R	64
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group, don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/S, timeshare 16 bit		64
Goodmans GCD550 £199	Average+ Fair+	A slow autochanger with a weakish lab performance but the sound is fair enough, the features good and the price is low	Remote, 6 disc autochanger, 2x 0/S	BB	64
Hitachi DA-7000 £150	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		58
JVC XL-Z444 £255	Good Fair+	An average performer, unremarkable though well equipped and fair value for money	Full feature remote, digital output, headphone socket		64
Kenwood DP-660SG £180	Below Average Below Average	Build quality and ergonomics are good, and the range of features far exceeds the price norm. However, sound quality is messy with a soft bass, recessed mid and sometimes spiky top.	Remote control, calendar/menu display, keypad, 20 track memory		62
Kenwood DP-880SG £250	Very good+ Fair+	A fine CD transport for the price, fine sound, very good lab results, good for a decoder?	Remote volume, programming, headphone socket	BB	64
Kenwood DP-990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58
Kenwood DP-1100SG £450	Very Good Good	Something of a high tech flagship, this model doesn't quite make the grade on sonic grounds but is well built	Full remote, optical and coax digital outputs, headphones		64
Kinergetics KCD-30 £1700	Very Good Very Good	Definitely a technical oddball with its distortion-cancelling circuits, the pricey KCD-30 nevertheless does sound very good, and also noticeably "different" – not necessarily to our collective tastes, but possibly to your's	Favourite track selection, remote, high output (vol. bal)		60
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation.	Track entry remote, programming etc.	R	58
Marantz CD65IIE £300	Very Good Very Good	Scorching sound quality from a competitively priced player, which is the new middle market reference	Remote, programming, digital output	BB	64
Marantz CD94 £800	Good+ + Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphone socket, favourite track selection, remote	R	58
Marantz CD94/CDA94 £1600	Very Good Excellent	Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price which seems a little steep. Very refined	Favourite track selection, remote, balanced output etc	R	60
Meridian 207 £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile – on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	On-board preamp, remote (inc volume)	R	64
Mission PCM2 £690	Good+ Good	A matured design with good features it is the best sounding power volume player available, it even tests well. It accepts the £200 PSX power supply option	Remote volume, display and phase invert	R	64
NAD 5220 £230	Average— Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		62
Nakamichi OMS-1E £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi OMS-3E £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphone socket		51
Nakamichi OMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
Nakamichi OMS-5EII £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
Onkyo DX-1500 £170	Average Fair	Ruled out on the grounds of its poor DAC filter, but it's not so bad really given the price	Manual, 2x 0/S, timeshared 16 bit		64
Onkyo DX-2500 £200	Average— Above Average	Attractive, easy on the ear sound quality at the cost of some loss of low level clarity and dynamics. Good tracking	Keypad remote, memory, headphone socket (variable)	R	61
Philips CD473 £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet, we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods	Volume remote, FT'S, menu display etc.	R	60

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 125

THE DIRECTORY

CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Pioneer PD-6100 £249	Good Good	A budget audiophile player; fine sound even if its lab performance seems a little uneven	Full feature remote, digital output, variable hdph	BB	64
Pioneer PD-M500 £269	Good Good	A high performance autochanger for the money, good value all round and generously featured specification	Full remote, digital output, variable hdph	BB	64
Pioneer PD-M700 £400	Very Good Fair +	Top class autochanger, surprisingly fast, high specification and a good allrounder	Remote, optical digital output, headphone socket		64
Pioneer PD-91 £800	Excellent Excellent	Close to state of the art in nearly all areas – soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	64
Revox B226 £658	Good + Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD820B £210	Good + Fair +	A budget Philips based player of dependable sound quality and offering very good value. Build is a touch lightweight	Remote, basic facilities	BB	64
Rotel RCD820BX2 £250	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and comfortably deserves Recommendation.	Direct track entry remote etc.	R	58
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc		58
Sansui CD-X501i £300	Fair Fair	Weak dynamic range for an upmarket player which shows in both lab and listening tests	Remote, programmable, digital output, headphones		64
Sharp DX-620 £199	Good Good	A surprising achievement but it shows what can be done. Another high value budget package	Remote, headphone output, 2x 0/S, timeshare 16 bit	BB	64
Sharp DX-R700H £225	Average – Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
Shure Ultra D6000 £495	Average + Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-M35 £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony CDP-550 £200	Good + Fair +	Another dependable Sony, it doesn't have a digital output but at the price who's complaining? Fit and forget	Full remote headphone output, 4x 0/S	BB	64
Sony CDP-M75 £230	Good Good	This midi version of the '750 saves £20 on the price (see CDP-750 review)	Track entry remote, menu display ect.	BB	58
Sony CDP-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.	BB	58
Sony CDP-M95 £280	Very Good Fair +	Very well equipped mid sized player fine build and finish, incorporating Sony's custom file disc labelling	Remote, programmable, variable hdph output	R	64
Sony CDP-337ESD £550	Good Very Good +	Well built, high grade player with excellent if undemonstrative sound. Excellent resolution, dynamics and bass weight, though arguably not control	Random access remote, calendar display, FTS, memory	R	61
Sony 557ESD £1000	Excellent Good +	Superbly built flagship model that produced excellent lab results and very good sound. Many luxury features though not that good value	Full remote, disc directory, digital output, power volume, 8x 0/S, 18 bit		64
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-P350 £250	Very Good + Good	Nicely built, good features and fine sound, what more do you want for £250?	Remote, digital output, variable hdph output	BB	64
Technics SL-P770 £350	Excellent Good	Sophisticated, high resolution player, but inconsistent with level with some coarseness and compression during loud passages	Remote, 18 bit, rotary cue wheel, comprehensive display	R	61
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good + + Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good	Headphones, remote control, search dial cueing, etc		51
Toshiba XR-9318 £150	Good Fair +	A basic Philips based player perhaps but just look at the price/performance equation	Remote via system, manual, non oversampled, 16 bit	BB	64
Toshiba XR-9128 £200	Very Good Good	A well equipped Philips clone with a very good performance for the price	Remote, programmable, digital output, hdph	BB	64

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across

the bands, and can have analogue or digital displays: they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

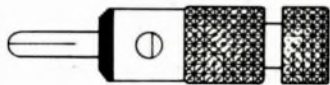
(The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
A&R Arcam Alpha £149	Good Average + +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW LW display manual tune	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only	FM only	BB	50

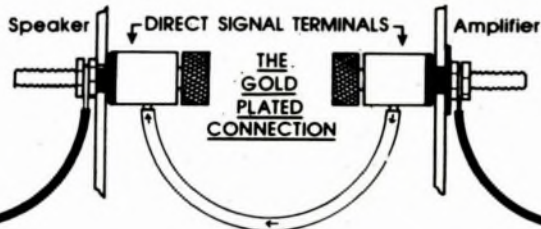
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TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Denon TU 450L £130	Average+ Average+	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation	FM/AM Digital	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/FM, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Hitachi FT-MD 5500 £200	Excellent Good++	A powerful, good sounding tuner with versatile facilities	16 presets, FM, AM, MW auto scan digital, signal meter	BB	55
Hitachi FT5500 II £200	Very Good Good+	Soundwise highly rated on FM, and on AM basically satisfactory – a versatile all-rounder	Auto and manual tuning, 16 presets	R	44
Kenwood KT-660L £130	Fairly Good Fairly Good	You get your money's worth of gadgets and the radio's basically sound although programming is complicated. AM – fairly good	Timer, clock, all bands	R	65
Kenwood KT-11000 £300	Good+ Good+	Behind a gaudy and rather useless display the radio is much better than you might first think. AM – good	Firework display. FM/MW bands only	R	65
Marantz ST35L £125	Good+ Average–	It works well enough but the sound could be better for the money	16 presets, AM/FM, digital auto scan, active tracking		55
Meridian 204 £495	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity 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
NAD 4020B £139	Good Average+	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient"	Analogue FM/AM	BB	50
Naim NAT 01 £1098	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only, Analogue	R	50
Nakamichi ST-7E £750	Good++ Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schotz enhanced sensitivity, auto time digital		55
Pioneer F551L £100	Good+ Good+	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	55
Pioneer FT 443L £130	Poor Poor	The pretentious 'computer controlled' features don't amount to much. AM – very poor	All bands		65
Pioneer F-737 £230	Good+ Good+	Terrific separation and selectivity on FM, but AM still lacking. AM – fair	FM/MW only	R	65
Pioneer F91 £350	Excellent Good++	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM – poor	FM/MW only	R	65
Quad FM4 £289	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £918	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM – virtually everything	R	60
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
SAE T-102 £449	Good+ Good+	Expensive for all the radio you get, but sounds interesting. AM – Poor	FM/MW only	R	65
Sansui TU-D99XL £249	Very Good Good+	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST-S300L/ ST-S100L £140/£100	Good Good	A reasonable entry point, not for difficult areas. AM – Poor	All bands	R	65
Sony ST 500ES £200	Good++ Average–	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 presets, digital scan	BB	60
Yamaha TX-L400 £130	Good+ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on sound quality, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa X-55 £380	Average Average–	The turntable was slightly better than usual, the cassette deck highly limited, but the dreadful loudspeakers are the clincher	Combined cassette tuner-timer/amp, dedicated T/T speakers, & optional CD		65
Aiwa X-78 £550	Average+ Good	Good. The loudspeakers are disappointing and the turntable is excessively microphonic, but the rest of the system works well.	Auto reverse cassette/tuner/amp & timer, T/T and CD	R	65
Aiwa Y1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54

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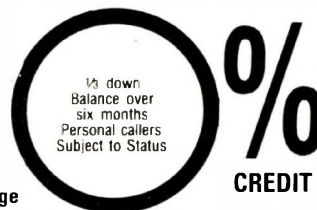


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THE DIRECTORY

CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai M.50CD £550	Poor Poor	Cassette lacks Type II compatibility, general sonics mediocre or less	Devolved from M 80 but simplified, part remote		65
Akai M.80CD £800	Good Good	Good all rounder with minor ergonomic shortcomings but generally practical layout	Separates based, twin auto-reverse cassette	R	65
Goodmans 5300CDM £400	Average— Average+	Crisply styled system with gutsy amplifier and sophisticated speakers. CD player works well, other sources are variously mediocre	Combined cassette/tuner/amp, plus T/T and CD with remote	R	65
Goodmans Maxim-Midi System £520	Average Average+	De-luxe version of 5200 system – very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54
JVC Midi-W900CD £1000	Good Good+	A competent allrounder, with important convenience related features, and powerful linked recording facilities. Less strident speakers would be appreciated	Separates system, equaliser, auto-reverse cassette	R	65
Marantz MX583 £750	Below Average Poor	The system has potential in an A/V context, but is patently lacking in a purely audio one. Only the CD excels	Component system with A/V amp, no speakers		65
Marantz MX673CD System £900	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional		54
Philips F777 £850	Good Good	Excellent CD player, tuner and amplifier, offset partly by poor cassette deck and turntable	Separates system, optional remote, no speakers		65
Pioneer System 300 £1000	Very Good Very Good	Sharp, articulate and powerful system that works. The turntable is a weakness as usual, but the only real weakness in an uncommonly sophisticated package	Remote separates system, optional multi-disc CD	R	65
Proton AI-3000 £550	Good Good	There are a host of minor problems, including no LW, but the unit is attractively packaged and can be made to sound very good despite a woolly sounding amplifier	One piece CD, cassette, tuner and amp, remote	R	65
Sanyo System 22 £350	Average Average+	Some careful detail design has given this system sound quality out of keeping with ordinary appearance. More than the sum of its parts	Single piece, plus speakers	BB	65
Sanyo W40CD £380	Average Average	Low cost, no options package with attractive displays, cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sanyo System 33 £400	Average Average+	Similar to the 22, and better when extended, but the price (and value) advantage is dissipated.	As 22, separate T/T, remote	R	65
Sharp SA-CD800H £700	Average Average—	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 350CD £480	Average— Average—	Visually stunning appearance hides very basic audio attributes, the turntable and cassette deck suffering severe pitch related shortcomings. CD is too expensive in this company.	Integrated one piece, (ex CD), 5 disc non-cartridge player		65
Sony Compact 500CD £550	Average+ Average+	Impressive visuals are matched to electronics which in audio terms lack inspiration. The speakers are particularly poor	Combined amp/cassette, 36 preset tuner, T/T component CD		65
Sony Compact 700CD £700	Average+ Good	Loudspeakers and (to a lesser extent) turntable spoil a fine sounding and stylish – if rather costly – package	Separates system, auto reverse cassette, 36 preset tuner		65
Sony Series 1000CD £1500	Very Good Excellent	Very sharp, articulate sounding system from CD and FM. Cassette deck good and flexible, turntable as usual is not in keeping	Separates system, twin auto-reverse cassette, amp with DAC	R	65
Technics X900CD £470	Average Average—	Good build and mostly good sound is offset by mediocre amplifier and loudspeaker and some operational oddities	Main cassette/tuner/amp, separate T/T and CD		65
Technics X950 System £850	Good Good	Fine sound from CD, FM and AM radio and cassette. The record deck is a little better than normal too, but the loudspeakers are disappointing	Component based, CD, twin auto-reverse cassette, tuner, auto T/T, amp and speakers	R	65
Technics X990 System £1250	Good Very Good	Powerful, flexible and well built system – loudspeakers apart. Even the turntable is on the rough side and the loudspeakers should be changed if possible. The rest of the system is AI	Twin deck, programmable T/T, amp, CD, speakers	R	65
Toshiba V17CD £370	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
Toshiba V18CD £400	Poor Poor	Neat and simple to use basic system with good CD but poor elsewhere and abysmal loudspeakers	Integrated amp/cassette deck, other components separate but dedicated		65

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

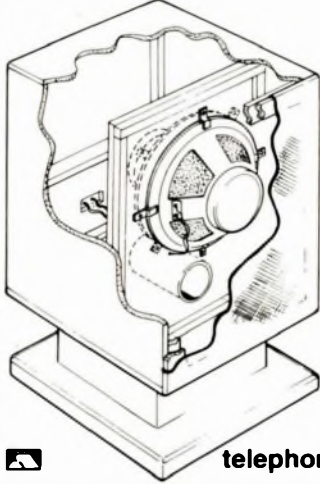
Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HP-X8 £49	Good Very Good	Very slick Walkman oriented phones which are tonally well balanced and go loud without becoming painful	Supra-aural, closed-back, dynamic	R	63
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £35	Fair Poor	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K240 Monitor £60	Good Very Good	Something of a classic these AKGs are very user friendly in all respects, sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £110	Very Good Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
Audio Technica ATH 909 £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £65	Good Average	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio Technica ATH-911 £75	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £30	Fair Very Good	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £45	Poor Good	Not the most revealing phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55

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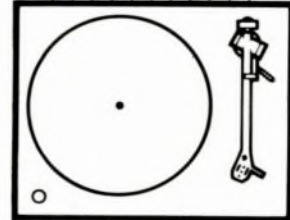
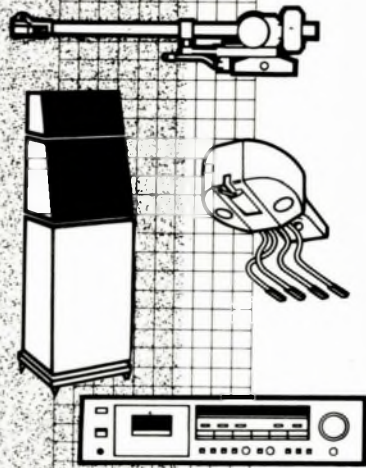
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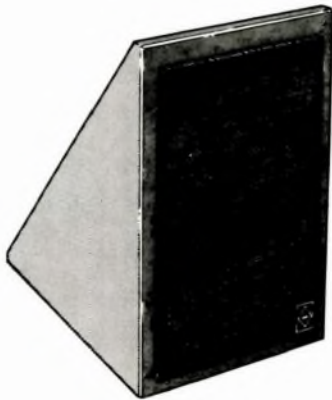
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HEADPHONES

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for <i>headbangers!</i>	Circumaural, semi-open, dynamic		55
Beyer DT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic	R	55
Jecklin Float Model One £79	Very Good Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Very Good Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
Jecklin Float Electrostatic £399	Excellent Good	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Koss K/6X Plus £30	Poor Fair	'Sixties-style' phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Quart Phone 30 £40	Fair Good	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition - though not stunning	Circumaural, semi-open, dynamic		63
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart PMB 65 £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Quart PMB 85 £90	Very Good Fair	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
Ross RE-2760 £35	Fair Poor	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
Sennheiser HD30 £13.50	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones	Supra-aural, semi-open back, dynamic		55
Sennheiser HD450 £27	Fair Good	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
Sennheiser HD480 £37	Fair Good	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
Sennheiser HD420SL £47	Good Good	The 420s gave a full and tangible quality to instruments and voices; whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £160	Very Good Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony MDR V3 £30	Good Fair	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
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
Sony MDR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
Stax SR34 £140	Very Good Fair	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Stax Gamma pro/SRD-X pro £296/£230	Excellent Very Good	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax SR Gamma £299 (inc. SRD-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price.	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £545 (inc. SRD-7SB Mk 2 Adaptor at £185)	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.

PERSONAL CASSETTES

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £30	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56

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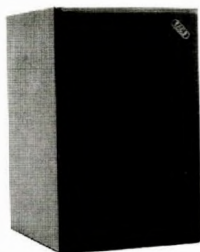
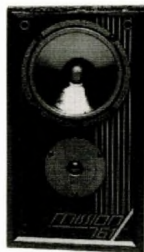
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PERSONAL CASSETTES

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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 durable	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sanyo JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating	Dolby, types I, II & IV	BB	56
Sony WM-F63 £100	Average - Average -	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good + Excellent	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most unsuitable 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

PERSONAL CDs

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Goodmans GCD-10 £120	Average - Poor	Cheap, flashy and not short on accessories the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		This
Kenwood DPC-77 £270	Good + Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output - a suitable domestic alternative	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car adaptors	R	This
Philips D6800 £130	Average Average -	A competitively priced and reasonably attractive looking player whose sonic performance is somewhat marred by a rather grainy top end	13 x 4 x 17.5cm, 516g, 3" ready, twin hdph sockets		This
Sanyo CP-12 £260	Fair Good +	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	This
Sony D-20 £150	Average + Fair	Not bad for a machine at this price, it's nicely designed and reasonably robust, with reasonable sound quality	13.8 x 3.8 x 15cm, 450g, mains adaptor	R	This
Sony D-40 £200	Fair Good	A 'largish' but attractive player that works well as a Discman being fairly immune to shock and capable of making a good job of reproducing the discs it's given	13.6 x 3.7 x 14.7cm, 480g, mains adaptor, slinky case	R	This
Sony D-88 £300	Average - Fair +	A stylish and 'cultish' object, the D-88 is very small and has an adjustable disc drive for three and five inch discs. Sound quality doesn't quite match appearance	9.4 x 3 x 9.8cm, 300g, 3" ready, mains adaptor, no line out		This
Sony D-150 £300	Fair + Very Good	One of the most enjoyable machines encountered, sounding informative and sweet and looking very fancy to boot. Comes complete with a tough carrying case	12.6 x 2.1 x 13.5cm, 420g, 3" ready, R mains adaptor	R	This
Toshiba XR-9458 £250	Average + Good -	Accompanied by a plethora of accessories including a meaty plinth and infra red remote, the Toshiba didn't quite make it on the sound quality front but is worth considering	12.6 x 2.4 x 12.9cm, 460g, 2 remotes, mains adaptor, 3" ready etc		This
Xenon CDP-03 £180	Average - Fair +	A well made and competitively priced machine that is ergonomically spoilt by flat slightly unresponsive buttons. Sound quality ain't too bad but a trifle boring	12.6 x 2.7 x 12.6cm, 560g, high frequency filter, key lock		This

CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/FM radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some.

In virtually every case a CD output socket is

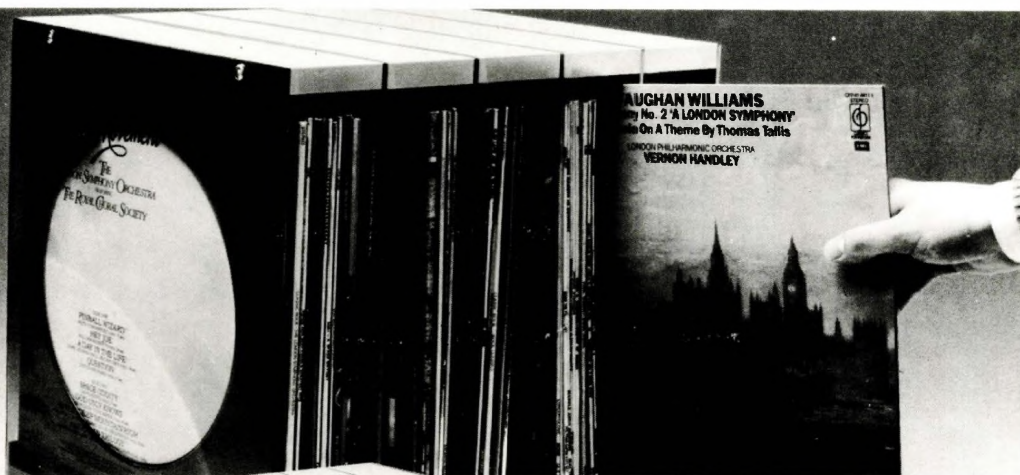
fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson RCD02 £300	Poor	A large, slightly tinny midi system-esque unit with removable speakers and a slightly brash sounding CD player	Twin cassette, graphic equaliser, spare input (DIN)		53
Fisher PH-D473F £300	Average	The Fisher is quite a neat and compact player which is nice to use but doesn't offer particularly great sound quality	Autoreverse, AFC		53
Hitachi CX-W800 £300	Average +	This meaty Hitachi lives up to Blaster expectations, its super woofer bass speaker giving maximum street credibility	Twin cassette, graphic equaliser, phono input	R	53
Memorex CD-3300 £280	Average	A little bit tacky, the Memorex put in a plausible if unenthralling performance, and will work with external speakers	Spare input		53
Panasonic RX-FD80L £300	Average -	Shiny in a glib way, this Panasonic features a reasonable cassette deck but a below par CD player with tiny transport controls	Autoreverse, spare input		53
Sharp WQ-CD15 £250	Good	A reasonably compact machine with a quite impressive CD player and a novel twin cassette mechanism	Twin cassette, graphic equaliser, spare input	R	53
Sony CFD-66L £350	Good	A very attractive player in the true yuppie mould of white plastic with silver details, it even sounds OK	Spare input, shuffle play, AMS (tape search system)	R	53
Toshiba RT-7096 £250	Poor	Quite a large box for the money, the Toshiba isn't too special when it comes to sound quality but does have partly wooden detachable speakers	Twin cassette, graphic equaliser, spare input		53

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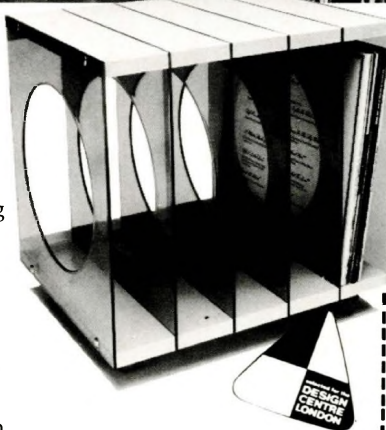
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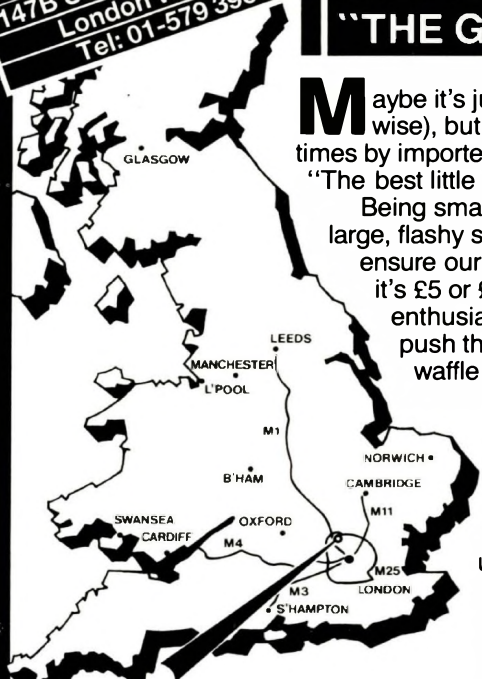
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THE DIRECTORY

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £40	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £47.25	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Foundation Fred £65	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £250	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Heybrook Point 5 £50	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent – a good value stand.	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £75	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £74	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £80	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Mordaunt-Short IS1 II £45	3 leg Good	Suited to low mass speakers, preferably using spikes to effect coupling, they sounded slightly 'jazzed up' but the overall sound was quite unmudded.	18 x 15cm 56cm	R	58
Origin Live £117	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
Partington PP4 £50	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
Partington Dreadnought II £120 (filled)	1 leg Very Good	Ideal for systems on the light/bright side of neutral, the Dreadnought II's nevertheless still need some careful re-examination by Partington.	17.5 x 16.5cm 63cm		58
QED TS22 Tristand £50	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
RATA Torlyte £190	2 panel Excellent	Suited to low mass speakers, these unusual stands are hardly discreet but offer transparent and clean sound – much like the Torlyte table!	25 x 21cm 48cm	R	58
Target HS20 £53	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HT15/3 £83	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Audioquest Sorbothane Feet £10 each	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS5 £50	Table Very Good	A little too close to the ground for comfort, perhaps, but this novel and stylish little table is certainly worth seeking out.	29 x 43 x 33cm	R	57
Cornflake TCS6 £50	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Deitec Isolation Base £135	Platform Good	Designed for all CD players, amplifiers and separates, but not suspended sub-chassis turntables, the isolation is second to none.	50.5 x 40cm	R	57
RATA Model A £125	Table Very Good	A three-legged Torlyte turntable support that has become something of an industry reference.	46 x 46.5 x 38.5cm	R	57
RATA Amplat £40.25	Platform Very Good	A lightweight and rigid Torlyte slat with spikes for floor or shelf mounting, it works well in conjunction with the Target TT2.	4 x 44.5 x 35cm		57
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Target TT1 £46.50	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money.	26 x 46.5 x 35.5cm	BB	57
Target TT2 £47.50	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57
Townshend Suspension Base £145	Platform Fair	Designed to complement the Rock turntable, this platform will bring subjective improvement to a wide range of electronics.	43 x 36cm	R	57

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The Audio File

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Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence the quality of that

signal. The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The

interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate to that length – some cables may well perform differently when used in longer lengths.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aparture LSD N/A in UK	Poor Fair	Faint resonant boom was audible at very low frequencies, but otherwise this cable sounded remarkably neutral.	Silver plated copper, PTFE dielectric		59
Audioquest Reference 2 £29	Good Fair	Ultimately Reference 2 simply damped much of the atmosphere and emotional charge of a musical performance.	OF copper		59
Audioquest Livewire Topaz £29	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £45	Fair Good	Smother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
Audioquest Livewire Quartz £65	Good Good	Quartz has an ideal, neutral balance that embodies sparkling clarity without the drawbacks of harshness or compression.	3 piece plugs, PTFE dielectric	R	59
Audio Technica AT6115 £50	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59
Audionote Copper ANC £35	Fair Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies.	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £85	Fair Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened.	Silver signal & Copper screen	R	59
Audionote Silver ANV £140	Poor Fair	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Aural Symphonics N/A in UK	Poor Good	This cable enjoyed an open and transparent midband and sounded remarkably neutral and faithful to the source.	OF copper PTFE dielectric	R	59
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltec Black Slink £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of facility.	8 silver plated OFC strands PTFE dielectric	R	59
Denon LC-OFC N/A separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £15-£25	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £4.60 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Kimber Kable PSB £32	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £47	Very Good Fair	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy.	Multi-gauge PTFE dielectric		59
Kimber Kable KC-AG £375	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
MDM Interconnect £14.95	Good Fair	The subjective performance of MDM did appear a little imprecise at the frequency extremes, but a worthwhile upgrade on budget interconnect.	Coaxial, solid core, gold plated plugs		59
MIT PC-Squared £75	Fair Good	This multi-gauge cable produced a very open and buoyant midband but sounded slightly 'peculiar' at frequency extremes.	OFC, multi-gauge	R	59
MIT Spectral MI330 £193	Poor Fair	MI330 displays a marvellously open and enticing midband quality, bass is warm and rich but this character has a tendency to dominate.	Multi-gauge balanced bandwidth		59
Monitor PC 0100381 £17	Good Fair	There is more than a hint of instrumental muddling and bass is slightly soft, however, the slightly 'shut-in' sound is par for the course at the price.	OFC, coaxial	R	59
Monster Interlink 400 £30	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger than life.	Multi-gauge	R	59
Monster Interlink CD £44	Fair Fair	Low frequency is commendably weighty, but the top-end sounds vague and lacking in image focus. Suited to some systems better than others.	Multi-gauge		59
Monster Interlink Reference £88	Good Fair	Protracted listening indicated a lack of dynamic speed – a subjective sluggishness. It may prove well suited to up front systems.	Multi-gauge Balanced bandwidth Gold plated plugs		59
Myst Tm £15.60	Fair Good	Fairly neutral with a pleasantly open and transparent midband. Some deep bass detail is lost but treble is sharply focused.	Solid-silver PTFE dielectric	BB	59
Origin Live Soli-Core Super £60	Good Fair	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains.	Solid-core gold-plated AT plugs		59
QED Incon P1-Gold £14.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GP1 Gold £18.95	Fair Fair	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though.	OFHC Graphite shielding	R	59
Sony RK-C310ES £40	Excellent Good	Possessing deep firm bass and a sparkling top end it offers a balanced perspective with negligible coloration.	Coaxial LC-OFC	R	59
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Thorens SAC 100 £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and fine detail lacks resolution.	Silver-plated OFC, coaxial		59
Van den Hul MC-D300II £59	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
Van den Hul MC-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution.	Twin axial silver plated copper	R	59

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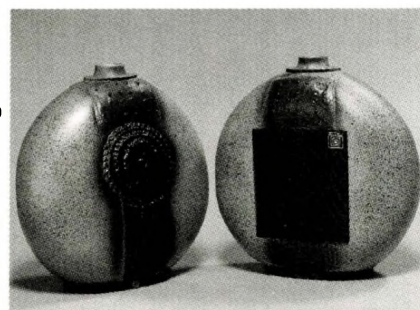
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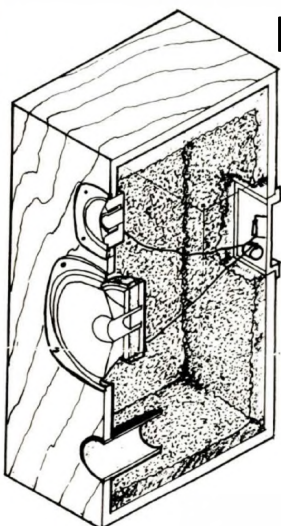
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THE DIRECTORY

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Van den Hul MC-D502 £77	Fair Fair	The tonal balance was 'tilted' by a strong and authoritative bass line, which had the knock-on effect of muting treble detail. A bit dear.	Twinned axial silver plated copper, teflon dielectric		59
Van den Hul Thunderline £147	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'lizzy' coarseness, bass is tight and dry.	Silver plated 'matched copper'		59
Van den Hul MC-Gold £247	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances.	Silver & gold plated copper		59
Van den Hul MC-Silver £747	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-OFC signal & screen	R	59

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Absolute Wire Force 4 £4.50 per metre	Good Fair+	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound.	744 OFC strands, PVC dielectric		64
Audionote DR-200 £16 per metre	Fair+ Fair+	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies.	200 LC strands, polyurethane and cotton dielectric		64
Audionote AN-SP £100 per metre	Average— Good	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless.	15 silver strands, polyethylene dielectric		64
Audioquest BC-4 £2 per metre	Average+ Good+	There was a slowing of fast transient edges to contend with but in general BC-4 offered a delightful clarity and sparkle throughout the highest octaves.	4 OFC strands, PVC dielectric	BB	64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green.	OFC, surface only – foam core construction	R	64
Audioquest Livewire Green £30 per metre	Good Fair+	Green proved more overtly dynamic and forward than BC-4 with simple music, but complex passages tended towards a mushy and ill-defined perspective. FCL – functionally crystal less.	FCL, surface only – foam core construction		64
Audio Technica AT6120 £95 – 10m	Fair+ Fair	Compared to earlier LC-OFC cables this PC-OCC derivative sounded smoother and less aggressive.	PC-OCC, PVC dielectric		64
Bellwire 12p per metre	Poor Average—	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution.	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 – 5m pair	Good Good+	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price.	4 silver plated OF copper strands, PTFE	R	64
Deltec Black Sixteen £456 – 4.5m pair	Very Good Excellent	Bass was deep and rhythmically secure, the mid tonally pure and free of additional sibilance while the treble was both relaxed, sweet and highly detailed.	16 silver plated OF copper strands, PTFE dielectric	R	64
DNM Solid core £2.30 per metre	Average Fair	DNM cable seems too unbalanced for general consumption but excellent results have been obtained in sympathetic systems.	0.54mm single strand, webbed PVC dielectric	R	64
Exposure £2 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs.	56 OFC strands, webbed PVC dielectric	R	64
Kimber Kable 4PR £49.45 – 5m pair	Fair Fair+	This directionally marked cable benefitted from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut.	4 x 7 copper strands per conductor, PVC dielectric		64
Kimber Kable 4TC £16 per metre	Good Good+	4TC made a great impression in the listening tests with an open midband, a smooth and unflagging treble with slightly rich but suitably weighty bass.	OF copper, PTFE dielectric	R	64
Linn K20 £2 per metre	Good Fair	Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery.	56 OFC strands, webbed PVC dielectric		64
Marantz ML-55S £24.90 – 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy.	30 OFC strands, 3 conductors PTFE dielectric		64
Mission Cyrus £2.50 per metre	Average+ Good	Because of its impedance characteristic this cable will deliver a smooth and unflagging treble balance with loudspeakers offering an easy load.	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables.	2072 x 0.07mm silver plated copper strands		64
Monster Superflex £2.50 per metre	Fair+ Fair+	Treble detail was both reserved and confused though there was little in the way of harshness and grain. Deep bass notes were also found to be lacking.	OFC, multistrand, Duraflex dielectric		64
Monster Original £4 per metre	Good Fair+	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass.	Multistrand		64
Monster Powerline 2 £12 per metre	Good Good—	Powerline stamped its own hallmark on the sound with a strong taut bass and an essentially clear midband giving tactile stereo images.	Multistrand, helical construction		64
Musical Fidelity Lifeline £11.50 per metre	Fair Good—	Lifeline did demonstrate a strong directional inclination, affording a laid back but fairly neutral balance when correctly oriented.	4 x 0.8mm PC-OCC strands	R	64
Naim NAC-A4 £2.25 per metre	Good Fair+	Tinged with brightness while the deep bass response seemed both over heavy and poorly integrated compared to the immediate competition.	Multistrand, webbed PVC dielectric		64
NVA £6 per metre	Average+ Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook.	7 x 0.25mm silver alloy strands, PTFE	R	64
Origin Live Soli-Core Ordinary £1.80 per metre	Good Fair+	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble.	1.8mm and 0.5mm single strands	R	64
QED 79-Strand 90p per metre	Good Fair	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today.	79 strand, PVC dielectric	R	64
QED Incon Graphite £1.75 per metre	Fair+ Fair+	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog.	OFC, polymeric screen		64
QED Flat 200 £1.95 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive.	200 strands, flat webbed PVC dielectric	R	64
Rotel Supra 4 £2.49 per metre	Good+ Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unflagging treble.	1,036 OFC strands, webbed PVC dielectric	R	64
Rotel Supra 10 £6.49 per metre	Good+ Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R	64
Sony RK-S5ES £59.95 – 5m	Fair+ Fair+	The sound of this cable was also somewhat controlled and over damped. The treble was relatively free and airy but lower octaves, including the midband, were constrained.	350 x 0.08mm OFC strands, heat shrink dielectric		64
Solid core mains cable 36p per metre	Fair+ Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent.	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £499 – 5m pair	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation that totally confused more complex orchestral passages.	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 – 5m pair	Fair+ Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves.	8 coax cables per conductor – very thick	R	64



ADVERTISEMENT

NEWSLETTER

Vol. 4, No. 8 January 1989.

AWARDS

There were two outstanding products which we felt advanced the state of the art in 1988. The KOETSU 80th Anniversary Moving Coil Pick-Up Cartridge proved, surprisingly, that there is still a substantial wealth of detail in the infinite-sampling technology of the LP Record. And in addition to the strength of vinyl at the top end, the revenues to the record companies from vinyl remains stable and substantial. The AUDIO RESEARCH SP-15 bridges the gap between the SP-11 and live music. Yes, it is really that good! We struggled between these two products: we hesitate to award Audio Research yet again; and to award a product limited to eighty pieces worldwide, so we acknowledge both products joint Gold Level Award and thank their creators for such painstaking dedication to our Art.

At Silver Level, the Roksan Record Player was born in 1988 in the sense that the Xerxes turntable was finally joined to the Shiraz cartridge and the Artemiz tonearm. These products reflect the expertise and dedication which took so long. You would not expect another "me-too" product from Roksan Engineering, and from £1,355 (depending on finish from black ash through walnut, rosewood, piano finish or *Cognoscenti*) this product brings the potential of the LP into more homes. Our bronze level award committee short-listed the Mission Cyrus One Mk.II at £179.90 or their 781 loudspeaker at £239.90; the former has won so many prizes except the readily-available-prize, and the latter didn't quite make it to the shops in time for Christmas. The new Tannoy Eclipse (£120) loudspeakers firmly place this Scottish manufacturer into the top spot for amazingly affordable Hi-Fi loudspeakers, and we offer them our award, congratulations and an order for another ten pairs please.

On the subject of awards, we are delighted to announce that The Music Room of Manchester has taken, for the second year, the Award sponsored by Sony and Hi-Fi news for best Dealer in Midlands and North of England. This region covers many of the land's best dealerships, so from head office may we rest assured that our English customers are being well looked after? This achievement reflects expertise and much hard work, so we congratulate our new Manager Nigel Charlton and Paul Eccles (his right hand man). The minority of ladies in the Hi-Fi trade is more than compensated by their excellence, and what would we do without our Louise Gore? New recruit Steven Wroe has already attracted his personal following and we thank him for a most promising start.

COMPACT DISC

Music lovers must now invest or upgrade in CD. So much improvement has taken place that from £200, either Philips or Yamaha offer a range which (in our opinion) represents the very best engineering and value from Europe or Japanese purist musical companies. The bridge joining these two is the American-Japanese-European owned (!) Marantz - and their machines offer the best of all worlds. New to this range is the CD 85, in effect an affordable CD-94 costing £499.

At £499, the Philips 880 must be considered but you must also listen to the musicality offered by the Mission PCM II. Although based on Philips chassis, Mission have unrivalled experience in value for money audiophile engineering and they are justly proud of their CD Player. Only at £649 does strong competition enter: the Cambridge CD-2, the amazing 16-bit x 16 technology by which Stan Curtis has achieved a world first for Britain. And yes, it sounds that good! Also from Cambridge, the A&R black box along with their range of ampli-

fiers and tuners deserves special acclaim. While we are in that lovely University town of Cambridge we will take our hats off to QUAD and to AUDIOLAB and call in to see MONITOR AUDIO. This loudspeaker company offers superb value to budget buyers, without compromising the cabinet quality and is now heavily engaged in research and development of high-end speakers such as the R-1200, a floor standing loudspeaker of excellence and elegance; costing £795 these offer gold MD technology and superb rendition of detail, dynamics and openness. You really must hear these!

To complete the section on Compact Disc: do not ignore the Philips Combi player: for £499 you can play CD's and by connecting up to a TV set, the gold discs now being released bring artists into your home in a new way. Sound and picture quality are amazing, and Philips are to be congratulated and welcomed to our camp for adopting so many purist approaches so alien to their cost-cutting products as little as five years ago. David, the audiophile, has really influenced Goliath and the result is happy. When the Philips technology is engineered to the ultimate standards, you get the Kinergetics KCD-30 and the CAL (California Audio Labs) Tempest Mk. II. If you need to ask the price, you cannot afford them; if you need the best, you cannot do without them.

ANALOGUE

The increase in manufacturing cost of the SME Series IV Tonearm is bad news, but we invested in enough stock to last us until the end of the year at £675 instead of £810. This arm complements Roksan, Oracle and Gyrodek but the latter with new power supply and Air Tangent tonearm sounds as good as it looks, and it looks jolly good! Keep up the good work, Mr John Michell, and renewed salutations

to the affordable Syncrodek with arm from Audio Technica or Rega.

At last LAST record care accessories are achieving some good editorial in Britain and we apologise to Accessory Club readers for the delay in the last shipment. There was a tremendous response to Paul Miller's article on record care accessories in *WHAT Hi-Fi?* in which he stated "LAST is the only formula I would wholeheartedly recommend that involves tampering with your records". People now, more than ever, want to conserve and get the best from analogue records. LAST fluids really work to clean records, preserve them and improve the sound quality despite the bad name attached to overpriced and often damaging cleaning fluids. Now for some exciting news: AUDIO TECHNICA UK announce a 10th Anniversary Limited Edition of their highly acclaimed Moving Coil Cartridges (AT-F3, F5; OC-7 and OC-9 which cost £69.90, £99.90, £259 and £399). These offer "signature" standard performance and we will make them available until 31st January to our customers at *no extra cost*. These cartridges are significantly better, and you may also take advantage of new-for-old stylus replacement discount of 25% if you return any Audio Technica MC cartridge other than those with replaceable styli. AT also announce the 1130 tonearm at £189 and the AT-450 metal bodied MM cartridge at a most tempting price of £49.90.

The Festive Season is the time to carefully consider accessories and we stock all the major items. Exclusive to The Music Room, until the others wake up, is the new range of interconnect and speaker cable from Audio Research. It is essential for those who already understand why they have invested in Audio Research, and will also bring some of this excellence to users of other electronics. Please ask for our AUDIO RESEARCH "Litzlink" Information and Price List.

AS ALWAYS WE HAVE LOTS OF SECOND-HAND BUT FULLY GUARANTEED GOODIES INCLUDING THE SP-11 AT £3,750, SP-10 AT £1,990 AND SP-7 AT £1,150. THE ULTIMATE IN ANALOGUE TECHNOLOGY BUT ONE IS THE GOLDMUND ST-4 AND WE HAVE ONE LIGHTLY USED AT AN UNREPEATABLE £2,750. PLEASE PHONE FOR DETAILS. WE WISH ALL OUR CUSTOMERS AND SUPPLIERS A PLEASANT FESTIVE SEASON, AND A VERY GOOD NEW YEAR IN 1989.

*The Music Room, 50 Bridge Street
Manchester M3 3BN, 061-835 1366*

*The Music Room, 221 St. Vincent Street
Glasgow G2 5QY, 041-248 7221*

THE DIRECTORY

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
van den Hul CS-122 £5.50 per metre	Fair + Good -	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
van den Hul CS-352 £12.95 per metre	Good Fair +	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised dielectric		64
van den Hul SCS-12 £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OFC PTFE insulated strands	BB	64
Vecteur S-CV90 £199 - 5m pair	Fair + Fair +	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spiced up with a lighter sharper delivery	6 x 0.7mm LC-OFC strands		64

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier there is a wide variety of in-car machines to choose from, some of

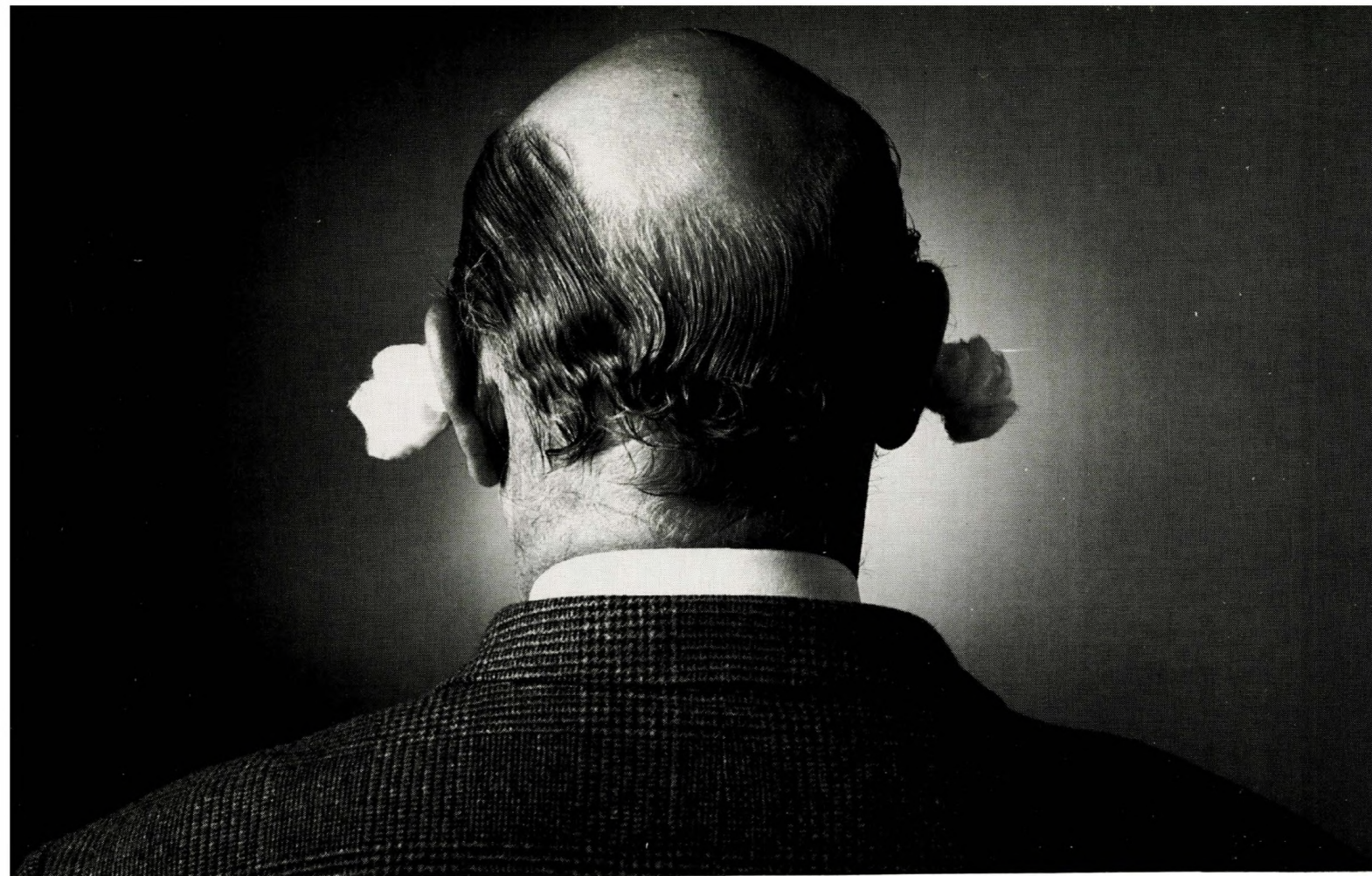
them offering practically every gadget or feature under the sun. The majority of sub £300 players are integrated units featuring a cassette player, AM/FM tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis

is on the frequency modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
Aiwa CT-Z3500YL £199	Fair Fair	A nicely designed machine with a flip up lid for disguise purposes. Sound quality from cassette is a bit poor but the radio is exemplary especially on AM	Bass/Treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., 8.4W	R	62
Blaupunkt Paris SQM 48 £253	Average Average	A powerful and sensibly designed player but let down by a very dull sounding cassette. The radio is a bit better	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, 11.5W		62
Blaupunkt Windsor SQR 38 £275	Good Average	Not very enthralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport	5 FM, 10 AM presets, 3.1W		62
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system	Bass/treble controls, 12 FM/6 AM presets, Slot-in, 15.1W	R	61
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you - a lot of gizmos for the price and it even sounds OK	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	62
JVC RX-318 £200	Average Average	This JVC sounded quite enjoyable and turned in an impressive performance on FM. It even looks quite nice	Bass/treble controls, 5 FM, 10 AM presets, slot-in, 8.8W	R	62
JVC RX-418 £250	Average Fair	An attractively designed machine with a fair selection of features - even an aux socket for a portable CD player	Bass/treble controls, 10 FM, 10 AM presets, Dolby, chrome eq., slot-in, aux socket, 7.7W		62
Nakamichi TD-400E/PA-300 II £450/£275	Very Good Excellent	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging	Bass/treble controls, chrome, NR, 7W		62
Philips 553 £120	Average Average	Not the most ergonomic player on test but sound quality was quite refined for the price. Presets are a bit gauche	4 FM, 4 AM presets uni-directional cassette 3.1W		61
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
Pioneer KE-3030 £150	Poor Fair	A tasty looking, if sonically bass heavy, little box well suited to blasting out rock or dub	18 FM, 6 AM presets 4.2W		61
Pioneer KEH-5080B £230	Fair Good	A chunky and neatly styled player with healthy power output and an easy relaxed sound. Just the thing for pumping up the volume	Bass/treble controls, 18 FM, 6 AM presets, anti-theft device, slot-in 9W	R	61
Sansui RX-3100L £180	Poor Fair	Quite flash looking with a reasonable feature count but FM sound and cassette replay quality could be a bit stronger at the price	Bass/treble controls, 12 FM, 12 AM presets, chrome eq., 8W		61
Sansui RX-5100L £250	Good Very Good	One of the cleaner machines around the 5100 has an excellent AM section and a reasonable cassette player	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., slot-in, 12.5W	R	61
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		62

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



YOU'VE NEVER HEARD OF CASTLE ACOUSTICS? THAT'S FUNNY, WE'VE NEVER HEARD OF YOU EITHER.

You're obviously more of a music lover than a hi-fi enthusiast. Or perhaps you've yet to hear the sound of a loudspeaker you really like.

So isn't it about time you unplugged two of your most important assets and allowed us an informal introduction. We have, you'll find, a lot in common.

We start by using our ears too, in the market-place, listening to what is really wanted in terms of size and looks as well as performance.

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I would like to be introduced to your range of loudspeakers. Please send me more info.

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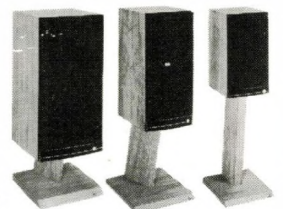
By reading this far, we hope we've made one more.

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All that remains is for us to hear from you. Clip the coupon or nip down to your local hi-fi specialist.

We feel that once you've auditioned a pair of Castle loudspeakers, you'll never want to listen to anything else again.

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REVIEW PRODUCT INDEX

LOUDSPEAKERS

ACOUSTIC ENERGY AE2	51	HEYBROOK HB200	71	TANNOY DC2000	91
ACOUSTIC RESEARCH 112	52	INFINITY 6 KAPPA	73	TDL MONITOR	92
ACOUSTIC RESEARCH 132	53	JAMO CONCERT 2	75	WHARFEDALE 505/2	93
ALEXANDER AURORA	55	LINN HELIX	77	CD PERSONALS	
ARISTON IMAGE	56	MISSION 761	78	GOODMANS GCD10	103
B&W 560	57	MISSION 762	79	KENWOOD DPC77	105
CANTON KARAT 60	61	MONITOR AUDIO R352MD	80	PHILIPS D6800	107
CASTLE WARWICK	63	MONITOR AUDIO R852MD GOLD	81	SANYO CP12	109
CELEF CIRRUS	64	MUSICAL FIDELITY MC2	83	SONY D20	111
CELESTION SL12Si	65	OPUS CAPELLA	84	SONY D40	113
ENERGY 22 PRO MONITOR	67	ROGERS STUDIO 1a	85	SONY D88	115
HARBETH LS3/5a	69	ROYD EDEN	87	SONY DI50	117
HEYBROOK HB100	70	STUDIO POWER SAPPHIRE	89	TOSHIBA XR9458	119
		TANNOY MERCURYS	90	XENON CDP03	121

ADVERTISERS INDEX

ABSOLUTE SOUND & VIDEO	72	HARBETH ACOUSTICS	120	RADLETT AUDIO	160
ACOUSTIC ARTS	60	HAYDEN LABORATORIES	16,18	RAYLEIGH HI FI	86
ACOUSTIC RESEARCH	42	HEYBROOK	100	READING HI FI	76
AERCO	158	HI FI CORNER	82	RICHER SOUNDS	4,5
APOLLO	140	HI FI EXPERIENCE	118	ROGERS SWISSSTONE	164
ARJAY INTERIORS	136	IN HI FI	148	ROTEL	I.F.C.,59
ARTIFACT DESIGN	166	ION SYSTEMS	116,120	SAILSBURY HI FI 1	48
A.T LABS	34,35	JEFFRIES HI FI	102	SEVENOAKS HI FI	38,39
AUDIOCRAFT	160	J.V.C	6	SMITH HL	88
AUDIOFILE	168	K.J LEISURESOUND	116	SONY	28,29,31
AUDIOFILE PRODUCTS EUROPE	68	LYON AUDIO	164	SOUND ADVICE	110
AUDIO FREAKS	104	MARCEL AUDIO	62	SOUND GALLERY, THE	162
AUDIO INNOVATIONS	104	MICHELL ENGINEERING	158	SOUND ROOM OF NORBURY, THE	125
AUDIO PROJECTS	154	MIKE MANNING AUDIO	102	SOUND SHOP, THE	108
AUDIO SOUTH	110	MISSION ELECTRONICS	O.B.C	SOURCE ODYSSEY	110
AUDIO TECHNICA	66	MOORGATE ACOUSTICS	154	SPALDINGS HI FI	140
AYLESBURY HI FI	160	MUSICAL FIDELITY	45	STILTON AUDIO	74
B.A.D.A	58	MUSICAL IMAGES	152	STUDIO 99	76
BOXSHALL, STEVE AUDIO	154	MUSIC ROOM, THE	112	SUSSEX AUDIO	158
BRADY W & A	142	NAKAMICHI B & W	30	SWIFTS OF WILMSLOW	108
CASTLE ACOUSTICS	174	OBRIEN HI FI	108	TANNOY	10
CELESTION	98	ORIGIN LIVE	158	TEAC	I.B.C
CHEW & OSBOURNE	60	ORTOFON	124	UXBRIDGE AUDIO	144
COVENT GARDEN RECORDS	106,150	PHILIPS	21	WEST MIDLAND AUDIO	164
DIESIS	162	PIONEER	22,23	WHARFEDALE	48,49
D.N.M DESIGN	49	PLAYBACK	108	WILMSLOW AUDIO	162
ELECTRO COMMUNICATIONS	94	PROGRESSIVE AUDIO	160	ZEUS AUDIO	116
HAMPSHIRE AUDIO	134	Q.E.D	114		



PERSONAL MESSAGES

Paul Messenger discovers the Loch Ness monster, but not in Scotland.

Hi-fi, particularly approaching the lunatic fringe, is crammed with all manner of heresies – ideas which fly in the face of present reason and understanding, but which disciples disarmingly justify on subjective grounds.

Sometimes the claims turn out to be the first rumblings of what eventually proves to be an earthquake of change – let no-one forget that the concepts of turntable and connecting wire 'sound' were both roundly dismissed as lunatic ravings little more than a decade ago. Other claims are quickly forgotten and disappear without trace (roundly dismissed as the ravings of lunatics). But more often those that don't catch on quickly become the Loch Ness monsters of hi-fi: they rumble around largely unnoticed for months or years and raise their ugly heads briefly above the surface from time to time for re-examination and discussion.

The latest Nessie to reappear is the idea of removing damping materials from the inside of your loudspeaker cabinets. It's not a new idea, and my suspicion is that it's not a very good one either, particularly in the light of a recent experience that I shall describe shortly.

But first some background. The only rationale I can recall for the 'damping is bad for your hi-fi' cult goes back some years and is based on 'because it removes energy and energy is information'. Although there may be a vestige of truth somewhere in there, it's also a dangerous

over-simplification.

I do agree that damping is often used with excessive zeal, in a sometimes vain attempt to cover up problems. But there is also a qualitative difference between the reactive and resistive elements in any damping exercise.

Resistive damping is harmless enough, not being frequency selective. Reactive damping is essentially undesirable because it introduces its own additional resonances as a side effect – though this may still be a necessary evil in the control of mechanical resonance.

Cartridges illustrate the situation very well, as the degree of internal damping has much to do with the relationship between the mechanical behaviour in the groove and the sound quality. The almost undamped Decca/London cartridges are the classic case: they work wonderfully well when they're working, but leave you close to the edge of the seat waiting for loss of control (ie mistracking).

If there is a rule or link for cartridges (and it's far more complex than just the addition or subtraction of damping), the (very) broad generalisation is that the greater the damping the 'slower' the sound, but the better the tracking and mechanical control. From which it follows that a lightly damped cartridge can sound very good, but only if it's given its best chance in a high quality turntable and tonearm.

However, I don't think there's much reactivity or hysteresis involved in adding a bundle of

damping material to the box of air that makes up 90 per cent of the volume of a loudspeaker system. The bundle of roof insulation off-cuts you find if you open the box is essentially resistive, and hence fundamentally benign. (In fact it adds to the thermal inertia of the air mass, which tends to make the box volume appear larger than it is.)

Loudspeaker manufacturers don't fill up their enclosures with wadding for no reason. And one such reason rudely drew attention to itself during this month's multiple loudspeaker review. Amongst the 30 pairs of loudspeakers was one which had inadvertently had the internal wadding left out. Suspicions were aroused by a very obvious harmonic sequence of 'glitches' in the frequency response, right in the middle of the midband and up to 10dB in severity.

Effectively the undamped enclosure's rear panel was reflecting the radiation from the back of the bass/mid cone, and this was coming back through the cone to interfere with the main, direct signal. The reflected signal doesn't just add to the main signal, it also suffers a time delay which corresponds to the distance there and back. At the frequency where this corresponds to half a wavelength, out-of-phase cancellation occurs, creating a sort of 'comb filter' effect through a series of harmonics.

Such a severe measured effect alone should be sufficient to dissuade anyone from lightly removing their wadding to insulate the dog kennel. But the blind listening tests further confirmed that the measurements were no figment of the anechoic chamber's imagination. Coloration is rife to the point where even yours truly (normally more tolerant than many) cried enough. 'Hollow' and 'cuppy' effects were most prominent, but the best adjective is simply 'boxy'.

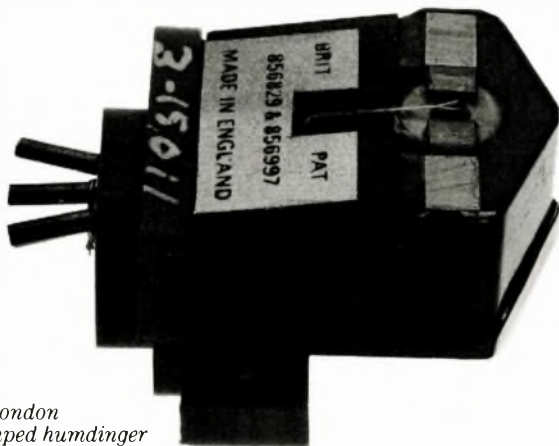
However, halfway through the test programme a very distressed manufacturer came on the phone with the news that some of his new speakers had been sent out without the internal

wadding. Observing that this spoke little for the effectiveness of the quality control department, we were assured that the sackcloth and ashes were on order, that the errant assembly line worker was at that very moment being hoisted by his thumbs to roast over a slow fire, and that 'recall and update' details and wadding was speeding its way around the dealer network. I immediately offered to help by publicising the problem serial numbers in the magazine, but was hastily informed that this might be counter productive, so would we kindly stay schtum. The matter is now with the editorial department who are checking to make sure that the remedial work is carried out as promised before deciding whether or not to comply with the request for silence.

Although the review had to be abandoned as unrepresentative, I still had the loudspeakers, and so asked for a set of the missing wadding to be sent. I was therefore able to conduct 'before and after' experiments, even though the identity of the loudspeakers must remain anonymous.

With wadding installed the loudspeaker sounded significantly different, certainly much lower in coloration and substantially free from the earlier 'boxiness'. I can see why some might 'prefer' the undamped sound on initial acquaintance, simply because there's more of it. But I couldn't detect any loss of speed, realism or immediacy when the damping was installed.

Indeed, the only negative consequence of adding the damping was the dreaded 'layers of the onion effect' – peel off one layer of coloration and you reveal the next level underneath. Small box loudspeakers remain small box loudspeakers, and large cones operating up into the midband have their own set of difficulties. But within the context of a commercial marketplace, where most loudspeakers are perforce built from compacted sawdust, I'd rather keep the damping in my box, and let the dog freeze.



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