

NOVEMBER 1988

# HI-FI CHOICE

150 AMPLIFIERS AND  
27 TUNERS – SUMMARISED

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

PERSPECTIVES: CAR AUDIO ON  
THE FUTURE

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SUMMARISED

TEST SUMMARIES ON  
OVER 750 HI-FI PRODUCTS

OVER 30  
CD PLAYERS ON TEST



## 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 ADF360

£99.95

**AIWA**

YAMAHA KX200

£119.95

**YAMAHA**

ONKYO TA2120

£119.95

**ONKYO**

DUAL CC8010

£119.95

**Dual**

NAD 6220

£149.95

**NAD**

KENWOOD KX660HX

£169.95

**KENWOOD**

MARANTZ SD45 II

£199.95

**MARANTZ**

### COMPACT DISCS

ROTEL RCD820

£139.95

**ROTEL**

MARANTZ CD273

£149.95

**MARANTZ**

YAMAHA CD29

£169.95

**YAMAHA**

DUAL CD1030RC

£169.95

**Dual**

PHILIPS CD473

£249.95

**PHILIPS**

MARANTZ CD65 II

£249.95

**MARANTZ**

MARANTZ CD65 II SE

£299.95

**MARANTZ**

PHILIPS CD880

£499.95

**PHILIPS**

### TUNERS

KENWOOD KT660L

£129.95

**KENWOOD**

NAD 4220

£139.95

**NAD**

ROTEL RT850AL

£159.95

**ROTEL**

HITACHI FTMD5500

£169.95

**HITACHI**

### AMPLIFIERS

ROTEL RA810A

£99.95

**ROTEL**

YAMAHA AX300

£99.95

**YAMAHA**

ROTEL RA820BX2

£109.95

**ROTEL**

NAD 3020E

£119.95

**NAD**

NAD 3130

£159.95

**NAD**

### SPEAKERS

GOODMANS MAXIM II

£79.95 Pr

**Goodmans**

VIDEOTONE MINIMAX II

£79.95 Pr

**VIDEOTONE**

ROTEL RL810

£99.95 Pr

**ROTEL**

ROTEL RL850 II

£119.95 Pr

**ROTEL**

TANNOY ECLIPSE

£119.95 Pr

**TANNOY**

TANNOY MERCURY 'S'

£159.95 Pr

**TANNOY**

TANNOY M20 GOLD II

£199.95 Pr

**TANNOY**

### SYSTEMS

KENWOOD M31CDS

£?

**KENWOOD**

ROTEL 820 BX3

£?

**ROTEL**

NAD VP

£?

**NAD**

### MISCELLANEOUS

BEYER headphones

£4.99

AUDIO TECHNICA AT95E cartridge

£9.99

**audio-technica**

ORTOFON OMP10 cartridge

£9.99

**ortofon**

GOLDRING EPIC cartridge

£12.95

**GOLDRING**

ORTOFON VMS20 cartridge

£17.95

**ortofon**

SENNHEISER HD420SL II headphones

£46.95

**SENNHEISER**

**These hi-fi prices are slightly cheaper than our in-store prices to Hi-fi Choice readers so bring or quote this ad!**

**BIRMINGHAM:** 10/12 Smallbrook Queensway. Tel: 021 643 1516 In front of the Albany Hotel on main ring road.

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**LEEDS:** 55 The Headrow Tel: 0532 455717 Opposite Lewis's dept. store

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**YORK:** 6 Feasegate Tel: 0904 645535 30yds St. Sampson Square.

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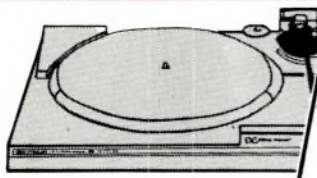


**RICHER**  
**Sounds**

# THE BEST OF BOTH

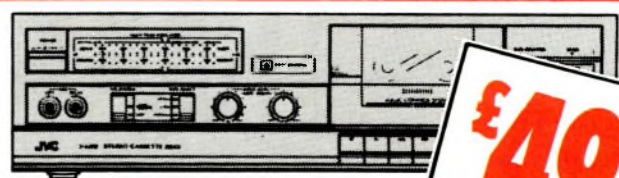
*The Original*

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



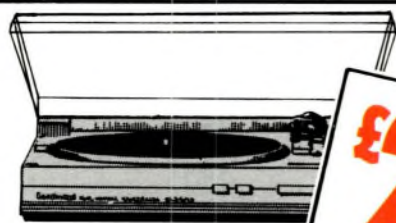
**£19**

**HITACHI HT7 turntable** ●Belt drive ●DC servo motor ●Black finish ●DC voltage ●435 x 80 x 350 ●Plug in cartridge £5 extra



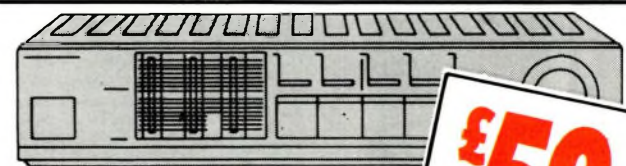
**£49**

**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)



**£29**

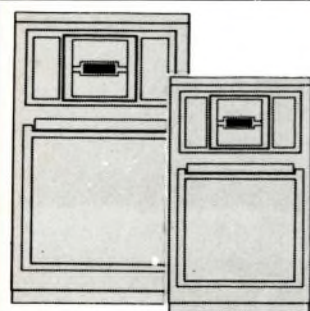
**GOODMANS GSP308 turntable** ●Belt drive ●DC motor ●static balance tonearm ●W&F 0.1% ●Black finish ●345 x 92 x 324 ●Cart £5 extra.



**£59**

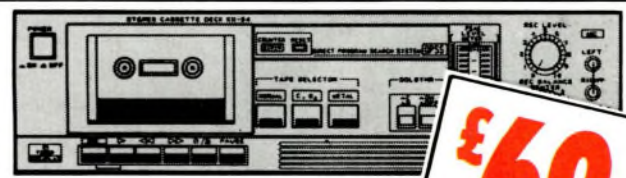
**MARANTZ PM26 Amplifier** ●30 watts per channel ●S/N 86dB ●Low impedance drive ●Black finish ●420 x 100 x 260

**FACTORY REPACK**



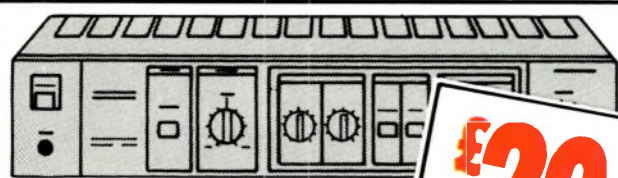
**£29**  
Per pair

**HITACHI SS-28X Speakers** ●Impedance 8ohms ●40 watts power handling ●Black finish with metal grille ●W190 x H315 x D190



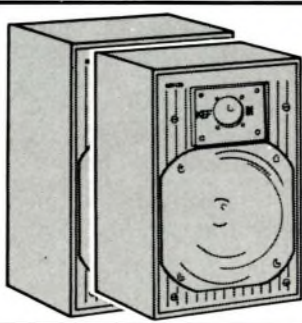
**£69**

**KENWOOD KX54 Cassette Deck** ●Dolby B&C NR ●Soft touch ●DPSS skip/repeat system ●W&F 0.09% ●Freq resp 20Hz-16KHz ●Black finish ●Metal ●420 x 123 x 269



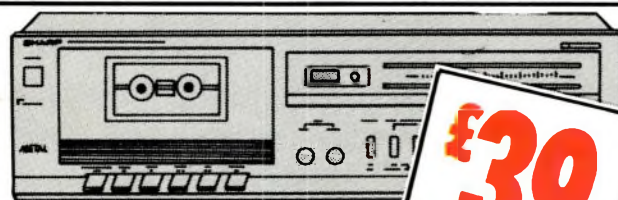
**£29**

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



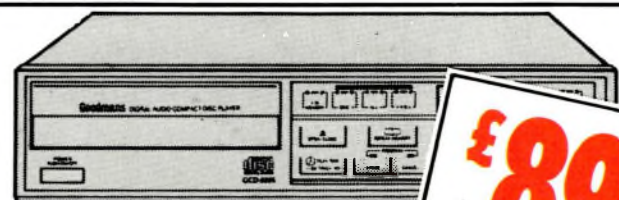
**£69**  
Per pair

**KEF C10 Speakers** ●60 watts per channel ●Shelf or wall mounting ●Impedance 8ohms ●Rosewood or walnut finish ●W205 x H300 x D172 (Also C20 £99pr., C30 £119pr.)



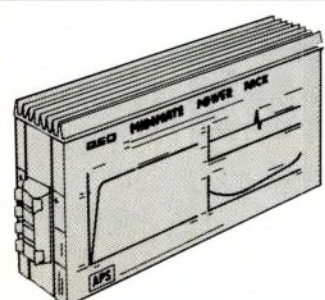
**£39**

**SHARP RT100E cassette deck** ●Dolby B NR ●LED peak meters ●Instant pause control ●Metal tape facility ●Silver finish ●390 x 117 x 219



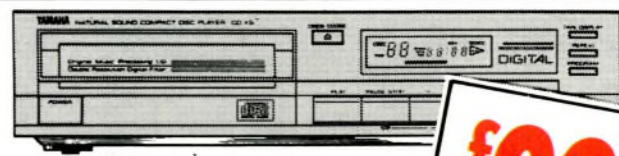
**£89**

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



**£39**

**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



**£99**

**YAMAHA CD-X5 Compact Disc** ●Digital display ●16 track random playback ●3-beam laser pickup ●3-way music search/repeat ●Index search ●Black finish ●340 x 80 x 280

Don't forget: If you see our hi-fi cheaper anywhere else within 75 miles of your



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

# HI-FI CHOICE

ISSUE NUMBER 64: NOVEMBER 1988



Cover photograph of the Sony 557ESD - see page 103 by Chris Richardson

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## PERSONAL MESSAGES

Paul Messenger rounds off the magazine with his own views on the audio 'scene'.

## MENU

# W

e're delighted to bring you a full length compact disc with this month's *Choice*, a high quality wholly digital production previewing Decca Classics' Autumn releases. And if you rattle the pages of the magazine you'll find somewhere a loose insert which gives the full track listing, running times, and catalogue numbers of the CDs from which the tracks have been taken. We've made the artwork just the right size to fit into a CD jewel box which you can buy from most CD stockists for around 50pence.

Enjoy your listening – and do look after the disc. This is a strictly limited edition exclusive to *Hi-Fi Choice*, so its rarity value could well make it a collector's item in years to come.

Having a CD on the cover of this month's issue comes as no coincidence, of course, as our intention was always for it to coincide with our latest tests on CD players. The last time *Choice* focused its attentions on CD players we got an inkling that the marketplace was becoming more competitive, but we never dreamt that the performance of low cost players was about to be pushed so far forward. Martin Colloms' listening tests this time around have produced some astonishing results. For example, Marantz's £300 *CD-65/IISE* achieved a higher score for sound quality than the score Martin has on file for Marantz's flagship *CD94* model which he tested in May of this year!

Clearly we're going to have to reassess all our *Directory* entries for CD players, something which we will attend to during the next few weeks. Presently we are recommending many fine up-market models – but on the basis of our latest findings, if all you're interested in is the best possible sound quality, there's simply no need to spend large sums of money on an up-market machine. Much soul searching will be done when we revise our listings.

Elsewhere in this issue you'll find reviews on a small group of digital amplifiers – amplifiers with digital inputs and on-board D-to-A converters – plus the long awaited results to Paul Miller's tests on loudspeaker cables, this a follow-up to the tests he did on interconnect cables in June.

John Bamford

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06273

SELECTOR

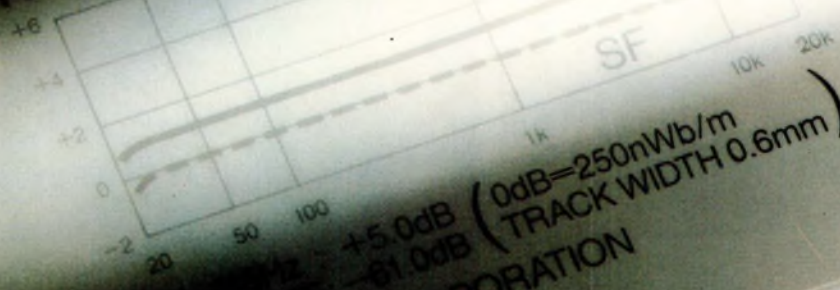
Class: High (CrO<sub>2</sub>)  
EQ: 70μs

(45min.) 90min.

Compact  
Cassette

Input: -20dB

Frequency response



+5.0dB (0dB=250nWb/m  
-61.0dB (TRACK WIDTH 0.6mm)

TDK CORPORATION

W. U.K.

IEC II TYPE II  
HIGH  
POSITION

SA-X 90



**THE QUIETEST TAPE IN THE WORLD.**  
**(AS YOU CAN SEE FROM THE OUTSIDE,**  
**WE'VE IMPROVED THE INSIDE.)**

A year ago TDK announced that SA-X was the world's quietest tape. Today, it still claims the lowest background noise of any audio cassette anywhere. (Our rivals still haven't caught up).

Not content with that, we have recently widened the dynamic range of the tape.

Look out for the new wrappers and improved shell design too. Put an SA-X in your player and we think you'll agree that the results, quite simply, are stunning.



A unique dual layer of Super Avilyn provides SA-X with the lowest bias noise in the world @ -61.0dB. New SP-ARII shell. MOL @ 315Hz; Playback Output level @ 3% THD: Saturation output level (MOL @ 10KHz) -6.5dB.

Measuring deck: TDK Reference Deck. Tape speed: 4.75cm/s. Track width: 0.6mm.

Recording head gap: 4 $\mu$ m. Playback head gap: 1 $\mu$ m. Reference level: 0dB=250nWb/m.

**TDK**



*play it  
again  
sam  
and  
again  
and...*



... when it comes to music: nobody plays it better than Yamaha. Sit back, relax and enjoy the dynamic, natural sound of a Yamaha cassette deck. Engineered to the highest standards, the Yamaha range of hi-fi cassette decks offers something for everyone – professional 3-head systems, auto-reverse decks, twin-tape machines plus advanced features like Play Trim and Dolby HX Pro\* Dynamic Bias Servo – and much more. Plus they're all RS remote control compatible – in harmony with the rest of your Yamaha

system. So whether you're buying your first cassette deck or

reaching for new heights of excellence, choose a

Yamaha – they're music, naturally.

For further information and the name

of your nearest Yamaha dealer, contact us at the address below.



*music  
naturally*

**100** **YAMAHA HIFI**  
YAMAHA 1887-1987

Yamaha Electronics (UK) Limited, Yamaha House, 200 Rickmansworth Road, Watford, Herts WD1 7JS. Tel: Watford (0923) 33166

\*Dolby HX Pro is a trademark of Dolby Laboratory Licensing Corporation





## PRODUCTS

### PENTA STOP PRESS

Held just as *Choice* goes to press, Britain's premier hi-fi show was bigger than ever. Most impressive stand was Roksan's Neal Street lookalike, *Hotcakes* and all; most exciting product the Sumo loudspeaker, and there was lots of interest from Oxford Acoustics, Tannoy, Alphason and practically everyone else.

CDV was effectively launched, but new CD players were the minority – Cambridge Audio's *CD1S*, Marantz' *CD12* and Stax' *Quattro II* being notable £2,500+



Seen for the first time this side of the pond – Jeff Rowland amps.

examples, alongside the more affordable (£500) Marantz *CD85*.

New vinyl turntables were much more common, with 'budget' models from Townshend (*Rock Mk V*) and Alphason (*Solo*), the £675 Source Odyssey *Sodeck* and a £1,138 Oxford Acoustics. Roksan plan £1,500 *Cognoscentis*, and Absolute Sounds has the Well Tempered *Table* and *Arm* now that the latest Oracles are coming via Rotel. New tonearms included

the SME 309 etc series, Naim's controversial unipivot, Roksan's *Artemiz*, Origin Live's *Jubal*, Kuzma's massive *Stogi Reference* and Linn's *Ekos*.

The cosmetically updated Arcam *Alpha (II)* looks very pretty, Denon has four new 20 series 'optical class A' integrations, plus a clutch of separates including a remote control digital preamplifier, Marantz a £450 'digital' *PM75* integrated model.

Further upmarket Oxford Acoustics showed Hawksford-influenced preamplifiers at £2,500 disc plus £3,500 active line. Rotel introduced the large Jeff Rowland range, and Path are bringing in Aragons (designed by Krell's d'Agostino). Alphason now has *Athene* and *Apollo/Coronis* preamplifiers, plus *Artemis* power, Presence Audio the *YBA3* combo, a straight line Albarray preamp, plus new valve designs called Cadence. Other notable thermionics are Beard's all-triode *P1000*, Croft's all-triode/OTL *Series III* and the Magavox range from Ray Lumley.

Signal processors included a new £400 *DSP100* from Yamaha, and a four channel *SSA-504* delay/reverb amp from Dynavector, while Ion Systems is importing Canadian Magnum Dynalab tuners.

Amongst a host of loudspeakers, Tannoy's *DC1000* and *2000* feature a completely redesigned dual concentric unit. Both Wharfedale (*505*) and Castle (*Warwick*) newbies are at



Available through Absolute Sounds, Duntech speakers from Australia.

£169, while JPW's *Sonata* has real wood at £100. Richard Allan returns with the *CD5*, Celef with three models from £180. Rogers has 'a' versions of *LS2/4/6*, Musical Fidelity the small box *Reference 2* and *4*, using many bits from the *MCs*. Meanwhile (Olympic style) Monitor Audio is going for gold.

Harbeth's new full size £700 *HL5* demonstrated very well, NVA's radical *Cube* likewise. Gale's endcapped *50!* is going for high output and efficiency, as are Wharfedale's *E*-style *Ventana* and *Vanguard*. Alphason's *Amphion* and *Orpheus* feature ribbon tweeters, while SD Acoustics' £700 *OBS* keeps an open back.

Absolute Sounds is shipping Duntechs from Australia – to counter Rotel's *Infinity?* EAR demonstrated a large line source model, and Acoustic Gold the

extraordinary Sumo *Aria* – a 'travelling wave' single driver, full range dipole.

More details in a full show report next month.

### PHILIPS PUSH HI-FI SEPARATES

Philips has announced a handful of new separates for the autumn season, including a MkII version of their successful *FA960* integrated amplifier. Still priced under £300, the *FA960 MkII* has addressed previous criticisms with an improved phono input (it now employs a Japanese-sourced IC) and 'relaxed' protection circuitry to increase current delivery to a claimed 140 amps peak-to-peak. Other refinements include improved tone control circuitry, chunkier output binding posts and additional gold plated phono sockets.

Lower down the price scale Philips has introduced the 75watt *FA880* amplifier (£250)



After one or two false starts, CDV gets off the starting grid.





MkII version of the FA960 has improved phono input IC.

and DFA888 (£300), the latter appearing to be remarkably good value as it has an on-board DAC (Digital-to-Analogue Converter). Readers referring to our tests on 'digital amplifiers' in this issue will see that we view them as something of a marketing gimmick in as much as potential benefits are largely redundant until the arrival of DAT, direct broadcast satellite TV and other digital sources. Still, as many of the Japanese majors have pressed ahead with launching digital amps you can't blame Philips for joining on the bandwagon – especially since they have some of the best DACs in the business and have been sitting on the technology for some considerable time.

Where Philips score with the DFA888, of course, is on price. The amplifier is fully equipped with both coaxial and optical digital inputs alongside the standard analogue inputs, the amplifier automatically locking on to the correct sampling frequency (32, 44.1 or 48kHz) as soon as an input is selected. It incorporates the TDA 1541 dual DAC used in Philips' CD880 compact disc player, with four-times oversampling. The analogue disc input employs the new IC used in the revised 960 amplifier, with MM/MC switching provided on the amplifier's rear panel.

Notwithstanding our reservations (scepticism?) about transferring D-to-A converters from CD players (where they can degrade sonic performance) to amplifiers (where they can do just as much harm), Philips claim that Japanese audio critics have been reporting positive improvements in sound quality – even when using the CD880 CD player. Philips engineers from Eindhoven suggest this could be due to the 5th order analogue filter employed in the new amplifier, combined with

improvements due to direct digital connections.

Also new from Philips is a highly intelligent remote control unit, the RC775, which is competitively priced at £69 (competitive especially since it can also control Teletext functions!), and the AV775 (£270) Surround Sound Controller which is designed to form the heart of a comprehensive audio/video system. AV775 is a control centre with in-built digital sound processing (for adding reverberation effects, etc) and Dolby Stereo circuitry for decoding the surround-sound information inherent in CD-V discs and video tapes with hi-fi soundtracks. Also the AV775 houses a two channel amplifier for driving the rear speakers in surround-sound systems.

In fact there's little that the AV775 can't do. It allows for either-way dubbing between two VCRs, an enhancer circuit with sharpness and level controls helping optimise picture quality, while an on-board timer sets up to five programmes for play or recording in your absence.

## CRYSTAL SISTER

Oxford Acoustics is touting its latest turntable, the *Crystelle*, as the 'more affordable derivative' of the Crystal turntables. At £1,138, *Crystelle* is still out of reach for most honest UB40 card-holders but will probably bring this range of luxurious hi-fi more into the public eye. The turntable looks less substantial than its heavier older sisters but employs many similar design features such as the power supply and mechanical earthing. It also has the clear acrylic platter – hallmark of the OA turntables.

Oxford Acoustics also has a new address: Unit 4, West End Industrial Estate, Witney, Oxon OX8 6UB. Tel: (0865) 791665.

## NEW LINES FOR AUDIOFREAKS

Surrey-based Audiofreaks, the company responsible for UK distribution of Kuzma and Oakley hi-fi products from Yugoslavia, have taken on Empire cartridges from Switzerland and Energy loudspeakers from Canada.

Energy is a new name to the British hi-fi scene, though their speakers have enjoyed good press reports elsewhere in the world. Prices start at £159/pair for the small, two-way *ESM-4* and £199 for the *ESM-3* models, rising to £299 for *ESM-2 MkII* and £599 for the *22 Pro Monitor* (£65 extra if you want the integral stand). Where price is little problem Energy also has a *Reference Connoisseur* model – £1,599 in walnut/oak, £1,799 in rosewood

Crystal's sister, the £1,138 *Crystelle*.

and £2,499 in red, black or mahogany piano laquer gloss finish. *Choice* hopes to be testing a couple of models in two month's time.

Empire is a highly respected name in cartridge manufacture, Audiofreaks acquisition of the brand seeing the return to these shores of such exotica as the *MC1000vdH* – now priced at £475. There are new models too, including a £110 moving coil called *MC-5M* and three high output fixed coil designs: *800/II* (£33), *900/II* (£47) and *100/II* (£59). Audiofreaks, 15 Linkway, Ham, Surrey TW10 7QT. Tel: (01) 948 4153.

## VENEER DEAR?

Readers with disgusting-looking loudspeaker cabinets may wish to take advantage of a cabinet-making company dedicated to loudspeakers.

Vulcan Loudspeakers from Rotherham will produce 'quality walnut' (or black ash) cabinets to order or have two regular sizes on offer. The BBC *LS34A* size costs £45 a pair or there is a 30-litre version for £60 a pair. Interested? Vulcan Loudspeaker Company Tel: (0709) 544105.

## EN ECOSSE

Linn Products, the almost Glaswegian hi-fi manufacturer has come up with a new tonearm to join the existing *Ittok* and *Basik* arms. Named *Ekos*, the £895 tonearm is now Linn's flagship arm although it still uses many features found in the *Ittok*.





Linn says the new arm's headshell is machined from a solid piece of aluminium which is then bonded to the arm tube with an 'advanced, exceptionally strong' glue. Damping on the lift/lower mechanism works both ways to reduce any harmful vibration and for the au fait, the bearing's tolerances are said to be one micron. Linn explains that the arm's name heralds the fact, to the French at least, that it is made in Scotland, but being engineers (and particularly fond of the letter K) the company has decided on purely phonetic nomenclature.

## HOT CAKES

Roksan has launched some new bookshelf speakers due to retail for £125 and tentatively named *Hot Cakes*. Apparently at odds with the rest of the Roksan range *Hot Cakes* have been designated 'lifestyle' speakers and are designed to be placed just about anywhere; in corners, on the mantelpiece or even in the bathroom.

The sealed cabinet, finished in luxurious piano black, is very much like a section from the Bang & Olufsen *Penta* speaker in that it has five sides and is pointed at the back making it suitable for corner siting. The three and a half inch drive unit is a full range dual cone that's sourced from SEAS and has a nominal eight ohm impedance. Roksan's sales manager, Xavier 'pinch-of-salt' Wilcox, is biased about their performance but claims that they sound better than *Isobariks*!

Those of you who are thinking about buying Roksan products better hurry to the stores now as prices will be increasing as from October 15. The black ash *Xerxes* is going up to £655 and the *Darius* without stands but with the new mono crossovers rises to £1,265. The exoskeleton-style stands have also undergone significant structural as well as cost changes to arrive at a retail price of £345.

## SETTING THE PACE

Pink Triangle Projects has released two outboard power supplies which are promised to eliminate all mains-induced disturbances.

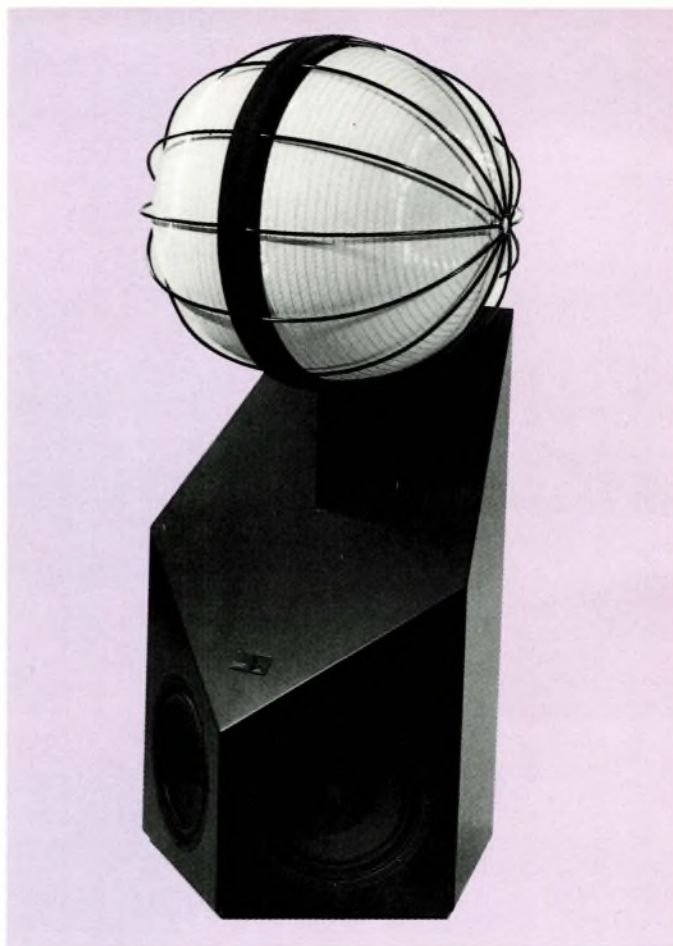
Turntable drive belts transmit low frequency disturbances (caused by even the cleanest mains supplies) from the motor to the platter – and consequently the stylus – by acting as low-pass-band filters according to Pink. The *Pink Alternating Current Eliminator (PACE)* essays to give pure power from an add-on module consisting of a set of lead-acid batteries and a voltage monitoring circuit. The module gives six hours of mains-free use before switching into 'battery/float charge mode'. Batteries (£30 a set) have a life expectancy of five years according to Pink who guarantee their product for three years.

Two variations of the PACE are available: *Pacesetter* (£143) is for *PT TOO* users and *Pacemaker* (£225) covers all other turntables which use AC synchronous motors. The *Pacemaker* unit will also allow electronic speed changing with 33 and 45 rpm. According to Pink it can be fitted to your turntable in 15 minutes.

## FIRST TIME BUYER?

Aiwa continues to add to its range of budget 'ideal to start on' cassette decks, introducing a £130 model with Dolby B and C noise reduction together with HX-Pro circuitry.

The *AD-F370* also lists an amorphous alloy head, and IC (integrated circuit) logic controls as novel features. A £150 model, the *AD-R470* boasts the above features as well as a fine bias adjustment control for tweaking between different brands of tape. The *AD-R470* also has a quick auto-reverse system which senses the leader tape at the end of a cassette side and immediately reverses the tape direction.



Take one beach ball, Medite board, tenon saw . . .

## DER KUGELAUTSPRECHER

Die Lautsprechertechnologie der Zukunft zeigt diese "Studie" aus dem Hause MB Quart Electronic: Der omnidirektional abstrahlende Kugellautsprecher, der mit der Magnetostriktion arbeitet, deckt einen Frequenzbereich von 800 bis über 50 Kilohertz ab. Wenn diese Technologie einmal ausgereift ist, wird sie den gesamten Lautsprecherbau revolutionieren.

Well, we don't normally like repeating press releases verbatim but no-one in the office felt technically up to this one! Meet the weirdest product of the month – MB Quart's 'breathing sphere' loudspeaker.

## EX KIWI

Linx Audio, now a British company, has added new amplifiers and tuners to its existing range. The company, which was bought from its New Zealand owners in June, has launched the £250 integrated *Vega* amplifier, a £349 FM tuner and the (redeveloped) *Stratos* pre and power amplifier combination. All the products are British designed and built. Linx Audio UK, PO Box 20, Canvey Island, Essex SS8 0RB. Tel: (0268) 511165.

## SATELLITE AND BASS

Studio Power have something for the bed-sitting generation who don't have room for large conventional loudspeakers. The £349 *Sub2000* system consists of a subwoofer box and two 'satellites' with mid-range and treble units.

The subwoofer can be hidden anywhere in the room according to Studio Power. It consists of two eight-inch bass drivers mounted opposite each other, with magnets pointing away. The satellites can then be mounted on bookshelves or the wall while you amaze your friends with the bass, heard but not seen.



Aiwa AD-F370: bringing down the entry level for HX Pro equipped decks.



SOUND AND STYLE



# PUT THE BEST TO THE TEST



**RA810A** 20W STEREO INTEGRATED AMPLIFIER



**RA820A** 30W STEREO INTEGRATED AMPLIFIER



**RA820BX3** STEREO INTEGRATED AMPLIFIER



**RC/RB850** STEREO CONTROL AMPLIFIER AND 50W STEREO (150W MONO) POWER AMPLIFIER



UK DESIGN AND DEVELOPMENT

**ROTEL** HiFi

25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES, MK12 6HR





The £15K Carver Silver Seven monoblok.

## NEW RANGE

The American Carver range of domestic hi-fi is being imported into this country by HW International. Better known for their professional equipment (their small amplifiers are very popular with touring groups) Carver has been making domestic hi-fi for many years. HW is initially importing nine units; a preamplifier, four power amplifiers, CD player, tuner, ribbon loudspeakers and a sonic hologram generator! HW was planning to show the range at Penta together with a £15,000 valve mono power amplifier which it hopes to import in the future. The other equipment isn't so outrageously priced; the power amplifiers start at £145, the CD player at £695 and the 'shoulder high' speakers at £1,750. Even when the equipment range is established it will remain an enthusiasts' quarry; John Rupp of HW said the plan was to give Carver to only 12 UK dealers.

## BUSINESS

### EDINBURGH SHOW

If you missed the lovely food and cool, relaxed atmosphere of the Penta show (*Pardon? - Ed.*) there is still time to view this year's newcomers and pedigrees in Edinburgh.

The Scottish Hi-Fi and Video Exhibition takes place at the Post House Hotel, Corstorphine Road,

over the weekend October 21-23. The show is now in its twelfth year and entry is free. Over 60 firms are lined up for this year's bash, while in the Lothian room there will be talks and seminars including a presentation by our own technical reviewer Paul Miller. Paul will discuss the ins and outs of system matching, explaining why some components work well together while others don't, and how best to buy a synergistic system. The *Hi-Fi Choice* team will also be on hand at the *Choice Magazine* stand to answer any hi-fi queries you may have. It may be useful to note that the Post House is next to the zoo - for those less interested in the electronic menagerie.

## DUAL CHALLENGE PRICE WAR

Hayden Laboratories has reduced the price of Dual turntables in the UK to fend off competition from 'ever cheaper CD players'.

*The 503-1, dropping its price in the face of digital competition.*



The Dual 503-1 is down from £125 to £115 while the 503-3 is down from £150 to £140. Hayden has also taken £15 off the price of their 'improved' Denon DRM 07 cassette deck and £10 off the Denon TU 450L tuner.

## NEW EPOCH

Mordaunt-Short has acquired Epos Acoustics in a move that gets it a new loudspeaker designer as well as a product range.

Robin Marshall, who was effectively the Epos one-man show, has relocated to the MS Sussex base where he will have more time for loudspeaker research. He takes over the design department at Mordaunt-Short's factory and will reportedly divide his time between the Epos and MS brands according to priorities.

Colin Hinkins, for Mordaunt-Short, told *Choice* that the move wasn't so much a TGI takeover as a way for Marshall to get back into design full-time. "It was a case of two like-minds; Robin is an engineer in the first case, but he was having to devote more and more time to the commercial side of Epos," said Mr Hinkins. "He's finished improving the *ES14* and now he'll be tidying up our top end products. We're always on the lookout for good engineers and we think we're quite fortunate to get Robin," he concluded. Mordaunt-Short will honour any warranty and service commitments to Epos loudspeaker owners.

## HIGH-END LISTENING

A good time was had by all at the official opening of Oxford Audio Consultants on September first. A conference room in Oxford's Randolph Hotel was hired for a musical evening where we were presented with sounds from the Oxford Acoustics *Crystal Reference* turntable with *Airtangent* arm and Koetsu *Red Signature* cartridge, the CAL *Tempest II* CD player, feeding an Audio Research *SPII* two-box preamplifier and the gargantuan Krell *KSA200* power amp driving Apogee *Divas*. Total value of the system was an incredible £25,000 or so, way beyond the aspirations of many of us, and some audio groupies had travelled from as far away as Brighton to get the opportunity to hear it.

Certainly it was a good turn out, with over 100 enthusiasts glued to their seats while Fraser Shaw, designer of the Oxford Acoustics turntables, and Absolute Sounds' Ricardo Franassovici acted as disc jockeys for the evening. The

sounds were good too, especially considering the size of the room and the fact that 100 bodies do an awful lot of absorbing!

For one visitor the evening was one never to forget. Mr Wakeling of Essex was the lucky winner of the prize draw for a Koetsu *Red* cartridge worth £896. (*Why couldn't it have been me? - Ed.*)

Oxford Audio Consultants' new premises are at Cantay House, Park End Place, Oxford. Tel: (0865) 790879. Each month they'll be featuring a high-end system on permanent demonstration which customers are welcome to pop in to listen to; if you want to audition a specific audio component you will of course need to book an appointment. October's featured system is the new *Crystelle* turntable, SME *V* arm, Koetsu *Red* cartridge, Krell *FAM-7* preamplifier, Krell *KSA-80* power amplifier and Apogee *Caliper* loudspeakers.

## IN BRIEF

Aston Audio inform us that while Burmester products are without official representation in this country they will handle servicing and technical problems. Aston Audio, Alderley Edge, Cheshire. Tel: (0625) 582704.

Absolute Sounds, importers of high-end exotica such as Krell, Audio Research, Apogee and Magnepan, have made an agreement with Martin-Logan Ltd, Kansas City, to service existing M-L loudspeakers originally sold in the UK via the now defunct distributors Automation Sciences. They will be announcing a Martin-Logan clinic shortly.

Hi Fi Experience are holding Quad and Linn Music Evenings in Camden Town. Quad will be shown on October 24 and Linn, November 15/16. The evenings are free and tickets are available from Hi-Fi Experience: 01-388 1300.

Cheshire's Aston Audio is holding Meridian and Rogers musical evenings in October and November. The first event focuses on Meridian where the firm will display their new range in the Stanneylands Hotel, Wilmslow on October 24. The second musical evening will feature the new range of Rogers loudspeakers at the same venue on November 21. Both events are free and start at 8.30 p.m. Tickets from Aston Audio: (0625) 582704.



# SEE MORE IN THE MUSIC THAN



Photo courtesy of English National Opera



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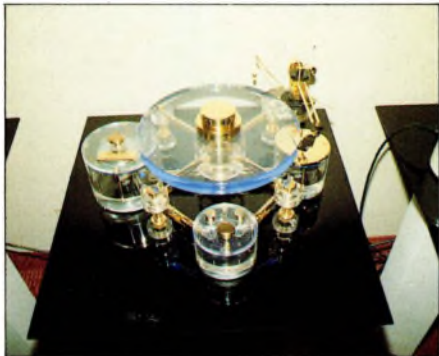
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If there's a single country on the 'Old Continent' where high-end audio really has an important role, there's no doubt that West Germany easily qualifies. Statistics continue to inform us that Germany is one of the countries with the highest individual financial power, ie there are more people per capita able to afford expensive hi-fi than in most other countries.

However, having loadsa money doesn't mean it'll be spent wisely. And that's where a vast selection of magazines enter the scene. Ten thick, glossy audio publications, most of them mainstream, are widely available and the influence of the audio press is enormous. Although their princi-



ples of product evaluation seem to be similar to ones which apply over here, the results turn out to be quite different.

Lab measurements are of great importance, and subjective verdicts relate interesting findings, most of which would not be so easily accepted by the experienced UK audiophile. This is probably just one of the reasons why German enthusiasts talk about the UK press all the time. And may also have been one of the motives to establish the 'High End Interessengemeinschaft' (High End Association) which organises a high-end show in the top-class Gravenbruch-Kempinski hotel, in the south western outskirts of Frankfurt.

This year's High-End exhibition could not be described as being much different to previous ones, but certain changes were noticeable. A separate three-floor hotel wing with numerous exhibition rooms was packed with various individual components and systems, mainly from the UK, United States and Germany. However, in comparison with last year there were more sensible volume levels during the various

demonstrations, and also extensive use of analogue front-ends, with CD used very sparsely. There were even some CD players beside the analogue turntables, but only in order to keep orthodox compact disc users happy.

So, what was there to hear and see? In the front-end field, the main news was of Roksan's new *Artemis* tonearm with its designer Touraj Moghadamm present to assist proper presentation. Most of the UK turntable/tonearm manufacturers were present including Pink Triangle, Alphason, Dunlop and Townshend, but there was also a good selection of other high-end contenders such as Pierre Lurné, Sota and Versa



Dynamics, joined by a few of the most creative German turntable companies.

As you may know, German designers try to combine looks, weight and size with sound quality, which doesn't necessarily bring exceptional results. But if I had to choose the most peculiar front-end of the show, it would definitely be the Austrian Postl & Smid *Stagliani* turntable with its peculiarly long tonearm – 20 inches to be exact! The rationale behind this innovative design was to dismiss the need for offset angle and bias. It was used with a van den Hul Grasshopper cartridge, and all I can say is that its cantilever seemed to be waving everyone goodbye!

In the electronics sector there was nothing to write home about. It seems valves and transistors manage to co-exist happily, and most respected brands from both sides of the fence were there to be enjoyed. The leading German valve electronics manufacturer 'Klimo' showed its full range of products, including the *Ertanax* valve tuner which looked astonishing but still isn't widely available. Apart from

some American brands like Quicksilver and Nestorovic, visitors showed significant interest in British products, such as those by Audio Innovations.

Most of the reputable American competition was on display, notably the array of Counterpoint products with the emphasis on pure valves rather than hybrids – surprising considering their hybrid power amplifiers are as good as many others costing much more. And such a show couldn't be without the enigmatic Jadis amps which were used with a Sota/Souther front-end and Martin-Logan loudspeakers.

There were also quite a few domestic valve products, Keschull having a



crowded room the whole show. It's difficult to describe the sound, though it didn't seem to differ too much from any of the other valve giants.

Solid-state amplification seems to be thriving, although it was strange to see someone like Dieter Burmester exhibiting only passively. The most exciting news in his room was a thoroughly redesigned separate D/A converter which should be combined with his preamplifiers to achieve the best results.

A company called Fischer Audio showed a small attractive modular system which offers all the necessary units to form a pre-amplifier system, in separate neat boxes at affordable prices.

As far as budget esoterica is concerned, Rotel and Mission kept their lead on the competition, having established themselves as a sort of reference where value for money is the main criterion. Long queues in front of their demonstration rooms were solid proof of their popularity.

I was extremely impressed with the selection of loudspeakers exhibited this



year. It's well known that Germany is a source of all kinds of designs which depart from not just the conventional approach, but which also try to achieve good sound by applying the most unusual solutions. The best German loudspeakers are usually extremely expensive, look different from anything else, and can be seen in all sorts of formats, colours and finishes. Basic two-way designs are quite rare, but multi driver constructions with tens of tweeters or mid-range units, passive or active are quite common. No matter whether they are right or wrong, these loudspeakers sell in Germany, although with their somewhat sonic characteristics it would be difficult to

best possible reproduction of music has led to the exploration of all kinds of cables, accessories, etc. Some of the distributors exhibit vast quantities of such products, cables in particular still being topical. Beside the established brands, there seem to be many new designs one of the most popular being the Japanese Isoda, with splendid looks and first-class manufacturing standards. One of the biggest cable suppliers is Monitor-Pc, their catalogue comprising almost one hundred different cables, connectors and other such items! CD stabilisers are particularly fashionable and connoisseurs believe they make a big improvement in the sound.

I'm not so sure that this is the way to go. Front-end components and electronics are probably quite good, but the question of loudspeaker quality remains open and will hopefully be resolved in the near future.

Although I did try to make a chart of the best sounds, I couldn't manage to list many entrants. The best overall sound came from a system consisting of the Well Tempered Turntable/Tonearm/Decca *Supergold vdH* front-end, Counterpoint *SA-11/SA-4* valve amplification and the absolutely marvellous Sound-Lab *A3* electrostatic loudspeakers. These loudspeakers are hand made in the US and have an outrageous price of £8500 in Germany.

(Far Left) An exotic deck from Postl & Smid.

(Left, centre) Klimo's £4,500 valve tuner.

(Left) The Well Tempered combo with Decca vdH.

(Right) Distinctive CD player from Micromega-Leedh.

(Far Right) Sound-Lab 3 electrostatics



imagine them raising much interest.

However, at least 90 per cent of UK loudspeakers are available in Germany, and most of them were to be seen and heard at this exhibition. It would be difficult to list them all, but whether a Mission compact design, big B&Ws or Acoustic Research *Rouvens*, the interest shown reflects the current trends of recognition and preference for such designs. Leading US loudspeaker companies also realise the potential of the German market. Infinity showed the new *IRS Betas*, Martin-Logan demonstrated the *Sequel* and *CLS* and small electrostatic manufacturers such as Acoustat and Sound-Lab didn't miss the opportunity to demonstrate some of their models.

Unfortunately, in Germany expensive loudspeakers cost much more than we could imagine, but importers and dealers say they can't complain about the quantities sold. One way or the other, loudspeakers must be the most difficult component to choose for a German enthusiast.

The continental approach towards the

You may be surprised that most of the visitors gather in, or outside the rooms occupied by the German audio magazines. As in other countries, audiophiles want to get as much advice as possible. And the demonstrations put on by the various publications raise such enormous interest that it is virtually impossible to accommodate all those who wish to hear them. Publications like *The Absolute Sound*, *Stereophile* and the well known *L'Audiophile* from France are all available, along with one of the few European alternative audio journals, *Das Ohr* (Ear).

So far, I have deliberately avoided talking about the sounds at Frankfurt. A show can offer only general insights into the sound of equipment and if a 'German sound' exists at all, it may not be to our taste. Changes towards a more even tonal balance, greater neutrality and higher levels of musicality were noticeable, but it was still different from what I had hoped to experience. If I am right, there's a general tendency to make everything sound as impressive and convincing as possible, but

I must also commend Pirol GmbH, importers of mainly British hi-fi for having well prepared demonstrations and very good sound, using the Dunlop Systemdek *IV* turntable, A&R *Arcam* amplification and Rogers *Studio 1P* loudspeakers. (These are essentially identical to the *Studio 1s* we're familiar with in the UK, Rogers sticking a "P" suffix on their German export models). Although in a different league to the aforementioned big system, the sound was extremely pleasant and musical with a nice level of resolution and a well developed soundstage. Unfortunately, that is all that stood out as far as sound is concerned.

High-End '88 in Frankfurt was a very interesting and revealing experience. No matter what is said about the products exhibited or their quality, the show was a big success and apart from the best events in this country it is one of the few European shows worth considering. And we do want to enjoy the real high-end as often as possible, don't we?



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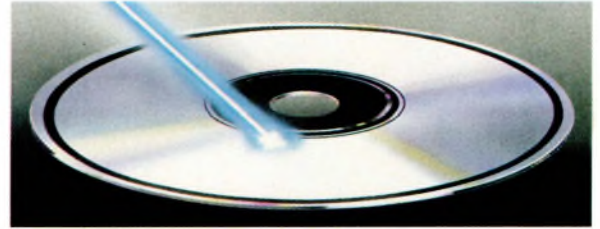
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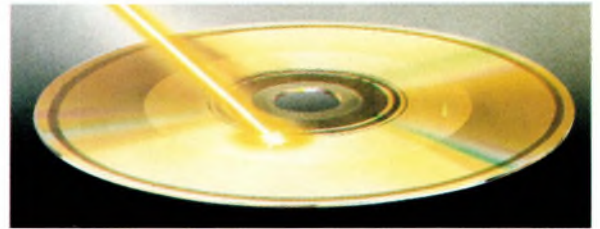
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## CHOICE SESSIONS

*Things we hear . . . This month, the latest Voyd turntable, Pink Triangle's PIP preamplifier, a range of electronics from Ion Systems and Denon's RC-605 'Unimote'.*

### ANOTHER VOYD FILLED

*Three motors, two belts – and a choice of wood veneers. John Bamford auditions the latest version of The Voyd turntable.*

The joke started when Voyd's three-motor turntable was touted as having been designed by Phillip A. Voyd – as in 'Phil a void' – and rumours began that someone, somewhere in the UK, was manufacturing a stunning-looking record deck that used three drive motors.

Voyd turntables weren't exactly available in every high street hi-fi shop, but some dealers around the country were known to be demonstrating this somewhat rarified model emanating from deepest Cheltenham. Since then things have escalated, the number of Voyd decks going abroad has increased too, and Guy Adams is now building turntables full time. Until recently an engineer for a major aerospace company, Guy was assembling record players in the basement of his home during evenings and weekends and holding down a nine-to-five job to pay the mortgage. Publicity was largely shunned because there were only so many hours in the day to make so many units. Let's face it – how many turntables could you manufacture after tea and the six o'clock news?

During recent weeks Guy Adams has taken the plunge and set up Voyd Turntables Ltd as a full time manufacturing company with everything you need to run a business: fac-

tory premises, a company van, and support from friends and loved ones. Earning a living can be fun if you're doing something that's close to your heart – it takes only a few minutes of conversation with Guy to appreciate that he has a passion for record players – and with a healthy order book for Voyd turntables worldwide there's no reason why the mortgage payments shouldn't continue to be met.

When you know the background to this perfect example of the Great British Cottage Industry, the appearance of *The Voyd* and its cheaper brother, the £550 *Valdi*, might take you by surprise. In truth the photo shown here doesn't really show the deck in its best colours. It looks handsome enough in black with its acrylic platter, but finished in mahogany the appearance is gorgeous. Wipe out any mental images of a product made by a hi-fi hobbyist; the attention to detail and quality of finish puts many other British hi-fi products to shame.

So what's all this about three motors? Guy Adams explains that the stylus acts as a brake as the walls of the infinitely small record groove try to 'drive' it. The degree of braking depends, in part, on the amplitude (volume) and frequency (pitch) of the modulation (signal) in the groove. Low frequencies and large transients are the most difficult signals to get past the stylus.

When a transient comes along, whether the thwack of a bass drum or subtle strike of a ride cymbal, the motor in a conventionally

driven sprung-subchassis turntable continues to turn at a constant speed, but initially it is easier for the motor to pull the entire record platter, the subchassis and the tonearm assembly towards itself than to pull the platter and record past the stylus. This dynamic instability is happening all the while the record is playing – and the result, says Guy, is that we're not retrieving accurately all the information content of the record groove walls, especially in the areas of low level detail and dynamic attack. These are the very areas, I'm sure, which are most important in determining good hi-fi from mediocre hi-fi. It is from here, for example, that we receive subtle clues as to the size of the room in which musicians are performing, and what kind of instruments they are playing.

Priced at a cool £965, *The Voyd* is clearly pitched at serious hi-fi enthusiasts who aspire to owning serious hi-fi systems. The three motors are external rotor high quality units made by Papst (read expensive – they're four to five times the price of the synchronous motors found in most record players), they're modified to run on a custom single point bearing similar to the concept of *The Voyd's* main bearing, and they are driven in parallel from a dual crystal controlled sine-wave generator housed in a separate box. A switch on this remote power supply changes the speed from 33 to 45rpm. Two belts drive the inner rim of the machined acrylic platter and the sales blurb claims the kinetic energy of this drive system is 150 times greater than with a conventional single motor unit. Anyone any good at sums?

What you hear from *The Voyd* – certainly what I heard when first coming across the breed a couple of years ago – is a strikingly powerful and authoritative sound, dynamic and immediate yet never forceful. It's hard to mistake the turntable's obvious ability to track the dynamic swings in musical events, while instruments sound natural and free to breathe and independent of each other.

To date I'd considered the less costly but no less beautifully made two-motor *Valdi* the more 'complete' performer. An early sample of *The Voyd* I tried at home a couple of years back had what I suspected was a microphonic top-plate and altogether looser and detached bass quality – and I wasn't convinced things were working too well. Since then the power supply has changed (following development work done on the *Valdi's* supply), the deck has gained an extra belt and it's now sounding so good that this time

*For many The Voyd is something to dream about. £965 buys the turntable – arm and cartridge comes extra.*





around I found it encouraging me to stay up all night listening to records. *The Voyd* is an exciting turntable to listen to, the performance is full of drama, yet it's never fatiguing or stressful – except where the music demands it. Expensive though it undoubtedly is, there's equally little doubt in my mind that *The Voyd* is one of the world's finest sounding turntables. My sample was fitted with a Helius *Cyalene* arm and Audionote *IO Limited* cartridge; for the less extravagant enthusiasts I'm informed the deck also works a treat with the £90 Rega *RB300* arm.

By the time this issue goes to press *Voyd* Turntables will have premiered its claim to the state of the record player art, the *Voyd Reference*, at the Heathrow Penta Show. This go-for-broke flagship has been in the making for many years and when Guy visited me a few evenings ago to reclaim *The Voyd* he showed me one of the motors destined for the big deck. About the size of a small biscuit barrel, each motor costs around £140 – that's at trade prices! How much is the *Reference* going to cost? To be honest, I didn't have the heart to ask . . .

## IN THE PINK

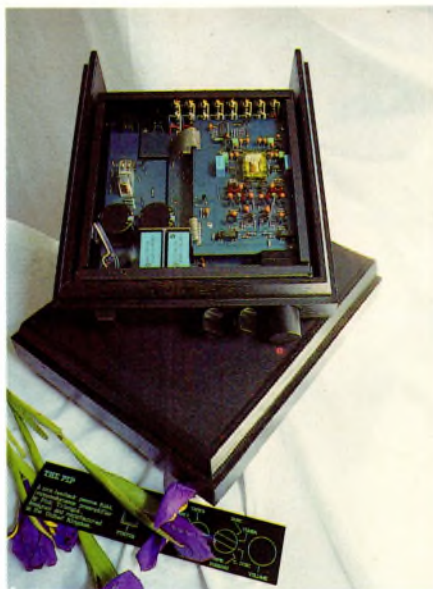
Following September issue's full technical review, Martin Colloms offers further thoughts on Pink Triangle's innovative PIP preamplifier.

Said to have taken ten years in the making, this latest version of the *Pip* preamplifier is in my view a remarkable achievement and is a welcome addition to the UK audiophile scene.

Depending on the volume level required, and also the sensitivity and loading of the matching power amplifier, *Pip* may be used in active or passive form, the latter worth another few per cent in sound quality terms and well worth using where circumstances permit. As explained in our September issue's review, the preamp's circuitry is based on a transconductance gain cell and a voltage-to-current amplification mode which allows high linearity without need for overall negative feedback. In passive mode, the second gain cell is bypassed while the output signal still traverses a unity gain buffer to provide good load drive ability to the output. The *Pip* has deliberately been kept small as sound quality is said to benefit from the shorter signal paths which result. Certainly it's true that extended signal runs on printed circuit track can take the edge off clarity and dynamics in electronic components.

In our listening tests, with the Goldmund *Mimesis Three* power amplifiers and lowish sensitivity Celestion *SL7000* loudspeakers the active mode was found to be required except for moderate listening levels. However, with higher sensitivity (say 88 to 90dB/W) speakers and a more sensitive power amp I suspect that the active line mode will rarely be required.

No equivocation is necessary concerning the sound quality for either line (active) or disc, both MM and MC inputs. Quite simply, it is state of the art, and closely approaches the performance of that inflexible, 'hairshirt' moving coil preamplifier made by LFD which I reviewed for this year's *Collection* (July issue). Comparing the performance with established high quality preamplifiers, *Pip*



*Pink Triangle's PIP preamplifier: you'd buy it for its transmission purity.*

has an undramatic, unexaggerated character which proved to be increasingly beguiling as the auditioning proceeded. It allowed the recorded music to tell its own story, the preamplifier proving characterless in the best sense of the word. You would not spend £2,765 on a *Pip* for its sound, rather you'd be buying it for its transmission purity, its transparency and its exceptional tonal accuracy.

Characteristics such as 'grain', sibilance, hardness or softness, defocusing, boom or dynamic compression have no relevance to the analogue disc input of the *Pip*, since they cannot be reliably identified by reference to current standards. The bass was crisp and powerful, rhythmic and tuneful yet never overbearing. Through the midrange it sounded remarkably even and coherent, highly revealing of fine detail, and superbly revealing of the individual timbres of natural musical instruments and voices. Vocals were expressive and articulate without any hint of sharpness or 'edge'.

Stereo staging was also judged to be first rate, while image width and depth were very well represented. Both specific focus and the delineation of layered perspective were most impressive. On its battery supply, the moving coil input was devoid of hum, virtually silent, quiet passages appearing to breathe from a near inaudible background. A fascinating characteristic observed during the listening was the way in which the total absence of hum appeared to improve the subjective pitch accuracy of low frequency sounds as well as improving bass detail.

In the treble, the *Pip* sounded delicate and revealing; subjective distortion was absent and the mid and treble energy balance seemed perfect in terms of its excellent stereo perspectives. Programme dynamics were read accurately and this performance was maintained right through the frequency range.

Only the most careful comparative auditioning revealed the modest contribution made by the active line amplifier – excellent in its own right but, when compared with the passive mode, showing the merest hint of compression and alteration of timbre towards the 'electronic' with a slightly rougher treble. Nevertheless, very few available signal sources would show any impair-

ment used via the active line stage. And no detectable bias for or against digital sources was apparent.

Certainly the *Pip* is a world class audiophile preamplifier, thoroughly engineered and boasting an outstanding moving coil disc performance. Here theory and practice have coincided wonderfully – a high resolution design with high linearity but no feedback – the preamp delivering a fine technical performance and a superb sound which is best described as sweet, dynamic and transparent.

I said in September that the battery supply is a minor operating inconvenience, and the rechargeable cells will need replacing every five years or so at a cost of around £100, but up to 12 hours of continuous listening is possible before the preamp switches to operating in 'charge' mode – and the inconvenience is indeed minor when weighed against the sound benefits of the battery supply. To date this is the finest production preamplifier I have ever heard and I feel it has reached significantly beyond established references.

## A MODULAR APPROACH

A comparatively new name on the British hi-fi scene, Ion Systems offer a well thought out building-block system of hi-fi amplifiers. Evelyn McDermott reports.

It is something of a rare event for a complete range of amplifiers to appear on the market from a small British manufacturer at one and the same time. Yet Ion Systems' comprehensive new range starts in Creek/NAD territory with the *Obelisk 1* at £165 and reaches to the heady heights of full-blown two and three-way active systems; competing with Musical Fidelity, Naim and top beasts from the US and elsewhere.

To many Ion is a new name, but in fact the firm inherits a fine pedigree. Chief designer Richard Hay worked with both Radford valve and transistor amplifiers, before setting up Nytech Audio. This company was famed during the 'seventies for producing a receiver that belied the argument that receivers cannot sound good. In a compact plastic case looking more like a desk-top calculator than a hi-fi component, its amplifier was capable of driving complex speaker loads loudly and elegantly. Meanwhile, the tuner concentrated on sound quality rather than ultimate sensitivity.

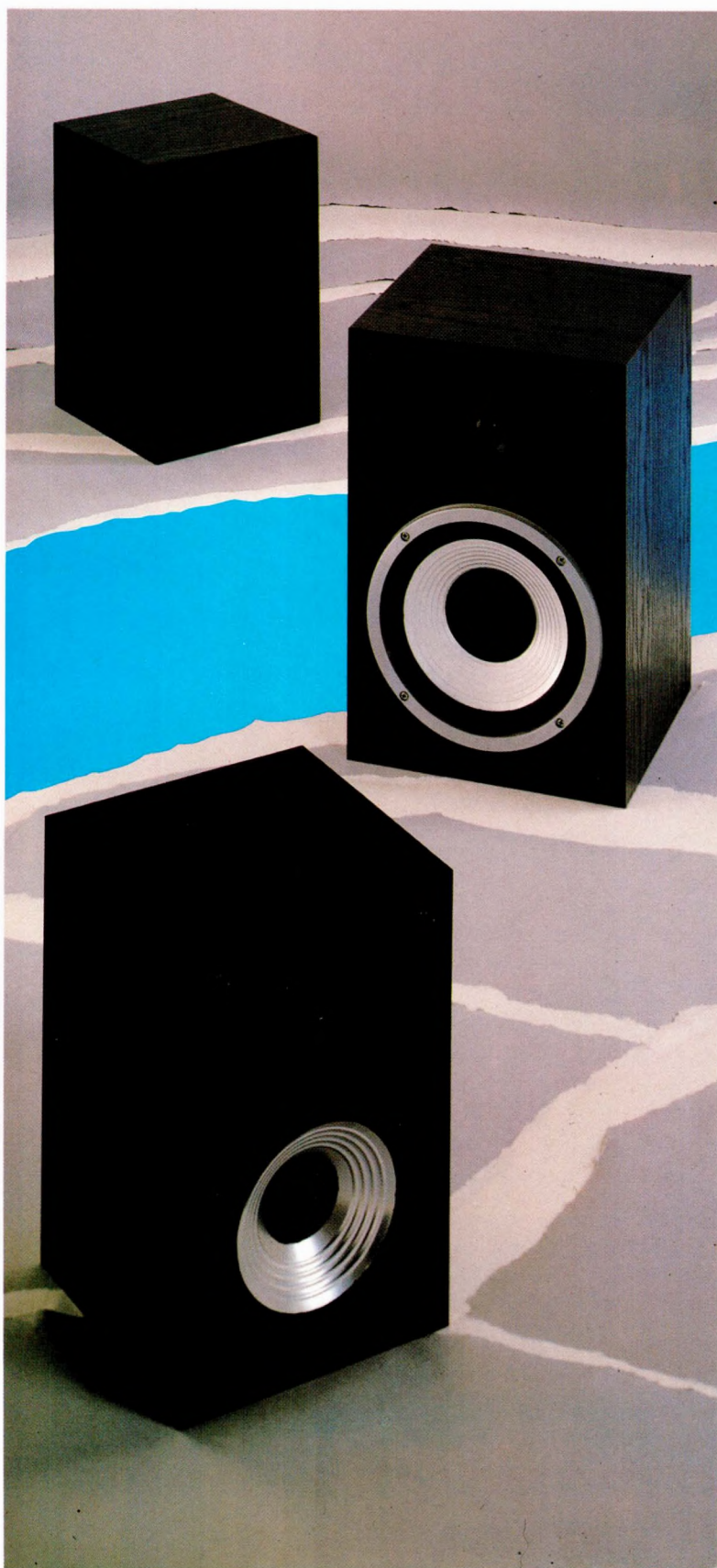
Now Nytech has been restructured and renamed Ion Systems. Richard has been producing amplifiers from his purpose built factory in mid-Wales for two years now. Having



*Obelisk 3X with X-Pak 1 power supply is a striking combination.*



# FOR THOSE IN THE KNOW AND THOSE WHO WANT TO KNOW



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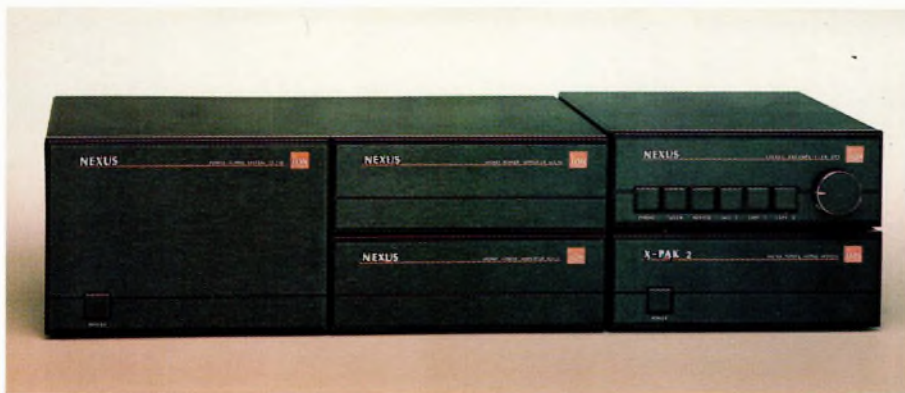
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*Ion Systems' building block system is elegant and cost-effective.*

tested the waters, the big launch is now on. To coincide, the amplifiers have been given a new set of clothes. If anything, Nytechs were notable for their visual discreetness; Ion has opted for a more classic look, as illustrated here. The facade is now brushed anodised aluminium, inscribed in red and grey with the model and logo. Internally the amplifiers are constructed to a higher standard than the old Nytech, with specialised components and minimal wiring promising reliability and performance consistency.

Circuitry is rather unconventional, with AC coupling of the output stages. When properly executed, Ion argue, DC stability is enhanced and circuit simplification keeps costs down.

Over the last four weeks I have been sampling the Ion range at home, with pleasure. From the cheapest *Obelisk 1*, the amplifiers have driven the mighty Roksan *Darius*, the diminutive Linn *Kans* and most recently the radical Naim *IBLs*, all with consummate ease.

Particularly notable is the thought that has gone into what might be termed the 'upgrading hierarchy'. There is an Ion model to cater for virtually any system, however ambitious. The potential purchaser can enter the market at his chosen price level. Furthermore, upgrading can be achieved cost-effectively in graded steps. There are three integrated models starting with the *Obelisk 1* at £165, going up to the *Obelisk 3* at £300. At each stage power supply improvements are made, and MC cartridges can be used with the *3*. In turn the *Obelisk 3* can be factory modified to accommodate the external power supply *X-pak 1*. This is built around a beefy 300VA toroidal transformer: by separate power supply standards it is cheap at £125.

From there the really ambitious can graduate to a *Nexus* based system using the separate *SP1* preamplifier. *Nexus* employs a novel modular construction based round a massive 750VA transformer. One or two output module cards are inserted to complete the power amplifier. In this fashion one *Nexus* case can double as a stereo amplifier or a monoblok. In building up an active multi-way system, the user avoids having to discard or trade in a single component. If all this sounds complex, the reality is methodical and logical. The move from a conventional stereo *Nexus* system at £1,090 to a dual mono, costs only £290 extra, as the output cards are retained. I do not know of any other manufacturer that allows you to model your system on such a versatile and cost-effective

basis. In the example given, going mono typically involves doubling the cost of the power amplifier, but not so with the *Nexus*.

Another desirable consequence of the Ion system is that the use of modules minimises the need for interconnect cables. As style becomes an important component of any hi-fi system, I hope there will be a welcome move away from the multi-box, multi-cable approach. A current top system may hide an interactive spaghetti junction of a dozen or more cables. It is a relief to have to deal with only a simple phono-to-phono pair and an umbilical cable, in both stereo and dual mono *Nexus* systems.

None of this would matter if the sound quality was not up to scratch. This will no doubt be dealt with in a detailed review in a forthcoming 'amplifiers issue' of *Choice*, but my initial sessions revealed promising clarity allied to power and presence throughout the range. A particular favourite was the *Obelisk 3X* with the *X-pak* power supply. At £450 it should provide effective performance in a competitive niche of the market.

As a footnote Ion tell me that to coincide with the product launch they have been building up their UK dealership network. In fact this has been doubled over the last three months. Go and see your dealer and you may find your amplification problems 'ioned' out.

## CLEVER REMOTES

*John Bamford gets lazy, zapping away with 'intelligent' remote control handsets.*

Only a year or so back, the thought of having an 'intelligent' remote control unit which could learn the commands of other handsets would have been a novelty. I believe I'm correct in saying that the first model to be touted in the UK was Onkyo's £99 *Unifier*. We

all know how frustrating it can be when you've one remote control handset for the TV, another for the VCR, and perhaps a third for your compact disc player. And isn't it always the case that the one you're looking for has slipped down the back of the sofa?

When Onkyo's *Unifier* was launched I loved the concept, loved the cute name, but thought £99 a bit steep. Then the market started hotting up and Memorex came in with an intelligent remote, the *CP<sup>8</sup>* which even boasted a liquid crystal display and on-board programmable timer. Neat.

Now Denon has introduced its variation on the theme, an intelligent remote control which even I can't lose down the back of the sofa. The *RC-605 Unimote* is about the size of a Filofax and designed to reside on a coffee table (or whatever) from where it can be used to control, well, just about anything you like. It comes pre-programmed to operate all remote-controllable Denon products (which you can erase if you don't own any), and when switched to programme 'B' mode signal codes for other brands can be entered and stored. Simply position the remote handset for your TV nose-on to the *Unimote*, press the enter and learn keys, and programming the *Unimote* to duplicate your TV handset takes a matter of minutes.

Of course, you can get up to all sorts of tricks. Entering into Record mode on my video recorder used to be a two-key operation. I've programmed the *Unimote* to command Record via just one button. What I really need now is a remote controlled vacuum cleaner, dishwasher and steam iron so I can lie on the sofa all day and 'zap' away to my heart's content.

Battery life is estimated at one year (four AA cells), while a one-hour memory back-up permits changing the batteries without memory loss. Price is a very competitive £60.

Meanwhile Philips has recently launched an all-singing, all-dancing intelligent remote control of more traditional 'handset' proportions which looks like the best value yet. The *RC 775* is £69 - which is a snip when you consider that in addition to incorporating an LCD it also has the ability to command Teletext functions. We received one at the *Choice* office a few days ago, so more details on this Philips model next month.

*RC-605 Unimote from Denon. Which button operates the leasmaid?*











# READERS WRITE CHOICE ANSWERS

## DESERT DIGITS

Having sampled an international selection of hi-fi magazines, I have found yours to be the best because of the standard format employed on reviews, the fine descriptions of technical and sound quality findings, but most of all the *Directory* which sorts the wheat from the chaff for the lazy man.

Unfortunately I've found it impossible to get good advice here about high-end equipment and am turning to you for assistance. I have tried to order the Sony 333ESD but the importer has told me it cannot be acquired. What they do have is an animal called the 557ESD, advertised as being an 18 bit 8x oversampling machine. It's a 220v fixed supply machine, so

would running it on 240v have detrimental effects when I return to the UK? And is it any good?

JEREMY ST CLAIR-BUTLER,  
RIYADH, SAUDI ARABIA.

*A review of the 557ESD is included in this month's bumper crop of CD players and it is recommended, though it's said to be less of a bargain in the light of the standards being achieved by relatively low cost players.*

*However, according to our CD expert Martin Colloms, the Sony 3337ESD, costs less (£550 in the UK) and sounds better! So see if you can get hold of one. There's no need to worry about the voltage difference, as you shouldn't encounter any problems when using a 220v machine in this country.*



The Sony 337ESD – a CD player that can spell.

## GREMLINS IN THE LOOP

I have recently purchased a NAD 3130 amplifier to use with my Garrard GT35P turntable, Akai GXC706D tape deck, Philips CD473 CD player and Castle Richmond II speakers. When either of the disc players are used the system sounds fine, but with cassettes, using the tape monitor button, the volume drops by approximately two thirds. When recording, any level setting above four results in distortion even though the playback level is quite low. Can you suggest why this is and if possible a remedy? I would also be interested in any general improvements that can be made to my system, and lastly should the impedance switch on the amp be at four or eight ohms?

JOHN LOCKWOOD,  
DUDLEY, CHESHIRE.

*If none of these faults occurred with your previous amplifier (if they did then get the tape deck serviced) check that the amplifier connections are correct ie 'tape out' on the amp runs to 'record in' on the cassette deck. If they're OK then check the*

*tape monitor circuits on the amp by recording direct from CD (bypassing the amp) and playing back through the CD or aux inputs. However, if the same faults are still occurring then the tape deck will have to be serviced by an Akai agent.*

*On the general improvements front upgrading your CD interconnect and speaker cable can bring remarkable rewards, as can using well designed speaker and equipment supports. Check the Directory for our recommendations in both these departments. On the tweakier (guarantee invalidating) front, replacing mains leads with solid core house wiring cable and bi-wiring the speakers will both improve sound quality – check out our Tweaks article in issue 58 for further details.*

*Finally, technically you should be using the 8ohm position for your speakers, but it would be worth trying the 4ohm option as most speakers present the amp with a varying load that's more like 6ohms in practise and can go lower. Use your ears to assess the difference.*

## UNDER PRESSURE

I have recently decided to do away with my present sound system, a Sony HMK 70 with Technics SB-G900 speakers, and invest in a more up to date separates system. My budget is approximately £1,000. A system was suggested to me by a slightly pushy sales assistant but I'm not sure if it's the right set-up to go for. He suggested a NAD 5120 deck, 3240 preamp and 6240 cassette deck to go with Mission 737 loudspeakers. I would be most grateful if you could view my situation and perhaps advise on a few alternatives.

PAUL J. ANDREW,  
CO. DURHAM.

*Your first piece of advice would be to avoid buying equipment from pushy salesmen. It shouldn't be necessary to put up with this sort of intimidation and your first priority should be to find a dealer who can demonstrate alternatives in a relaxed environment. Try to track down a dealer who stocks some of the following brands: turntables – Systemdek, Linn and Manticore; amplifiers – Mission, Rotel and Creek; loudspeakers – JPW, Heybrook and Royd, setting aside about £75 for stands and cables. On the cassette deck front the likes of Akai, Denon and Marantz have proved most competent in past reviews.*

*Leave the actual combination up to the dealer as he has far more experience in this area than we do.*

## PROMISES

Help, help, help. My wife has promised me a new cassette deck for my birthday and having looked, listened and played with quite a few, I've narrowed my choice down to three and can't make up my mind. When I first bought a system I referred to *Hi-Fi Choice*, but the cassette decks I have in mind haven't as yet been covered by you. My shortlist is as follows: Aiwa AD-WX808, JVC TD-W777 and Technics RS-T33R; what do you reckon?

R. MASON,  
MARCH, CAMBS.

*You're right we haven't tested the decks you list, but we notice they're all £250 twin deck*

*machines, a genre that rarely achieves recommendation. However, in Alvin Gold's last tests (October) he found a Technics machine, the RS-T330R, that made the grade and only costs £200, which is remarkable. This may well replace the Technics model you mention and should be checked out if a twin deck machine of reasonable capability is required.*

## TINNY AND PITCHY

Can you help me? My system which consists of a Technics SL-BD222 turntable, SU-V40 amplifier and Wharfedale 508 speakers tends to sound 'tinny' at times and also a little 'pitchy'.

I intend to keep the speakers and am hoping to upgrade the amp to either an SU-V45 or V55, whichever is best suited. I think the turntable may be the cause of the aforementioned effects and I would appreciate some advice on a replacement, bearing in mind that the 508s have a soft sounding bass. I'd like something with depth, tunefulness, sharpness, clarity and good bass reproduction. I think the Ariston Icon would be a good bet, or maybe something cheaper; what do you think? Also, which speaker stands would be most suitable for my speakers?

MISS A. DAUNT,  
WOKING, SURREY.

*You're correct in thinking the turntable is the cause of your problems and, replacing it with something like an Icon would be likely to improve the situation.*



The Wharfedale 508, a Best Buy in its time.



Beware of imitations





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CD-93.

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

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

HI-FI CHOICE, MAY 1988.

CD-73.

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

HI-FI NEWS & RECORD REVIEW, APRIL 1988.

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

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

NEW HI-FI SOUND, JUNE 1988.

You won't find Akai's Grand Excellence range in any ordinary hi-fi shop. Only the very selective hi-fi specialist will carry them.

You may have to search a bit to find one, but when you do, it'll be music to your ears.

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For your nearest Akai audio/visual specialist, see list overleaf.



However, we haven't formally reviewed that particular Ariston and would prefer to recommend something like the Q-deck or a Rega Planar 2. Using the latter with perhaps an Audio Technica AT95E cartridge will give you a significant increase in sound quality over your Technics deck. The Q-deck is semi-automatic and thus slightly more user friendly than the Rega although it doesn't rate quite so highly in sound quality - try to listen to both.

When it comes to upgrading your amplifier listen to some of the home grown options such as those from QED and Mission. They're built with sound quality rather than features in mind and would give any of the models you mention a run for their money. On the speaker stand front the Monotrak M4 and Heybrook HBS1 models are the most appropriate of those we've tested, but many of the stands with top plates of about 25x21cm that are welded rather than bolted together would be suitable - assuming they've got spikes, that is.

**CHIRRUPING IN DC**

I am one of the very few fortunate owners of the van den Hul Grasshopper cartridge. I bought it through a friend of A. J. van den Hul in the early 'eighties when I lived in the Hague. I'm presently living in the States, where not a single Grasshopper has been sold so far. Over the last five to six years I've read your articles with interest and established you as my reference in the hi-fi press. And having read articles where you refer to this skeletal cartridge, I would appreciate it if you would give me some advice regarding extracting its optimum performance.

It's currently mounted in a Premier MMT arm on an AR turntable. I also have an Eminent Technology 1 tonearm (and will mount the Grasshopper at my own risk and glue it in!) and an Oracle Delphi turntable, however, both of these are back home in Sweden. I have an Audio Research SP-10 and a pair of Ray Lumley monoblocks (I'm a bit of a tube fan) and the loudspeakers are Etude MP-1s.

I like my system very much, especially the jewel of a cartridge although I have been looking for a decent arm for a long time and can't find anything that really makes sense. I am looking for a very analytical arm that would work well on my Oracle. I would be grateful for any suggestions or ideas.

MATS A. PERSSON,  
WASHINGTON DC, USA.

I would have thought that the ET1 would be an eminently suitable arm for the deck and cartridge. However, perhaps you should try the combination in a



One of our four-legged friends - the Heybrook HBS1 speaker stand.

slightly less long term fashion than bonding, just to see if it makes the grade. Suitable alternatives are the Airtangent 2, another linear tracking arm, and the SME V, which were both very well received when we reviewed them, and represented the state-of-the-art in tonearms. It should be possible to hear a demonstration of both these combinations at a good dealer in your area.

A more radical approach would be to wait until the Autumn and seek out the Roksan Xerxes turntable and their new Artemis tonearm. Although we haven't had a chance to formally review the arm our first impressions were extremely positive. We heard the combination with their forthcoming cartridge, the Shiraz, a modified EMT similar to the Grasshopper in that it hasn't got a body as such.

Another favourable point to this combination is that (in the UK) the arm and deck retail for less than either of the two tonearms mentioned so far. But don't let that diminish your expectations.

**UNTRAINED EARS**

I have a complete Pioneer separates system (details given) and have recently been considering changing either the whole system or parts of it, especially the speakers and cassette deck. However, I would emphasise that all the units are in perfect working order and sound quality, to my untrained ears, is excellent. I was wondering whether you could give me your opinion of the system in general and also any advice on upgrades. Finally, I would appreciate it if you could recommend a compact disc player to go with the system.

ALASDAIR MACKENZIE,  
STORNAWAY, ISLE-OF-LEWIS.

If, as you say, the system sounds excellent, untrained ears or otherwise, there is really no need to change it. Having 'trained' or experienced ears just makes attaining satisfaction with one's system all that more difficult. Your system, like practically any, could be improved but if you find it entertaining and enjoyable why bother? One of the dangers inherent in hi-fi as a hobby is that it encourages continual upgrading when this may well be unnecessary and expensive, but the idea is to end up with an enjoyable source of entertainment.

Buying a CD player is probably a good idea, however, as it should provide a music source with greater fidelity than those you already have. Use the Directory to make a shortlist of possibilities and try to audition some of them to see if your experience concurs with ours. It's really not necessary to spend much more than £200 and something like the Philips CD472 or Sony CDP-550 should fit in well with your system. Save any change for software.

**DOWNFORCE DELIBERATIONS**

I purchased a copy of July's *Hi-Fi Choice - The Collection*, and was hoping you could answer a query that is niggling me.

**NARROWING THE FIELD**

Could you advise me on which amplifier I should buy to use with my Ariston Q-deck turntable and Philips CD473. I have some old Dynatron speakers as well as a Sanyo pair, but ultimately I intend to get Tannoy Eclipse or Rotel RL850 IIs. The amplifiers I have in mind are the Marantz PM35, NAD 3020e, Rotel RA820A and the Yamaha AX-300, but I would appreciate some help in narrowing this list down to a feasible amount for audition.

M. NEAL,  
EAST SUSSEX.

(Of the amplifiers you mention the NAD and Rotel both came out well when we looked at them. The

It concerns the test results section for the Linn LP12/Ittok review and in particular 'the downforce calibration error' figures for the tonearm. I'm afraid I might appear a bit thick but I can't figure out whether the results shown, -0.3 grams, mean that when the calibration shows a downforce of 2gms you are actually tracking at 1.7gms or 2.3gms!

This is irritating me somewhat, as at present I'm using an Audio Technica AT-OC9 in an Ittok and am tracking at 1.4 grams according to the calibration. However, your error figures would seem to indicate that the true figure is either about 1.15 grams which would seem extremely low or 1.65 grams which would agree with your review of that cartridge. Can you put my mind at rest?

STUART MOSS,  
BRECON, POWYS.

We're sorry if we've confused you with our calibration error figure. An error of -0.3 grams at a 2 gram reading means that downforce is in fact 1.7 grams. However, this error will vary slightly from arm to arm and the best way to set downforce is by using a balance such as those made by Shure and Goldring, then tweak it subtly by ear until the sound 'snaps into focus', as someone used to say.

Rotel rates slightly higher on sound quality in our opinion and is one of the strongest amps in the sub £150 market. However, you should audition as many as you possibly can and let your ears be the final arbiter.

When it comes to new speakers you should compare the options with your old Dynatrons, - we haven't tested these but they may be reasonably good by comparison with contemporary budget boxes. If you can handle the inevitable aesthetic intrusion get hold of some speaker stands (Castle and Celestion have recently come up with some relatively attractive models), in order to make the most of whatever speakers you use.



Rotel's RA820, hard to beat at the price.



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20

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## ASPIRATIONS

*Our 'audiophile' this month is a lawyer whose study contains a perfectly respectable system but whose listening room set-up delivers some of the best in music reproduction. Text: Dan Houston. Photographs: Chris Richardson.*

UPSTAIRS

# Downstairs



*Leon Braunstein.*

*The system may not blend into the background but the sight of audio equipment is a pleasure here.*

**T**his month we take a look inside a house nestling in woodland, 750 feet above sea level on the North Downs in Surrey. Our host, Leon Braunstein, is a company lawyer, and a confirmed audiophile since the age of 13! The house itself is a detached brick-built modern two storey rectangle with Leon's study and 'second system' downstairs and his listening room upstairs.

The study is furnished in yew wood with a chestnut leather Chesterfield sofa and wing armchairs arranged on one side, opposite the French writing desk. Rows of legal and reference books invite you to browse or you can enjoy two original Ken Carter oil paintings – a tea clipper racing home and two frigates in battle.

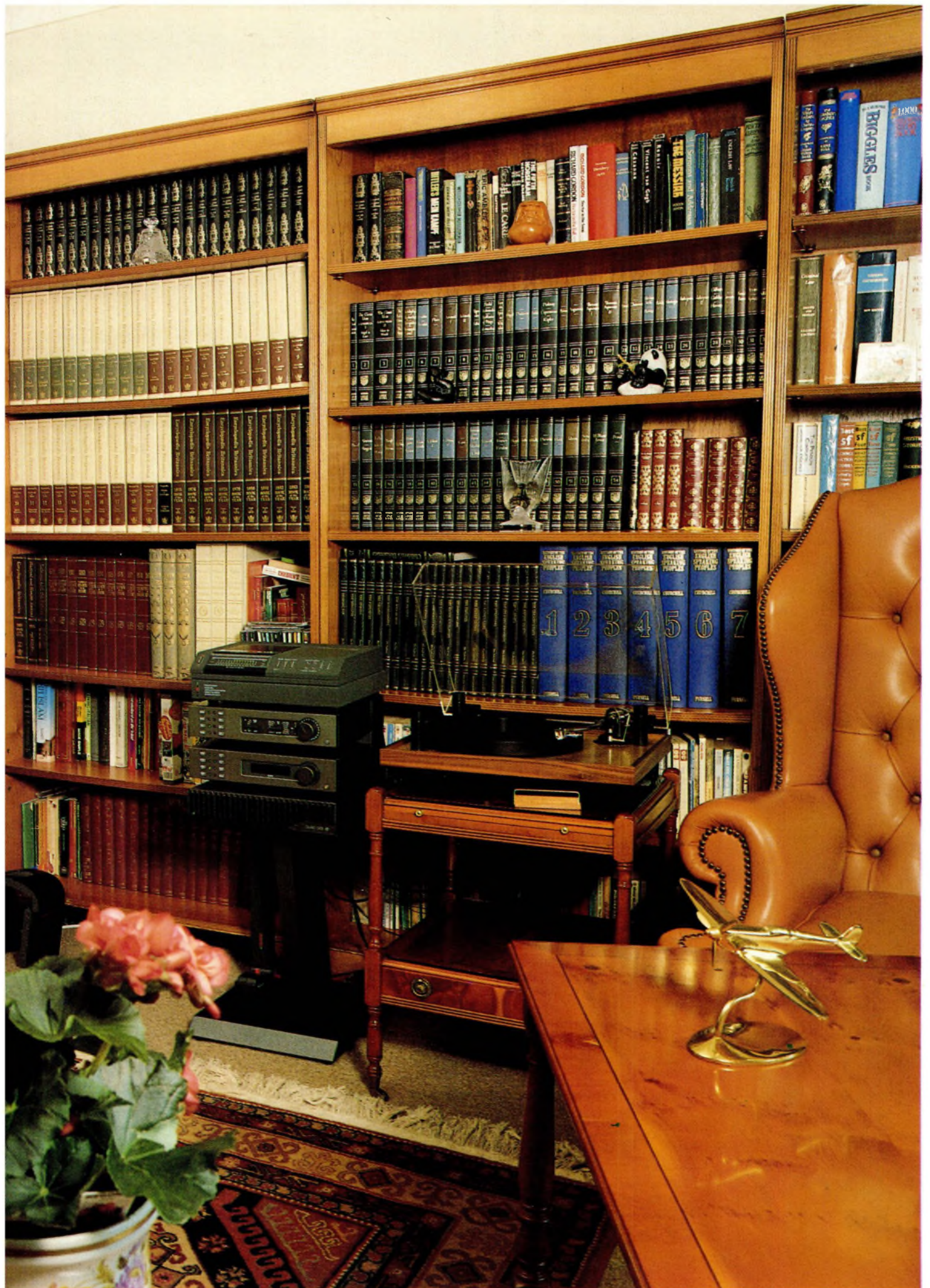
The feel of the room is fairly 'busy' with ornaments arranged on the bookshelves and available surfaces. A small flintlock travelling pistol, brass model Spitfire and a three dimensional wooden puzzle lend the room masculine overtones and add to its character.

The hi-fi is exhibited boldly in front of the bookshelves. And this (typically audiophile) approach with the vast Sony *Profeel* television gives the room an informal atmosphere for both relaxing and working. The former activity is surely the easier when one considers the desk is not in the best place to enjoy the speakers!

The analogue front-end is the Alphason *Sonata* turntable with its own *HR 100S* arm











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



V970X STEREO CASSETTE DECK

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



and van den Hul EMT *MC1A* cartridge, all standing on a yew table. This is run into a Quad *34/306* pre/power combination which drives a pair of piano-lacquered Ensemble *FA 1* loudspeakers sitting on heavyweight 'bespoke' Foundation Audio stands.

A 'matching' Meridian *MCD Pro* CD player sits on top of the Quad stack and blends in well, being the same width and almost exactly the same colour as the rest of the system. Beneath Quad's spaceship-console style stack a Cobra aerial pulls in the radio signal from places like the Crystal Palace transmitter, ten nautical miles away. Leon is an amateur pilot whose conversation is sprinkled with references to altitude, compass orientation and distance in 'knots'. The innocent-looking Cobra, he says, is better than the dipole aerial he had installed in his loft. At £45 each (from KJ West One) they don't come cheap but are said to be worth it. Certainly, there was a virtually full signal strength reading on all the Quad's preset stations. There is also a pair of Jecklin *Float* headphones for 'quiet listening'.

A working library of CDs and vinyl records are kept in this room although most of Leon's collection is housed upstairs with the main system. The downstairs system set the pace for the visit, with all the immediateness one associates with live music. The Alphason turntable emphasised the difference between CD and vinyl with Ricky Lee Jones on vinyl sounding very laid back and warm. The Meridian is also very capable of producing what is required, which according to Leon is a musical sound. "Too many people listen to the bass and treble, whereas I come back to the priorities which is the musicality of a system," he told me.

"Manufacturers and retailers sell a hi-fi sound rather than adopting a musical approach. Transparency, dynamics and the soundstage should be the priorities. Many people like listening to a coloured sound which they say is musical – and it may be – but to my mind it's unnatural; I try to get a transparent, natural soundstage so you can close your eyes and think you're in the concert hall."

This is how Leon describes his primary system which is positioned in two stacks in his listening room upstairs.

At the heart of this system stands the extravagantly finished piano black Pierre Lurné *Audiomeca J1* turntable. Pierre Lurné is a French designer who had a significant influence on the Goldmund turntables which the *Audiomeca J1* distinctly resembles. It uses its own automatic parallel tracking tonearm with a Clearaudio *Accurate* cartridge. The arm even picks itself up at the end of each side bringing using friendliness to the world of esoteric audio. It does seem strange not to have to squat down, eyes narrowed in focus on the stylus as it pneumatically descends onto the vinyl's smooth stripe!

Leon had just upgraded his preamplifier



to the Matisse, a new British valve design with a separate power supply. In making the move he tried out several other more expensive preamplifiers but raves about the capabilities of his find, praising its musicality; its ability to paint a picture in sound. The signal is then beefed up for the Martin-Logan electrostatic loudspeakers by a very rare Conrad Johnson *Motif MS100* stereo power amplifier which unlike other CJ products is a solid state device. (Our picture also shows the *Motif MC8* preamplifier which is out at pasture at the moment.) Nakamichi's Sumo wrestler of a cassette deck – the *1000 ZXL* looks more like something they retrieved from the space shuttle, whilst slung underneath the Pierre Lurné is a Revox *B260* tuner and a Sony *555ES* CD player. Below these, Yamaha's *DSP 1* (digital sound processor) and four channel *M35* power amplifier promise some stunning acoustic sound effects through two pairs of loudspeakers, B&W *DM110* and Acoustic Research *18BX* in surround sound mode. More of that later.

Looking up I noticed a tiny tell-tale black square on the ceiling light. Could it be that a respectable audiophile was versed in the black art of Peter Belt's products? Yes, it turns out that Leon had the whole room 'Belted' (see issue 58) which he says makes an audible difference to the capabilities of his system. However, as a practical person he has not festooned the room with gadgetry from the PWB factory and merely benefitted from the polarising technique offered by some shops (eg: KJ West One in London).

Our listening session started with the latest audiophile record by Tracy Chapman, whose guitar string fingering was far better focused than at her appearance at the Nelson Mandela concert in Wembley, say. I'm not saying there was as much atmosphere but there was far greater clarity and resolution in the sound than one can get at any 'amplified' live performance (though some might beg to differ on this



(Top) The study: equipment is informally set up but be careful if you want the book behind in a hurry.

(Centre) Where's the groom? Actually these speakers aren't getting married.

(Bottom) All the kit for DIY sound effects.

#### The downstairs system:

Alphason Sonata/HR-100S-MCS	£695/£412
van den Hul EMT <i>MC1A</i>	N/A
Meridian <i>MCD Pro</i>	N/A
Quad <i>FM4</i>	£289
Cobra aerial	£45
Quad <i>34/306</i>	£269/£236
Ensemble <i>FA1</i>	£1695



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point. *Ed*). This was more like Miss Chapman in the room, sliding her fingers up and down the steel and gut strings and delivering her strong dark songs without any recourse to electricity.

The electrostatic Martin-Logans are cased in walnut and present a curvilinear, almost transparent front. The bass is extended by an Audio Pro *BI-45* subwoofer unit (made in Sweden) placed behind and between them. The same recording was played on the Sony CD player for comparison which delivered the same resolution and focusing but perhaps not the same intimacy or atmosphere. "Analogue has more depth, more timbre than CD," said Leon, "things begin to open out; it's more lifelike; the bass goes deeper."

A Decca recording of Gilbert and Sullivan (*The World of Gilbert and Sullivan 1969*) showed how good both the recording techniques (or perhaps approach) of that era and the Pierre Lurné are. The stage came into focus with the cast arranged from left to right both in front of and behind the speakers. Leon's aspired aim – that one should be able to close one's eyes and imagine the concert hall – was realised here with superb imaging from the Martin-Logans, allowing the ear to pick out just where the performers were.

Part of the reason for such good acoustics is the room itself which is acoustically quite dead because of the carpet, furniture and paintings. The room is 'L' shaped and has a low ceiling. Woollen rugs, some of them very old, from the Qashqui region in Persia, hide speaker and interconnect cable and also play their part in the room's acoustics. Reasonably flat room characteristics are also a help for getting the most out of Yamaha's DIY Albert Hall kit.

The *DSP1* is something that came and went with the hi-fi press so it's good to give it an airing here. Basically it is a 'surround system' which employs digital technology to recreate the acoustic characteristics of several different environments. Yamaha's engineers travelled the world measuring the acoustic responses of great venues such as the Royal Albert Hall and the Carnegie Hall, then put their findings onto computer to give you 13 preset environments.

The sound processor takes the signal from your record player, CD player or any other source, including video and boosts it with delays over the different frequencies so giving the echoes and 'atmosphere' that makes each venue individual. It is linked to your pre or integrated amplifier and requires a four channel (or more) power amplifier to be used in surround mode. In this case a pair of B&W *DM110s* on Target stands and another pair of Acoustic Research *AR18BX* speakers complement the signal which can also be passed through the Martin-Logans.

Videos, especially in stereo, become very involving as you throw a scene from *Top Gun*, say, into the 'Live' setting. The

only thing it might not like is a live recording in a different setting. For instance we put Simon and Garfunkel *Live in Central Park* (a brilliantly recorded piece of live music) into Munster Cathedral and got pandemonium! But in the Wembley stadium setting they sounded great.

The remote control *DSP1* is also very flexible and you can tailor it to the room's acoustics as well as using Yamaha's pre-programmed settings. It will also memorise the settings you 'tailor' for different pieces of music so you can achieve the optimum acoustics for your own room with that piece of music.

In the end we settled for opera in the Warehouse Loft setting, while Leon sat for his photograph. It must be said that this was with his own camera – a Bronica *ETRS* medium format model. The photographer's muttered curses about his own (Japanese) camera breaking down punctuated a love duet out of Puccini's *Tosca* which was sounding like a rehearsal in an empty theatre.

Theatre is another of Leon's hobbies and he is pictured against his Revox *B77 MkII* reel-to-reel tape recorder which is next to a small mixing desk. He puts together sound effects for an amateur theatre and the *DSP1* is obviously one of the stars of the piece!

It might be possible to levy the charge of 'gadgeteer' against Leon if he wasn't so obviously passionate about music. For him, this equipment (including the likes of his camera) is a means to an end rather than an acquisition as such. And as a converted Bahai he puts human relationships first according to the edicts of his religion, he said. Nevertheless, the sheer amount and diversity of equipment in this setting is very impressive – and very daunting when it comes to reading model numbers back from shorthand! The star rating should definitely go to the upstairs analogue set-up with the British newcomer, the Matisse, which defies your belief that it's a record playing (aren't they obsolete now?) and not for real.

#### The upstairs system:

Pierre Lurné <i>Audiomeca J1</i>	£2995
Clearaudio <i>Accurate</i>	£2000
Sony <i>CDP 555ES</i>	£1000
Nakamichi <i>1000 ZXL</i>	N/A
Revox <i>B260</i>	£910
Matisse	£3000
Conrad Johnson <i>Motif MS100</i>	£3600
Martin-Logan <i>CLS</i>	£2985

*Upstairs: there's an obvious pun about the transparency of these speakers; on hearing them it's also true.*

*Looking at this Matisse no art gallery would hang it; it's when you hear it that it lets the colour of music through.*

*Pierre Lurné: lovely name, lovely turntable.*









# And to think we almost forgot the flashing lights.

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*The lack of pyrotechnics is a deliberate ploy; we like to keep things simple. In fact this system is so simple that anyone literate can operate it. (Stay with us. You're well on the way to passing the audition.)*

*Simplicity is the key to the system's internal construction too. Excessive wiring can create all kinds of acoustical problems, so our designers prefer a single circuit board with military specification soldering. And, before leaving our Cambridge plant, every product is stringently checked by computer and the keenest of human ears. (Our pernickety assembly and fussy quality control methods are now legendary.)*

*With that in mind, New Hi-Fi Sound decreed way back in December '86 that the Delta 90 amplifier "Looks well set for a long and honourable life on the hi-fi market."*

*The Delta 80 tuner moved Hi-Fi Choice to give it their "Best Buy" rating.*

*Of our Delta 70 CD player, Gramophone said "Here then is a CD player which does a first class job of reproducing music of all kinds, with a laid-back style and fidelity which most true audiophiles and music lovers will appreciate."*

*And what of the enigmatic Black Box? This separate digital to analogue decoder has been universally acclaimed by the Hi-Fi critics and will significantly enhance the sound of all good CD players (including our own).*

*With the highly praised Arcam Two + speakers these separate components come together to form the Arcam Delta system. As Hi-Fi Choice recently pointed out "More than any other system.....the Delta provides a standard of reproduction significantly in excess of the sum of its parts."*

*Everyone agrees that the Arcam Delta system will perform splendidly for years and years to come. (Which is more than can be said for the average set of flashing lights.)*

*Should you wish to continue the minimalist chic throughout your parlour, therefore, may we suggest a Bauhaus rocking chair and a pair of ergonomic slippers?*

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*Hi Fi Choice, April 1988.*

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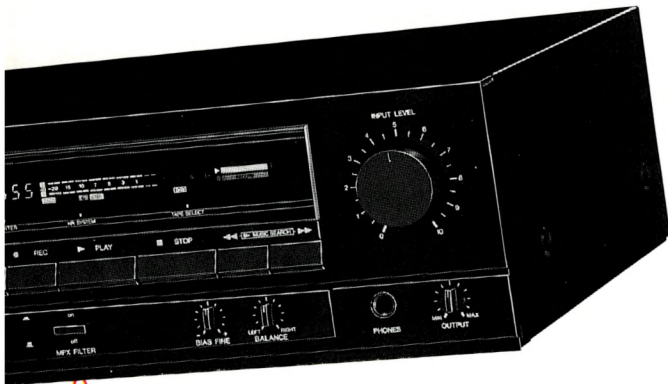
*Hi Fi Choice*



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.*



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*Hi Fi Choice*



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## PERSPECTIVES

Paul Messenger gazes into the crystal ball of in-car electronics technology.



HI TECH

# Wheels

Leaden July skies, liberally scattered showers and Croydon's unpromising concrete jungle set the dubious scene for an anticipated *Aspirations* feature. A unique motor car developed jointly by Dutch multinational Philips (on the electronics side) and Worthing-based specialist coachbuilder IAD (International Automotive Design) might be some sort of aspiration for the car thief planning to emigrate to Tibet, but there's no way anybody's going to be able to buy this one.

The Royale is a strictly one-off proposition, showcasing some of the potential futures for in-car technology in the broadest sense. So without any further ado we rescheduled the feature under the *Perspectives* banner, giving the technology a little more space to breathe while indulging in a subject rather more photogenic than the average amplifier.

The car body is exquisitely built and very striking, though not necessarily beautiful to all eyes, and certainly rather large by European standards. There are touches that call to mind the latest General Motors executive streamliners (Vauxhall Senator). If passed in the street motor watchers might guess it was a prototype of GM USA's high-tech Saturn project.

The underskin mechanics may be a bit too prosaic to quicken the pulse of the sporting motorist, but the 2.7litre Subaru flat-six can reportedly push the car along at 100+ mph, and this cylinder configura-

tion is clearly going to help in leaving as much room as possible for all the electronics.

Car radios existed fifty years ago, although popularisation paralleled the transistor-led portable radio boom of the 'fifties and 'sixties. The 'seventies and 'eighties in turn brought the stereo cassette player (and particularly the cassette/radio combi) to similar prominence, effectively creating the whole concept of in-car entertainment (ICE).

However, apart from providing a DIN-sized hole in the dash and a handful of loudspeakers of dubious merit, car manufacturers have tended to turn a blind eye to many of the future possibilities for ICE, where the 'E' is fast coming to represent electronics rather than merely entertainment. Philips sees the DIN slot remaining, albeit as something of a design and presentation millstone, but expects considerable growth in boot-mounted add-ons, controlled remotely from the dash slot.

Entertainment remains a crucial element in the design of the Royale – to an extent which few can even have dreamed, with on-board CD and back-seat video using something like 13 strategically positioned loudspeakers. But the car-as-mobile-office syndrome is also given full rein, along with a few other electronic/automotive features that have nothing to do with either – not least the ability to deliver multilingual abuse to the car you've



*Hi-tech Royale – bodywork by specialist coachbuilder International Automotive Design*





*Exquisitely built, the Royale calls to mind General Motors' executive streamliners.*

just overtaken!

The cellular telephone is the key that's slowly unlocking the office-on-wheels concept. It's been a huge commercial success in the UK for person-to-person communication, and that which transmits speech can also transmit data. Appropriate error correcting interfaces are moving towards second generation flexibility, with high speed modems and the facilities to send/receive fax, telex etc., though attempts to plead office status when encountering a business lunch clamping are likely to be thwarted by discussions about planning permission.

The Royale as is doesn't really make a practical roadgoing proposition. Even if you could get insurance cover, the vehicle registrations people would probably kick up a fuss. Although the beautifully finished leather cabin cocoons the occupants and artfully sanitises the user interface, the boot is the automotive equivalent of the floor length green baize tablecloth that puts the Paul Daniels factor into high tech demonstrators by concealing a rat's nest of wires and prototype boxes. ("Soon all this will be reduced to the size of my gold filling", he flashes winningly as a dishevelled Barry Fox appears from beneath the table . . .).

The excuse in the Royale's case is rather better. A car which is primarily meant to be

looked at, sat in and played with rather than driven needs the back-up power supplies of an operating theatre. And we are dealing with prototype electronics which are still a long way from production in some instances, so the odd bank of memory chips is quite excusable. Furthermore, the boot is sufficiently cavernous that most of these bits could in fact be mounted discreetly behind a removable (for service) screen, and still leave room for a clutch of suitcases.

## E FOR ENTERTAINMENT

This car definitely offers an incentive to employ a chauffeur, and not just because the dashboard is as electronically over the top as the rest of the insides. Unlike the vast majority of automobiles you get real stereo sitting in the back seat, as well as at the other seats. This is achieved through clever placing and appropriate active powering of no fewer than twelve (comparatively) conventional loudspeakers, backed up by a rather clever 'bass actuator' sub-woofer system.

The actuator is not a loudspeaker in the conventional sense, but in effect uses a mass-loaded magnet/motor to convert part of the shell of the car – in this instance the rear of the floorpan – into a giant low frequency transducer, operating below 80Hz. It's a most elegant and compact solution to the difficult problem of creating real bass within the confined car environment, though it is necessary to tailor the characteristics of the actuator to the specifics of

a particular panel of a particular car.

The front cabin has a three-way stereo set-up – treble from the dash extremes, mid from the footwells and bass from the doors – while the back shelf and doors are used in the rear. Both the concealment and placing of the loudspeakers and the operation of the bass actuator emphasise Philips' point that it is essential for the acousticians to be involved right from the start of the project.

The electronics driving the loudspeakers are conventional analogue if state-of-the-art stuff. *AF264* and *AF265* power amplifiers are fed from *AP470* active filters and *AP170* computerised graphic equalisers. The latter is the major tool used to compensate for the inherently uneven response of the cabin, measuring the response and then storing the appropriate inverse equalisation in memory.

All these electronics are concealed from view and permanently set, but an additional four-way dashboard switch allows further equalisation fine tuning to take account of the changes in absorption characteristics, according to the number of passengers being carried.

This must be about as elaborate a system as is practical using analogue filtering techniques, though theoretically digital filtering operating in the time domain has far greater potential for subtly compensating for the ugly acoustics of an automobile cabin. Digital filtering can perform very tightly, discriminating frequency boosts and cuts far beyond analogue capabilities, but the practical problem at present is the need to perform the equalisation on a digital bitstream, so current cassette and radio sources would need A-to-D conversion.

However, the people at Philips regard practical in car digital filters as still some years off, and not necessarily of immediate use, given the inherent compromises of car accommodation and signal/noise ratios. By the mid 'nineties it's likely that a new technology known as 'noise cancellation' will have started to creep into the upper echelons of luxury vehicle design. This should eventually enable car cabins to be made significantly quieter for the occupants, and so in turn enhance the potential for in-car hi-fi – and provide justification for more complex digital equalisation.

Signal sources built into the Royale combine a customised *DC774* cassette radio and *DC085* compact disc player, the latter providing some optional dynamic range compression as an acknowledgement of the limited signal/noise ratio available. Said player can theoretically accommodate CD-Video and CD-ROM software as well as audio material.

## THE BACK SEAT

Video capability is another reason for Royalists to employ a chauffeur and sit in the back seat, for each of the front seat backrests incorporates a tiny LCD CTV,





*Ergonomic controls for the electronics fall easily to hand.*



*Driver has hands-free cellular telephone, positioned right (f control 'discus'.*



sourced from the Japanese Marantz subsidiary. These new toys are still fairly rare in the UK, but look likely to add a televisual dimension to the Walk- or Carper-son lifestyle before too long. Already popular in Japan, apparently some 40 per cent of personal CTVs are purchased primarily for in-car use.

Philips envisages feeding off-air TV to back seat Royale passengers, though the prototype here took TV signals from an on-board VCR – which I suspect might be a much more satisfactory signal source for a moving car. Indeed the sort of ultra-compact and portable 8mm video hardware currently being introduced by Sony could well be ideal for car installation.

LCD TVs use a comparatively new technology that is still advancing rapidly, and is qualitatively radically different from the familiar CRT (cathode ray tube). Fundamentally, where CRT is a light source, LCD is a light filter, more analogous to a colour transparency.

Flicker is not a problem, power consumption is very low and the units can be made very slim and compact. This last point makes them suitable for building into car backrests, as does the greater immunity from vibration than CRTs, though the operating temperature range of 0-45°C is a shade marginal.

Thus far, resolution is only about half that of the PAL broadcast standard, but problems of contrast, colour saturation and response times are all improving steadily. 'Active matrix', whereby individual pixels are separately transistor switched, is the current buzzword for the better quality displays.

The maximum practical screen size is

only about three inches at present, so the backseat passenger will have to squint or lean forward to see much detail – an eight or nine inch screen is really necessary to make in-car use enjoyable. However, this aspect of the technology is also advancing rapidly – Sharp claims to have developed a 14-inch 300,000 pixel colour screen with mass production planned for '89. Ultimately, liquid crystal displays are likely to revolutionise television in general.

## E FOR ELECTRONICS

Beyond the entertainment aspect of the Royale is a package of advanced electronics that would enhance the kudos of any self respecting yuppie. Separate cellular telephones – hands free in front, normal handset in rear – provide the first line of communication with the outside world.

"Facsimile machine (option): a standard interface is provided for the installation of a facsimile machine". Practically speaking this is still wishful thinking, though certainly within the capability of current technology. To my knowledge the cellphone high speed data transmission standards are evolutionary, and most 'portable' fax machines are still mains-powered luggables, not quite yet ready to mutate into elegant in-car installations. The suggestion that I should send myself a fax was met by studied disinterest.

Less pie in the sky is a dismembered Philips NMS9100 personal computer distributed in modular form around the rear compartment. Main PCB, hard disk and power supplies hidden from view, floppy disk drive in the centre console and keyboard display stowed in a backrest pocket. Modem communication is avail-





HARP: JOHN EGAN 1805

PHOTO: LIAM WOON

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The decision to integrate the computer so totally with the car does seem a little curious, considering that transportable lap top computers are already well established in the marketplace, with virtually no restrictions on power and memory for those with strong biceps. The build-in concept does help reduce the risk of theft (of the computer), but somehow I see the away-from-office computer user preferring to take the one computer from office to home to hotel to boat to weekend cottage or whatever, rather than popping out to the car park or garage.

Perhaps the most interesting future developments in in-car electronics will be in the field of navigation devices – a whole new untapped area (with due apologies to the rally driver's compass). Philips has done much of the advance talking, and has been working for some years on a CD-based system codenamed CARIN.

Royale doesn't actually feature a fully-fledged navigation system, but CARIN is there in spirit, as a simulation of goodies to come, showing the anticipated capabilities and possible ergonomics of the system. CARIN integrates CD-ROM map data with deadreckoning from an on-board compass and wheel sensor data, so the driver can key in his 'You Are Here' current coordinates, and those of his intended destination. A speech synthesis chip (backed up by LCD pictograms) will direct him along his route, correcting or compensating for any errors or detours.

When panic and disbelief sets in (half-way up the A1 en route to Dover), the driver can pull in, switch off the engine and call up an LCD display of the electronic data map. The eventual plans include linking up with RDS (radio data services) transmissions to avoid bottlenecks and optimise travelling time, and possibly linking into NavStar satellite-datum navigation – both of which sound rather unlikely.

Given that CARIN is claimed to offer an accuracy of ten metres over any travelling distance, the satellite link-up sounds like an unnecessary complication – think of the aerodynamics and drag of a satellite receiving dish, and wonder how accurately it will focus in a 70mph wind – or maybe there's some simple way round that one; we shall see. Despite stalking the motorways of Britain in increasing numbers particularly when the sun shines, bottlenecks are shy creatures, shunning publicity and interviews. As soon as they get mentioned on the radio, they are inclined to move ten miles down the road to a new location.

In-car navigation sounds a wonderful idea, though somewhat hampered by the complexities involved. Perhaps The Post Office should sponsor a simpler version based on punching in Postcodes for start and finish points. One problem with 'smart' bottleneck avoidance is the substantial real-time intelligence infrastructure needed to get it working; another that it



(Top) Rear video screens are perhaps too small. TV sound can be monitored on 'phones.



(Centre) On-board personal computer is fully integrated with the car. Curious . . .

(Bottom) Rear passengers are cosseted in leather upholstery while they work. Shades of the Choice editorial offices!





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CHANGE**

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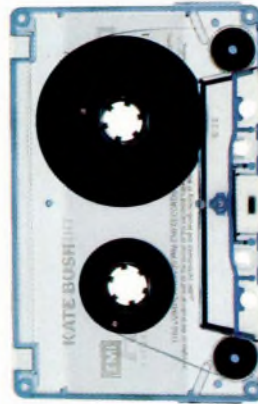
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will only work as long as access is restricted to an elite – the determinant of a great many technological improvements, from the flush toilet through to the cordless or cellular telephone.

One electronic feature which is guaranteed to bring out the boy racer in anyone is a full width LED message display across the rear bumper – a bit like those irritating programmable messages that increasingly spoil late night window shopping with their importunate demands.

One might argue that there is a safety justification for being able to communicate to the driver behind – to inform that fog lights have been left on, or a boot lid is open perhaps. But the potential for mischief – making is so enormous I'm sure they'll be banned as soon as the first *XR-3i* bolt-on package hits the market.

The Royale device relayed a selection of messages in Italian or Dutch, stored in programmable memory and recalled at the touch of a button, none of which made any reference to the parentage or sexual proclivities of the reader – but I can't see the same self discipline operating on the Brentwood bypass on Friday night.

Philips is fond of reminding people of its roots in artificial lighting – the Eindhoven skyline proudly lights up the sign Glolampfabrikken at night – so the final item of radical technology on this car of the future is a set of the slimmest yet brightest headlights around. Specially developed gas discharge sources akin to those used for high intensity street lighting are used in a lense/reflector configuration only 40mm high, which should assist the stylists and aerodynamicists of tomorrow's cars.

## E FOR ERGONOMICS

Last but far from least is the amazing 'user interface' for operating the electronics – a real industrial design wet dream, straight out of the RCA postgrad summer show if ever I saw one! All controls sit on a sort of hubcap size disc mounted on the console between driver and passenger and duplicated in the rear, the disc sized and shaped to fit comfortably and fall readily to hand, and pivoted to swing round for use from left to right.

The nicest part of this unit is that the control buttons are grouped according to function, graded in size according to relative importance, and shaped distinctively to enable 'blind' operation after a little practice – a very important safety feature. About the only thing missing is an automatic CD jewel-case opening machine . . .

Philips doesn't win any prizes for recognising that electronics will revolutionise car design over the next decade; that much is obvious. The Royale's contribution lies in showing how far the process could go, and how important it is that car and electronics are integrated harmoniously, providing motor manufacturers bring in electronics (and acoustics) expertise at an early stage of the design process.



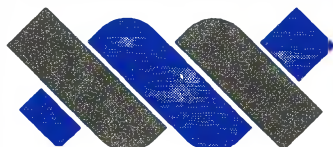


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*Hi Fi Choice, April 1988.*

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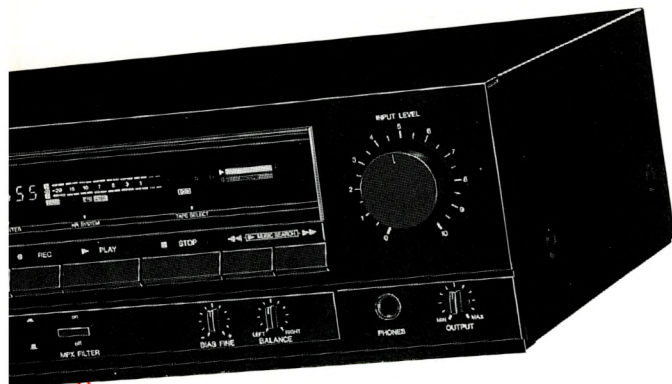
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*Noel Keywood, Hi Fi Review.*



DR-M24HX £289.95

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*Hi Fi Choice*



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# MARKET RESPONSE

*In our exclusive dealer survey this month Dan Houston talks to dealers about CD players, asking which models sell most and which brands are reliable.*

This market response was compiled in the period following CD's debagging by the non-specialist media. Journos, recognisable by their sensationalist snouts, routed out the juicy bits from articles in *New Scientist* and *The Guardian* and now firmly believe a compact disc lasts only eight years.

The problem stems from research into CD longevity which showed that in a small number of (badly made) discs the aluminium reflective layer was corroding and with time would make them more and more unplayable. Surely this has had an effect on the industry? "No", replied the dealers we spoke to, "people interested in buying CD players are still buying them." Jim Langley, of Darbys Hi-Fi, said: "people are mentioning it but it's not affecting sales. If anything it has raised the profile of CD; there's no such thing as bad publicity."

Dealers said they explained to customers that very few (five per cent) CDs did have problems; that good software would continue to be expensive and weren't the press foolish for confusing five with a hundred per cent? Only one dealer we spoke to had experience of a deteriorated disc – a copy of Paul Simon's *Graceland* produced by Warner Brothers. "You can see it's dull on the label side in the middle," he explained. "It's playing all right at the moment but the dullness looks like it's spreading." Warner Bros, however, said they had never heard of any deterioration with their discs.

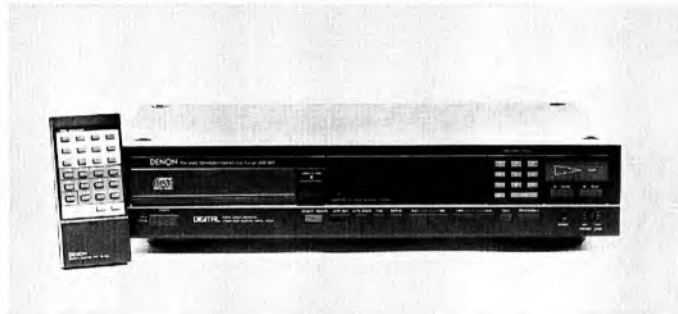
Such comment is worrying but compared to vinyl discs CDs are pretty hardy. Who hasn't been to a party where the vinyl gets scattered on the floor as the evening goes on, and then (ouch) even danced on!?

## HOW LONG?

What is perhaps *more* worrying is the life of CD players themselves. Several dealers gave us periods between three and five years for the life of the laser system, particularly in cheaper players. One dealer claimed that the lasers had packed up on several machines when they were just

out of guarantee. The problem, as far as one can tell, seems to be with the RafoC (radial focusing mechanism) which needs to be free on its bearing to swing as the laser 'reads' the disc. Any resistance adversely affects the machine's playing capability.

New laser systems cost around £150, making replacement in a cheap player hardly worthwhile. One dealer costed replacing the laser mechanism on a £170 Mitsubishi player; the total bill including labour and VAT came to £149.50. If needed every three years or so, that gets to be



*The Recommended and best selling DCD 800.*

expensive – especially when compared to record players.

It could be business suicide for a CD player manufacturer to do what Southend-based turntable makers, Rega Research do and offer a lifetime guarantee. Another dealer explained that many of his problems stemmed from machines using the Philips *CDM2* laser mechanism. This has since been upgraded to a *CDM4* which has sorted out any problems, he said.

Whatever is said about CD, the medium is here to stay, and sales have overtaken those of record players dramatically in the last year or so. According to Brema (British Radio and Electronic Equipment Manufacturers Association) 737,000 CD players were sold into the trade last year as opposed to 200,000 turntables. In spite of this several dealers told us that analogue sales are still higher than CD players. Many commented that customers would listen to a variety of equipment and find they preferred the analogue sound. CD has always been criticised for brashness and a 'two-dimensional' sound, and to hear this criticism continuing lends

hope to analogue which obviously has a few years' life in it yet.

The lower, budget, end of the market is where most business takes place, with price wars pushing the cost of hardware down. A few years ago it was difficult to find a sub-£300 player, whereas they are now thought of as the more expensive models. The problem with this natural cost cutting is that reliability and build quality suffer. And of course there's pressure on the dealer to sell cheap models in a range, otherwise his competitor will do

respect.

## RELIABILITY

In spite of comments like the above, reliability seems to be somewhat better than we calculated in our last survey with only 4.03 per cent of players arriving from the manufacturer as faulty. (The previous figure was 5.15 per cent.) However, the figure is still the highest we have calculated for any hi-fi component and some companies have quite awful return rates compared to others. With CD players faults occur across the board and there appears to be no obvious Achilles heel apart from the mentioned longevity of players.

If your CD player does go wrong getting it back can also be a problem. More dealers seem able to handle faults than earlier on in the year and if they can mend it, you shouldn't be without the player for more than a week on average. However, if it has to go back to the manufacturer or distributor then the story is often different with an average of almost four weeks.

The 'average' figure isn't too bad but everybody had a different story to tell about the customer whose CD player had been back to Japan or had been sitting on their shelf for months on end waiting for the requisite parts. The Japanese came in for more criticism than the Brits here, some dealers sounding very tired of the battle to get joy from service departments. Sony came in for particular criticism for having franchised their service departments to private companies. A couple of dealers told us the service centres were no longer interested in the guarantee on their products and that it was impossible to get equipment back from them. However, Sony claim that the system is slick and effective accusing dealers of being lazy and whingeing about nothing. They admitted there were occasional backlogs of equipment but many of the faults should have been sorted out by the dealers.

Dealers were asked who were the best boys at dealing with problems and we got seven

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*Hi Fi News, December 1987*



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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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positive comments for Denon with an average return period of less than three weeks. There were five mentions for Mission as being fast, and four for Cambridge and Yamaha. Marantz was criticised for being a bit slow (five and a half weeks) by three dealers, and Nakamichi, Philips and Rotel each got a couple of disgruntled comments.

We calculated the most reliable and unreliable CD players on a points system. Of course, the more of a product a dealer stocks the more likely he is to find a faulty sample but on the whole we found that they were aware of this and gave considered answers – often from their computer records.

We calculated the most reliable brands as being (in order): Denon (60 points), Technics (36 pts), Yamaha (36 pts), Marantz (30 pts), Sony (20 pts). The unreliable brands turned out to be Cambridge Audio (-28 pts), Philips (-26 pts) and Denon and Mission with -21 points each.

Denon are the main anomaly here; in the last CD players issue they registered a staggering 102 points which partly led to their putting a two-year guarantee on all their products. However, in recent surveys the firm seems to have suffered somewhat, with dealers either supporting or denigrating the company. Rob Follis of Hayden Labs who import the Denon brand explained that Denon has only just established a service department to cater specifically for domestic products. Previously the service department had also dealt with the professional market, with the subsequent pressure to repair the Pro equipment before the domestic stuff.

We also received comments from dealers about Cambridge Audio who have repeatedly suffered in this reliability column. Several added, on their forms, that Cambridge seem to be getting much better, and many pointed out that if a Cambridge player went wrong it was immediately replaced which "means the customer is happy at least."

## CONSISTENCY

We asked dealers for their opinions on sound quality consistency in brands from batch to batch. A good consistency rating demonstrates that a manufacturer takes care that the sound quality of his product doesn't vary from sample to sample. On the production line a slight change in the setting for error correction for instance can make all the difference. But

consistency is an odd ball and there is a question as to whether dealers actually notice, with 14 declining to comment here. Of course, if you put a system in a different room it will sound different because of the room's characteristics but dealers mostly listen to equipment in their own shops so we continue to ask them about it.

The most consistent brand was calculated as Denon followed by Marantz, Yamaha and Technics in that order. Inconsistent brands were given as Yamaha, Marantz, Cambridge and Pioneer. Look who crops up twice! It just goes to show how individual sound quality is to different people. But we plan to persevere with this comment however contradictory the results may appear.

## TWEAK IT

One of the easiest ways to make an immediate upgrade with a CD player is to buy specialised interconnect cable. Cable lore is daunting to those not versed in it – "surely some flex'll do, won't it guv?" – but dealers told us they would often demonstrate a difference (improvement) in sound by changing the standard interconnect from CD to amp with some esoteric stuff. Interconnect is not that expensive, you can get something perfectly respectable for around £20. The QED *Incon* range were cited as best sellers for what it's worth followed by Chord Company offerings and those by van den Hul (the cheaper ones) and Monster Cable.

Another useful tweak mentioned in our May issue was the use of CD interface mats which sit on top of the disc while it's playing. The mats are said to be magic, and act as a damper to the spinning CD reducing the resonances set up by a juddering outer edge as it spins round. Sound is said to improve and become more open and airy. The mats are available at around a fiver for ten and are imported by Presence Audio of Horsham.

## THE BEST SELLERS

Our survey asked dealers for their three best selling CD players in each of three price brackets. 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 £180

- |                           |    |
|---------------------------|----|
| 1) Yamaha <i>CDX5</i>     | 23 |
| 2) Philips <i>CD371</i>   | 18 |
| 3) Philips <i>CD471</i>   | 18 |
| 4) Technics <i>SLF200</i> | 16 |

In hindsight it would probably

have been better to keep the bracket 'below £200' as there would have been more models covered. Yamaha is the only brand to have featured here in our first survey.

### Mid price £181-£400

- |                           |    |
|---------------------------|----|
| 1) Denon <i>DCD-800</i>   | 75 |
| 2) Marantz <i>CD65DX</i>  | 53 |
| 3) Marantz <i>CD275SE</i> | 28 |
| 4) Denon <i>DCD 600</i>   | 25 |
| 5) Sony <i>CDP750</i>     | 22 |

Marantz and Denon had best selling models in this price bracket in our last CD players survey.

### Top price over £400

- |                                  |    |
|----------------------------------|----|
| 1) Cambridge Audio <i>CD2</i>    | 62 |
| 2) Denon <i>DCD 1500II</i>       | 57 |
| 3) Marantz <i>CD 94</i>          | 56 |
| 4) A&R Cambridge <i>Delta 70</i> | 47 |

Of these the Denon and A&R models were also best sellers in May.

This survey is compiled by sending out around 100 questionnaires to dealers up and down the country. It is then backed up by telephone polling to put some flesh on the bones of the results as it were. The approach is random but if a dealer wants to be regularly pestered then we do so. We had replies from 35 dealers covering 33 brands of CD player. 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 matters like reliability, consistency and which companies are on the ball. The more sensitive matters are treated in confidence. We don't pretend it's a complete picture or that the list of best sellers is 100 per cent accurate for the UK at the moment. The survey is a poll and should be seen as such.

**If you would like to participate in our survey please write to us at 14 Rathbone Place, London W1P 1DE, or telephone 01 631 1433.**

## PARTICIPATING DEALERS

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

- Active Audio, Derby, Derbyshire.
- A. Fanthorpe Ltd, Hull, Humberside.
- Analog Audio, Finchley, London.
- Aston Audio Ltd, Alderley Edge, Cheshire.
- Audio Insight, Milton Keynes, Buckinghamshire.
- Bartletts Hi-Fi, London N7.
- Billy Vee Sound Systems, Lewisham, London.
- Bowers and Wilkins, Worthing, West Sussex.
- Brentwood Music and Hi-Fi Centre, Essex.
- Bryants Hi-Fi, Aldershot, Hampshire.
- Chew and Osborne Ltd, Saffron Walden, Essex.
- Chichester Hi-Fidelity, Chichester, West Sussex.
- Cleartone, seven shops in Bolton and the North.
- Cloney Audio, Blackrock, Co Dublin, Eire.
- Darbys Hi-Fi, St Albans, Hertfordshire.
- Doug Brady Hi-Fi, London, Warrington and Liverpool.
- Eric Wiley, Castleford, West Yorkshire.
- Gilson Audio Ltd, Middlesborough, Cleveland.
- Hi-Fi Care, Tottenham Court Road, London.
- Hi-Fi Experience, Tottenham Court Road, London.
- J.R.C., Torquay, Cornwall.
- Lyon Audio, Stanway, Colchester, Essex.
- Moorgate Acoustics Ltd, Rotherham, S. Yorkshire.
- Norman Audio, Preston, Lancashire.
- Nottingham Hi-Fi Centre, Nottingham, Notts.
- Now That's Hi-Fi, Portsmouth, Hampshire.
- Paul Green Hi-Fi, Bath, Avon.
- Pro Musica Ltd, Colchester, Essex.
- Radlett Audio, Radlett, Hertfordshire.
- The Audio File, Bishops Stortford, Hertfordshire.
- The Cornflake Shop, Windmill Street, London W1.
- True Fi Sound and Vision, Aldershot, Hampshire.
- University Audio, Cambridge.
- Uxbridge Audio Ltd, Uxbridge, Middlesex.
- Witney Audio, Oxford.
- Zeus Audio, Belfast and Dungannon, N. Ireland.



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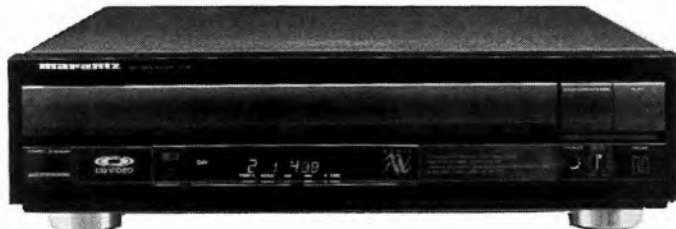
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# CHOOSING AND USING . . . CD PLAYERS

*CD players are now the most popular component in the hi-fi chain and while prices slip gently downwards, quality moves up steadily.*

Compact disc has come a long way in five years, and is now starting to represent a significant percentage of hardware and disc sales (particularly by value). Rather surprisingly, the UK has proved one of the slower growing markets, though this partly reflects a greater difference in price between a CD and its LP or musicassette equivalent than in some overseas markets. Whereas disc prices have only recently started to slip, player prices have dropped to a third of those charged when the system was first launched. £200 is now a typical budget price, some machines cost as little as £130, and cheap mechanisms are built into systems and portables. Yet at the same time there is a healthy demand for upmarket players offering improved sound quality and/or unusual features.

The arrival of CD has been a great stimulus to the hi-fi trade, not only by creating substantial sales of CD players themselves, but also in re-focusing attention on the various other parts of the hi-fi system. Visiting a hi-fi shop for the first time in years perhaps, customers are appreciating the steady advances which have taken place on all fronts, and are taking the opportunity for a general system upgrade. Even LP record players are selling well, sometimes after direct comparison with the new medium, as customers recognise the major investment they already have in vinyl discs and appreciate the fine quality now available from vinyl. Indeed, CD credibility was not helped by early claims for 'perfect sound forever', a perfection which has often fallen far short of the expectations of many hi-fi enthusiasts.

CD certainly has a number of advantages over its rivals. It is inherently rugged and unaffected by playing, free of surface and background noise and wow and flutter effects, while signals kept in digital form are theoretically immune from degradation. The addition of data channels allows complex pre-programming and accessing, and future CD

applications under development include adding video (CD-Video) interactive A/V (CD-1) and the CD-ROM computer software format. In-car, portable and personal players are in the shops, though there is still the nagging doubt that tape is inherently more immune to the shock and vibration of such applications, while the wide dynamic range and inaudible background noise can be almost an embarrassment in a noisy environment. Doubters notwithstanding, the format clearly is here to stay, which is an achievement in itself when one notes the enormous historic difficulties encountered by those trying to create a successful new domestic format, not to mention the current problems facing DAT, touted as the tape equivalent to CD.

## THE DISCS

Only five inches in diameter and attractively silvered, the compact disc currently costs up to twice the price of an LP or musicassette (in the UK) and should resist damage or wear. It can carry more than an hour of music and comes packaged in an irritatingly fragile and awkwardly designed 'jewel case', containing additional printed 'sleeve' information.

For record companies in particular, establishing a brand new format is an exceedingly difficult task, in view of the vast inventory needed to represent a play-only format effectively, and in this instance, the technical problems of pressing with necessarily great precision. Inevitably there was a learning curve in the disc manufacturing processes, and full quality potential is still not reached in many cases. However, the range of titles now available on CD has grown spectacularly, particularly in the classical and jazz fields, emphasising the commitment of the record companies to the new format. And considerable extra disc production capacity just coming on stream should help bring prices down somewhat.

From the general consumer's point of view, price will still be a

key factor. While early CD users were clearly prepared to pay a 100 per cent premium, it remains to be seen what sort of long term price premium compact discs can command over LP and musicassette rivals. History has shown that the broad base of recorded music sales is very price-sensitive but not especially quality conscious – musicassette purchasers who were attracted by the convenience of that medium were not deterred by sound quality substantially inferior to LP.

## THE PLAYERS

The conventional CD player may simply be plugged into any hi-fi system, as one would a tuner or cassette deck. The amplifier's 'aux', or 'tape' inputs will be perfectly adequate, though the results might be a little loud through the speakers, and require a lower volume control setting than usual. Many more recent amplifiers have a 'CD' input, and this may have a more appropriate sensitivity. Some specialist amplifiers have taken the trouble to connect the CD input directly to the preamp volume control, so as to minimise the interference of the signal path.

There is also a mild risk that a CD user will find his amplifier no longer seems to go as loud. The reason for this is that the digital CD medium is better at preserving the high loudness peaks in music which analogue systems 'squash' downwards. Consequently for the same peak output, the mean (average) output from CD with the same recording will be slightly lower

than before. One can of course compensate by cranking up the volume, but if an amplifier is already being used close to its limits, the CD peaks could cause premature 'clipping', for which the only solution is a bigger amplifier.

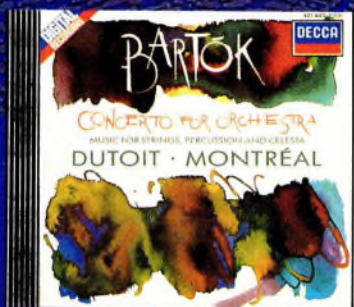
The prospective purchaser faces a wide range of choice at wildly varying prices, starting below £150 and going up to above £2,000. Players are available for in-car use, are incorporated in large portables, and exist as tiny personals, with some doubling as unconventional domestic machines. The mains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

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



*Ferguson's £130 CD-07 shows how the price of reasonable-sounding CD players is tumbling.*





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 music for strings, percussion  
 and celeste  
 montreal symphony orchestra  
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 MC 421 443 4  
 LP 421 443 1  
 (october)



**beethoven**  
**symphony no 6 'pastoral'**  
 academy of ancient music  
 christopher hogwood  
 CD 421 416 2  
 MC 421 416 4  
 LP 421 416 1  
 (october)



**brahms**  
**symphony no 1**  
 concertgebouw orchestra  
 riccardo chailly  
 CD 421 295 2  
 MC 421 295 4  
 LP 421 295 1  
 (august)



**mozart**  
**le nozze di figaro**  
 petteri salomaa/barbara  
 bonney/håkan hagegård  
 arleen augér  
 drottningholm court theatre  
 arnold östman  
 3CDs 421 333 2  
 3MCs 421 333 4  
 3LPs 421 333 1  
 (november)

**j s bach**  
**orchestral suites**  
 academy of ancient music  
 christopher hogwood  
 2CDs 417 834 2  
 2MCs 417 834 4  
 2LPs 417 834 1  
 (november)

**beethoven**  
**piano concertos 1-5**  
 vladimir ashkenazy  
 (soloist/director)  
 cleveland orchestra  
 3CDs 421 718 2  
 3MCs 421 718 4  
 3LPs 421 718 1  
 (december)

**puccini**  
**manon lescaut**  
 kiri te kanawa/josé carreras  
 teatro comunale di bologna  
 riccardo chailly  
 2CDs 421 426 2  
 2MCs 421 426 4  
 2LPs 421 426 1  
 (september)





**j s bach**  
**english suites bwv 806-811**  
 andras schiff  
 2CDs 421 640 2  
 (october)



**beethoven**  
**symphonies 4 & 5**  
 chicago symphony orchestra  
 sir georg solti  
 CD 421 580 2  
 MC 421 580 4  
 LP 421 580 1  
 (september)

Decca are pleased to offer readers of Hi-Fi Choice the opportunity to preview a selection of our major releases for this autumn. The promotional CD offered free with this issue of Hi-Fi Choice includes excerpts from 13 new recordings which will be available between now and the end of the year. All the recordings previewed are featured in this advertisement and will be available from your dealer during the month indicated.

The latest edition of Decca's new CD catalogue is now available from your dealer or from Decca Classics.

**autumn releases**  
 a selection

DECCA



**schumann**  
**symphonies 1 & 2**  
 cleveland orchestra  
 christoph von dohnányi  
 CD 421 439 2  
 MC 421 439 4  
 LP 421 439 1  
 (october)



**fauré**  
**requiem**  
 kiri te kanawa  
 montreal symphony  
 orchestra  
 charles dutoit  
 CD 421 440 2  
 MC 421 440 4  
 LP 421 440 1  
 (october)



**haydn**  
**string quartets**  
 takács string quartet  
 CD 421 360 2  
 MC 421 360 4  
 LP 421 360 1  
 (august)

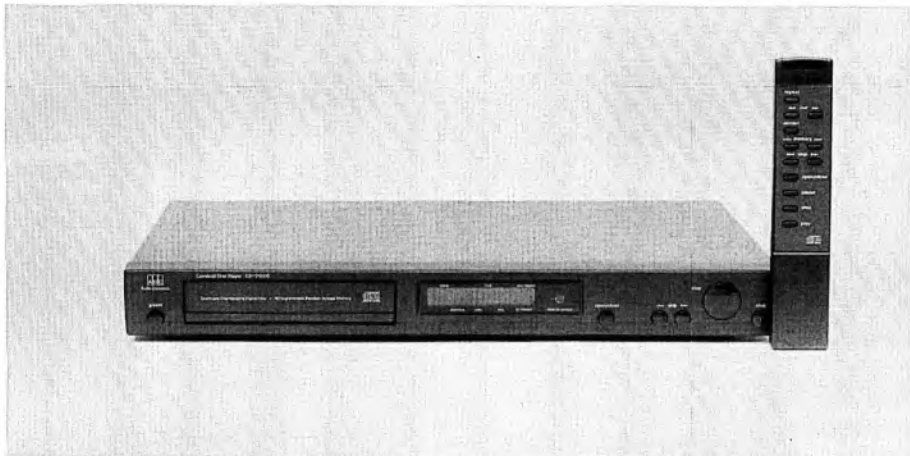


**nielsen**  
**symphonies 4 & 5**  
 san francisco symphony  
 herbert blomstedt  
 CD 421 524 2  
 MC 421 524 4  
 LP 421 524 1  
 (september)



# ADC CD-2000E

SOUNDTEC LTD., UNIT 9, BELFONTRADING ESTATE, LUCKLOW HILL, HALESOWN, W. MIDLANDS. TEL: (021) 550 7387.



The ADC brand was once famous as one of the bastions of US magnetic cartridge manufacture, and for many years was a major rival of Shure Bros. Purchased by BSR in the 'seventies, the cartridges were a natural complement to a company which was then the world's largest turntable manufacturer, and the ADC brand was also used on certain electronic components, notably graphic equalisers.

Since 1987 ADC (and certain products from sister ProAudio company dbx) both then under the BSR umbrella but recently taken over by the company responsible for the Finial laser vinyl disc player, has been distributed in the UK by Soundtec Marketing, a newish distribution company which has several ex-BSR employees.

This Spring, Soundtec used the Bristol hi-fi show to launch what must surely be one of the prettiest and most stylish CD players ever made – a genuine slimline dubbed the ADC CD-2000E, selling at a premium £330 price. At first sight the premium looks well justifiable for anyone wishing to take a stand against the appalling package standardisation inflicted by overcautious multinational marketing departments upon the BSC (British standard consumer).

One byproduct of the slim lines is a strictly limited range of facilities – which may also be regarded as an attractively clean and uncluttered layout by those who'd rather play discs than wrestle with the oriental idea of modern ergonomics. A nine digit display, play, stop and skip is all you get on the player itself – not even a set of fancy feet. The remote handset allows simple programming of up to 16 tracks, and adds both repeat and scan. The metal case with plastic fascia is reasonably rattle free. Outputs are analogue only phono.

A less welcome byproduct of the slim lines is the restrictions placed upon the power

supplies, which are very small. The fairly basic circuitry uses a single shared DAC with 4X oversampling, plus Sony error correction and servo control chips. There's no sign of audiophile oriented componentry, though the disc drive is moderately decoupled.

## LAB REPORT

Nothing too exciting to report here, as might be expected from the fairly prosaic technology used. But then there's not much to criticise either, and the overall set of results certainly offers a worthwhile improvement over the earlier, less expensive 250X model, particularly at high frequencies.

Dynamic range is average, linearity and low level distortion a little below average, but the frequency response is clean, high frequency distortion is very good, and separation and channel balance are both fine. Ultrasonic spurious are well suppressed, though there is a mild 0.2dB error in the de-emphasis curve at 5kHz. Shock and vibration immunity is only average, but error correction is very powerful.

## SOUND QUALITY

The sound was considered a mite unusual, some panelists commenting on an apparent variation of soundstage width with changes in music volume, while the overall ratings for stereo depth, focus and transparency were a straight average. Upfront detail in the soundstage was well enough presented, but dynamics seemed somewhat uneven and a little artificial.

The bass is a strength, showing good extension and tight control and providing a tuneful foundation. The midrange is a trifle forward and slightly 'boxy', but refreshingly free of hardness or 'glare'. Treble showed moderate 'grain' and 'tizz', and was a shade exaggerated, tending to sound bright on some material with forward balanced loud-

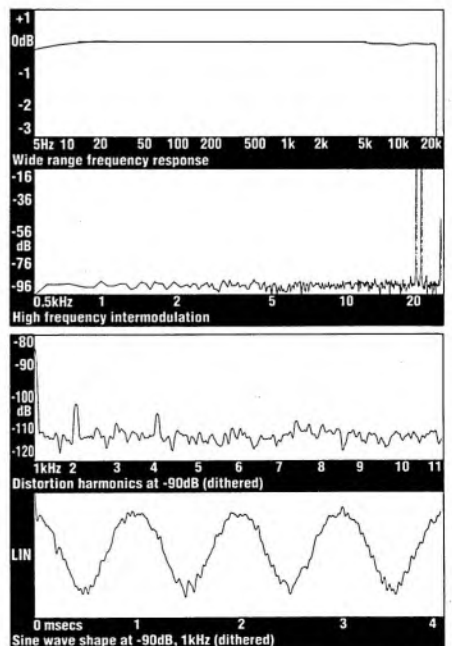
speakers. The 'differentness' of the sound remains difficult to pin down, but was certainly a quality unique to this player.

## CONCLUSIONS

The pretty exterior and refreshingly simple ergonomics should be sufficient to win this player plenty of sales, and certainly it ranks amongst very few that can be considered either elegant or granny-proof – never mind both! But viewed dispassionately from the perspective of subjective and objective performance versus price, it is clearly too expensive for Recommendation.

## TEST RESULTS

Test resolution (L/R av)	15 bits		
Output level, source impedance	2.14V, 0.59dB, 100ohms		
Effective dynamic range	96dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-96dB (0.0016%)	-91dB (0.0025%)	-88dB (0.004%)
Ref -70dB	-26dB		
Stereo separation	98dB	97dB	82dB
Stereo balance L/R	0.17dB	0.16dB	0.17dB
Frequency response (20Hz to 20kHz)	±0.20dB		
High frequency intermodulation	-100dB (0.0001%)		
Electrical noise (CCIR ARM, 1kHz)	-97dB		
Mechanical noise	low		
Ultrasonic noise	-106dB		
Error correction	1.3mm gap		
Shock/vibration resistance	average		
De-emphasis	-0.2dB at 5kHz		
Track finding speed (15, YEDS 2)	4 secs		
White noise overload test	OK		
Size (w x d x h)	43 x 33.5 x 5.1cms		
Typical price inc VAT	£330		

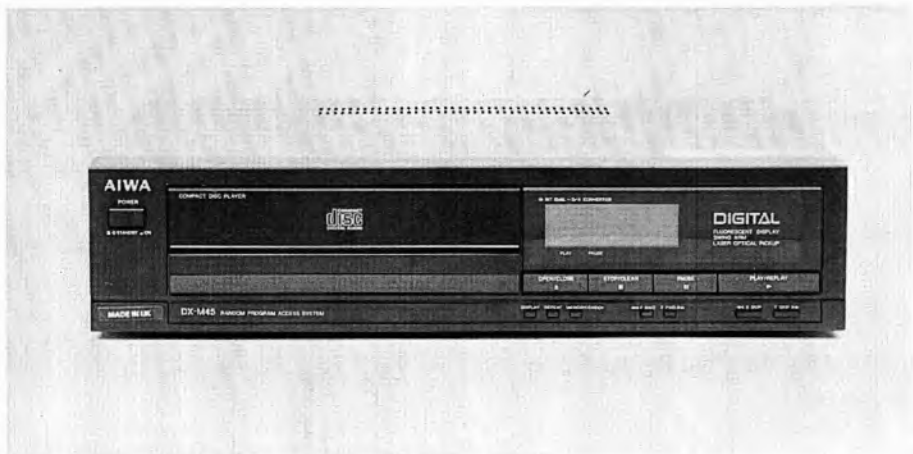




# AIWA DX-M45

AIWA (UK) LTD., UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDX UB7 0LY. TEL: (01) 897 7000.

RECOMMENDED



Aiwa is best known for cassette decks which have been market leaders in the budget sector for as long as memory remains reliable. The company itself has been owned by Sony for almost as long, though it operates almost completely autonomously – about the only recent common ground was in the launch of DAT recorders, which Sony made for just about everyone, and where Aiwa was used as the launch stoolie for political reasons. Besides recorders, Aiwa is big in personal stereos, midi systems and of course CD players, which is the scene of much of the current consumer electronics action.

Perhaps the most unusual feature about this player is that it is made in the UK, an initiative which other large scale manufacturers have been slow to follow but which offers attractive financial shelter from EEC trade watchdogs. As a simple £150 midi size player it will make an obvious partner to non-CD midi systems – the midi system market is much larger than that for standalone players – though the dictates of fashion suggest its appeal will consequently be less strong to separates purchasers.

The M45 is a very simple machine, lacking any form of remote control and with only the basic roster of operational features. Not that there's anything wrong in that, simplicity having its own virtues as anyone forced to try and fly some of the over-complex upmarket machinery will attest. Quite heavy for a machine of this size and price, the metal chassis and wrap give a good impression of build integrity even if the fascia is the usual plastic moulding.

The internals are based on Aiwa's own PCB, with analogue filtered twin 16-bit TDA1541A Philips DAC, plus a few IC op-amps for filtering/buffering. Layout is tidy enough, so servicing will be easy, though there are some exposed mains points inside, and the power supply arrangements are

rather rudimentary. Normal commercial grade components are used throughout, though the high quality Philips CDM4 laser mechanism is well decoupled.

## LAB REPORT

The frequency response reveals the limitations of analogue filtering compared with the more recent digital technology which is now widespread. The high frequencies may look like one of Alton Tower's white-knuckle experiences, but the expanded vertical scale used for this graph is designed to magnify such weaknesses; the total variation is only 1.5dB, but this will probably be sufficient to create a distinctive sonic signature.

Another key factor for anyone auditioning the M45 is that its output is a full 2dB below the CD standard, and from a highish source impedance. Neither factor is likely to cause any practical problems, but the difference in level will need to be compensated if the Aiwa is to get a fair trial in A/B auditioning.

The weak spot in the test programme is the high frequency distortion, which is distinctly poorer than average (not that 0.0something% is in any way inadequate!). Low level linearity and distortion is good, dynamic range fine and balance and separation, are basically OK. The electronics are quiet, but the de-emphasis curve is a little 'bright'. Error correction is very good, and the mechanism is quiet with decent shock immunity.

## SOUND QUALITY

The 'fair' overall rating for sound quality is very respectable for one of the cheapest CD players to come our way. Dynamics are fairly good and the stereo soundstage is wide and quite deep, with decent midrange focusing.

Perhaps reflecting the modest power supply arrangements, the bass end sounds a little 'plummy', lacking extension and firm

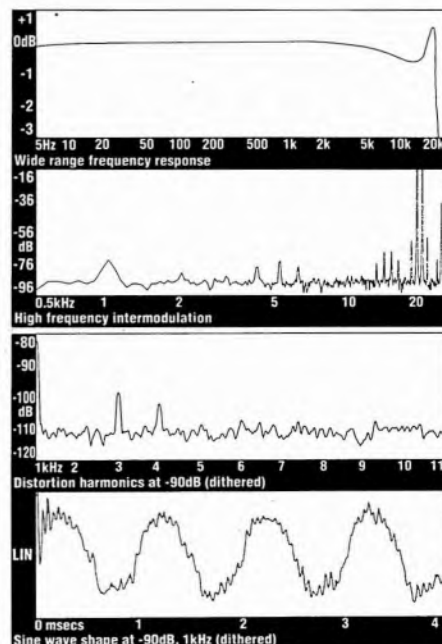
foundation. The midrange is slightly 'thinned' tonally but decent enough for the most part, suffering from a little congestion on more complex material. The treble sounds a little blurred and has a slightly soft 'grainy' character with mild tonal alteration.

## CONCLUSIONS

This is a thoroughly workmanlike manual budget midi player, using a number of Philips building blocks but in a budget-oriented Aiwa application. The presentation is attractively simple and solid, and both the measured and sonic performance are perfectly respectable considering the price, so Recommendation is clearly in order.

## TEST RESULTS

Test resolution (L/R av)		15.7 bits
Output level, source impedance	1.57V, -2.1dB, 1Kohms	
Effective dynamic range		103dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-100dB -85dB -63dB	
	(0.001%) (0.0056%) (0.071%)	
Ref -70dB		-33dB
Stereo separation	121dB 116dB 79/92dB	
Stereo balance L/R	0.09dB 0.09dB 0.67dB	
Frequency response (20Hz to 20kHz)		±1.0dB
High frequency intermodulation		-74dB (0.020%)
Electrical noise (CCIR ARM, 1kHz)		-104dB
Mechanical noise		low
Ultrasonic noise		-109dB
Error correction		1.2mm gap
Shock/vibration resistance		above average
De-emphasis		+0.60dB at 5kHz
Track finding speed (15, YEDS 2)		4 secs
White noise overload test		slight negative clip
Size (w x d x h)		36 x 32 x 8.4cms
Typical price inc VAT		£150



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# AIWA XC-007

AIWA (UK) LTD., UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDX UB7 0LY. TEL: (01) 897 7000.



Still best known for cassette decks which dominate the budget sector, Aiwa is also big in personal stereos, midi systems and of course CD players. The company operates entirely autonomously of its parent Sony, but has recently started a similar strategy to the latter's *ES* initiative with an upmarket series of hi-fi separates sailing under the *Excelia* banner. The first DAT player on the market launched this sub-brand a couple of years back, but there are now conventional cassette decks and CD players such as the £500 *XC-007* reviewed here.

£500 can be expected to buy plenty of CD player, and the *007* weighs in at a very considerable 13kg – enough to provide a stern test for any DIY shelving. The weight is matched by similarly considerable rigidity, while luxury touches include wooden end cheeks, big feet with slight compliance and solid well damped panels. The controls are complicated but sensibly ordered and the display is large and elaborate with full 20-track menu display, four separate numeric readouts and numerous flags.

Direct track entry buttons are on both player and handset, and the various little buttons provide every function you can think of, not to mention a few you couldn't. There are two repeat modes, timer/play/random play mode, time (display mode) and blank (inserting a four second blank between tracks). Bootleggers will appreciate the 'recall' function, duplicated on the handset, with digital 400Hz, 1kHz and 8kHz signals to line up cassette deck record levels.

There's no remote volume adjustment, presumably for quality reasons, though fixed or variable analogue outputs are available, the latter controlled from a large volume control that also adjusts headphone level. Optical or electrical digital outputs are provided, selectable from the front panel.

The sample supplied was intended for

100V (60Hz) Japanese mains, but a UK version arrived later. The internal decode system ingeniously uses two 20-bit digital filters and control circuits to create a 20-bit resolution ranging system based on dual 16-bit DACs with 4X oversampling. There are two smallish power supplies, one for analogue and one for digital circuitry. Multi-board construction has some rather scrappy harnesses, but steel panels improve rigidity and provide internal screening. Selected Nichicon capacitors improve analogue coupling/decoupling, and the variable output has a good quality potentiometer. The linear motor transport has quite good mechanical decoupling.

## LAB REPORT

Perhaps the most obvious niggle with this player is that it inverts absolute phase, while nevertheless maintaining good phase linearity. The frequency response shows a very slight suggestion of a lift at high frequencies. Low level resolution and linearity are both good, dynamic range is very generous and distortion is low under all measurement conditions. Channel separation and balance are both very good, error correction and de-emphasis accuracy are reasonably good, and electrical and mechanical noise are both low.

## SOUND QUALITY

The 'good' overall rating is competent enough, but must also be regarded as a mild disappointment in the context of the very high price of this player.

The sound is certainly sweet and musical enough – but perhaps a little too much so, as transients seemed softened and dynamics mildly diluted. Essentially clear and neutral in the midrange, the treble sounds a little blurred and lacking in fine detail while the bass could have had more 'grip' and 'drive'. Stereo images seem a little narrowed, though

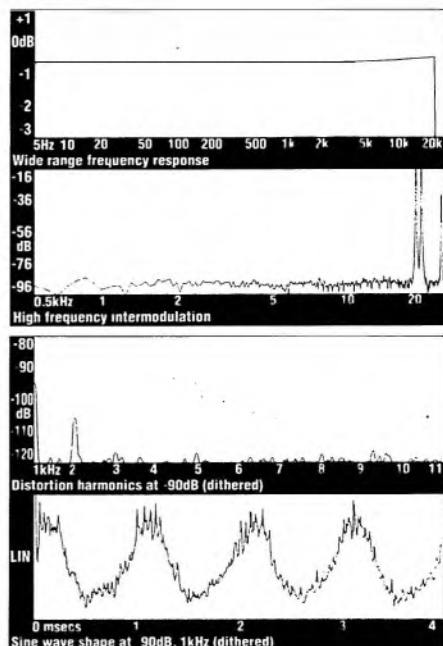
depth is above average and focus good.

## CONCLUSIONS

Given the £500 pricetag, the *Excelia XC-007* is a mild disappointment. There can be no argument with the build quality or the extensive range of facilities on offer, even though the extent of the latter might seem a little intimidating, but on the evidence of our tests Recommendation is not really appropriate on value for money grounds.

## TEST RESULTS

Test resolution (L/R av)		15.8 bits	
Output level, source impedance		2.13V, 0.55dB, 965ohms	
Effective dynamic range		107dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-94dB	-93dB	-83dB
	(0.002%)	(0.0024%)	(0.0071%)
Ref -70dB		-37dB	
Stereo separation	129dB	116dB	90dB
Stereo balance L/R	0.04dB	0.06dB	0.01dB
Frequency response (20Hz to 20kHz)			±0.13dB
High frequency intermodulation			-97dB (0.0014%)
Electrical noise (CCIR ARM, 1kHz)			-109dB
Mechanical noise			low
Ultrasonic noise			-107dB
Error correction			0.9mm gap
Shock/vibration resistance			good
De-emphasis			-0.1dB at 5kHz
Track finding speed (15, YEDS 2)			3 secs
White noise overload test			OK
Size (w x d x h)			43 x 37 x 12.5cms
Typical price inc VAT			£500



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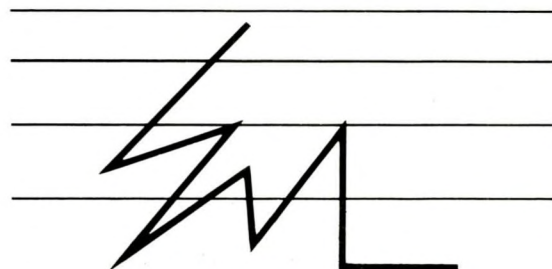
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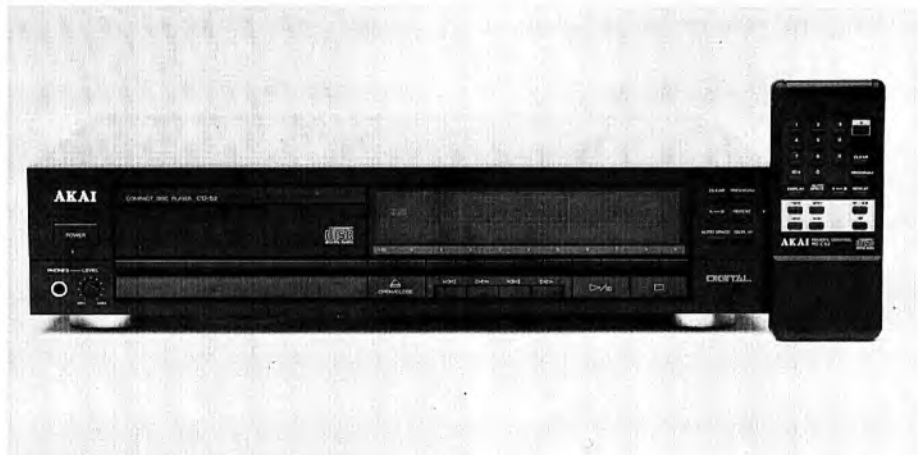
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# AKAI CD-52

AKAI (UK) LTD., 12 HASLEMERE HEATHROW ESTATE, SILVER JUBILEE WAY, HOUNSLOW, MIDDLESEX. TEL: (01) 897 6388.

BEST BUY



Originally a tape recording specialist, Akai has long been involved in full range and component system manufacture, and has a natty line of video recorders besides. After running into a spot of financial bother a few years ago, the company came under the effective control of the giant Mitsubishi conglomerate which has provided a new lease of life. Akai and Mitsubishi's Diatone brand have been merged as A&D on the Japanese home market, while elsewhere Akai's traditionally export-oriented products seem to be benefiting from strenuous attempts by the restructured company to establish an upmarket hi-fi presence.

The remote control *CD-52* sits right on the most popular (or at any rate volume averaged) £250 price point. It is a large, chunkily – indeed quite traditionally styled machine, all metal in build but quite lightweight nevertheless, and with sharp corners to boot. Headphones have a gold socket and a volume control, and the large but strictly cosmetic feet are also gold coloured. The rear panel has digital and analogue phono sockets, but there's no gold here.

The controls are sensibly thought out to promote intuitive use, while still providing the extensive range of facilities which is seemingly demanded at anything above rock bottom budget price. The main section features large buttons for play, stop and open/close, with smaller indented keys to operate skip and scan. The 10-key direct track entry has its own set of buttons below a large display area which is crammed with flags and a track menu, leaving only small numerics. A separate little button group covers programming, repeat functions, auto space and display mode.

The internals consist of decent quality twin DAC 4X oversampling technology. The normal size power transformer feeds a selection of commercial grade smoothing capaci-

tors, but with a number of separate regulators for the various stages. The digital chips are mainly from Sony, including the digital filtering, which feeds a pair of Burr Brown *PCM56P* DACs mounted on a separate board along with the analogue filtering and output stages – here the capacitors are more carefully selected. The transport is a pretty standard plastic affair mounted on a steel sub-chassis, and there is no internal panel damping, though build quality is reasonable.

## LAB REPORT

The frequency response is very flat, though the de-emphasis is a shade dull ( $-0.34\text{dB}$  at 5kHz). Neither low level distortion nor linearity are particularly impressive, but distortion at high levels is fine. Error correction and shock/vibration immunity are only fair, but both mechanical and electrical noise is low. Dynamic range is good, channel balance excellent, and stereo separation good too.

The output level is nearly 1dB above the CD standard, a situation which is almost guaranteed to make the Akai sound just that little bit more impressive than most when compared directly. Do not be fooled!

## SOUND QUALITY

This is the best sounding Akai *Choice* has yet auditioned, regardless of price, and the fact that it is far from expensive adds to our enthusiasm. Rating a strong 'good' overall, the sound is strong, clear and well focused, with fine depth and dynamic involvement, and decent stereo staging.

The bass sounds extended and tuneful – maybe a touch heavy handed at times but with plenty of wallop, not to mention spank (smack no longer being an appropriate term in the worldly wise 'eighties). The midrange is crisp and well balanced, with virtually no unwelcome hardness or harshness, while the treble remains coherently well integrated,

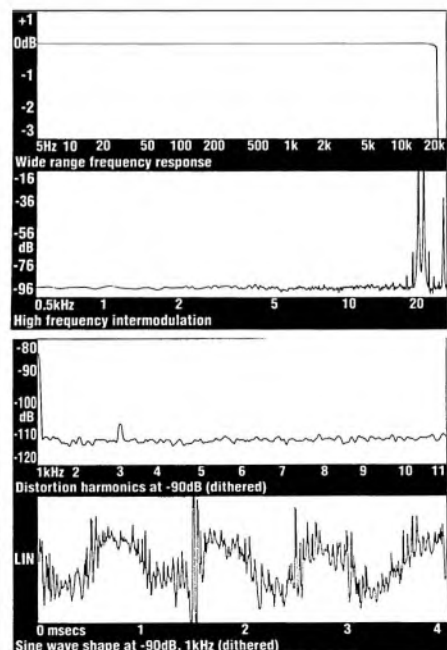
with explicit detailing.

## CONCLUSIONS

Given a feature and facility count well up to its price, a lab performance that comfortably passes muster, and a sound quality which many more expensive players could do well to emulate, this impressive looking and well built Akai clearly deserves a Best Buy rating.

## TEST RESULTS

Test resolution (L/R av)		15.2 bits
Output level, source impedance	2.22V, +0.91dB, 615ohms	
Effective dynamic range		98dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-91dB -92dB -82dB	
	(0.0028%) (0.0025%) (0.0079%)	
Ref -70dB		-27dB
Stereo separation	105dB	98dB 84dB
Stereo balance L/R	0.0dB	0.0dB 0.02dB
Frequency response (20Hz to 20kHz)		$\pm 0.30\text{dB}$
High frequency intermodulation		-102dB (0.00081%)
Electrical noise (CCIR ARM, 1kHz)		-101dB
Mechanical noise		low
Ultrasonic noise		-107dB
Error correction		0.9mm gap
Shock/vibration resistance		average
De-emphasis		-0.34dB at 5kHz
Track finding speed (15, YEDS 2)		4 secs
White noise overload test		OK
Size (w x d x h)		42.5 x 34.5 x 9.7cms
Typical price inc VAT		£250





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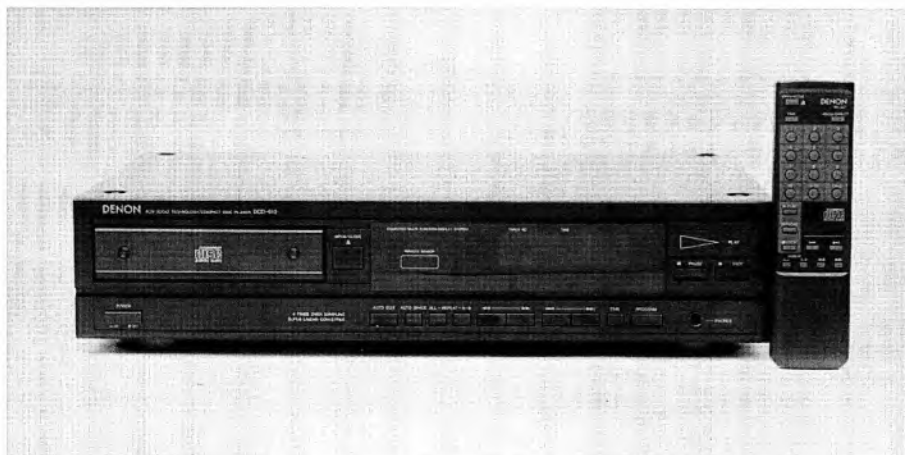
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# DENON DCD-610

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

BEST BUY



Denon's UK progress has been one of the success stories of the 1980s. Achieved initially through some rather good cassette decks that provide honest engineering rather than superficial glitz, the Denon habit is now spreading to CD players, amplifiers and what have you, helped by loyal dealers who like the high reliability (not to mention a persuasive line in incentive travel bonuses).

The *CD-610* occupies pole position for the company's 1988 season's products. It is priced at a slight premium over the budget offerings from other brands, but is still competitive enough at £200, being larger, better equipped and cheaper than its predecessor. With full remote control there will be more than enough features for the vast majority of users, though the overall build seems a shade less substantial than its more upmarket brethren, and the styling more restrained. Like so many current players, the *610* is fitted with large but essentially cosmetic plastic feet, but the budget clearly didn't stretch to the gold rings found on the luxury Denons – those fitted to the *610* are not even shiny.

In fact it's a very lightweight and basically plastic player, albeit with metal top and base. The main control layout is straightforward and sensible, and there's a subsidiary row of pushbuttons to confuse the unwary. Bootleggers will appreciate the auto-edit and -space; then there's two repeat functions, skip, scan, time (display mode) and programming buttons. Penny pinching is evident in providing a headphone socket without volume control – of use only to those whose headphones happen to have a volume control built in, so why bother? A smallish display lurks behind a largish panel, but has plenty of information including a track menu. A note on the box of our sample pointed out that the drawer mechanism is being speeded up and quietened in production.

The rear panel has only analogue outputs

– no digital bitstream is available to drive an external processor. The internals comprise Denon's 'super linear' converter and a single, time-shared *PCM56P* DAC, with extra sample/hold circuitry to avoid high frequency interchannel phase shifts, and Sony 2X oversampling and digital filtering. The transport mechanism is a rather lightweight affair.

## LAB REPORT

Channel balance is fine, separation satisfactory, and the interchannel phase error low. The frequency response shows a distinct, if mild rise at high frequencies, while de-emphasis is 0.3dB bright (5kHz). Distortion is reasonably low, linearity a reasonable 15.6bits, and the low level sinewave reasonably well resolved. All pretty reasonable stuff so far, if nothing much to wax lyrical about.

The output level is a shade below the standard, and the output impedance is on the high side, so this player may not be the best choice for direct to power amplifier connection. The signal/noise ratio is a little below average, and shock immunity is about average too. In all, the *610* passes muster, but does show evidence of the budget constraints imposed by the £200 price point.

## SOUND QUALITY

The slight brightness seen in the measured response was audible in the mildly 'thinned' and exaggerated treble. Perceived as a touch too much 'sparkle', and occasionally sounding a little rough around the edges with less than perfect focus, the treble nevertheless shows less 'grain' and 'edge' than its predecessor. Prospective purchasers should take care to ensure that this characteristic is not reinforced by inappropriate choice of partnering amplifier and loudspeaker.

Elsewhere, the midrange is crisp, detailed and finely focused, if a shade 'hardened',

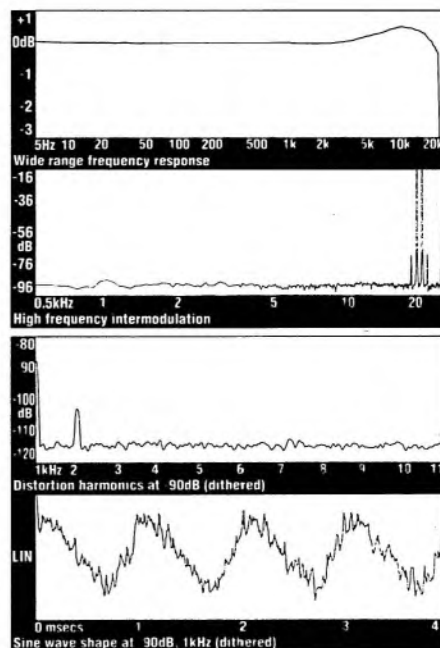
while the articulate bass shows good extension and weight. Dynamics are pretty good, and stereo imaging is particularly strong in the midrange, though some phasiness disturbs the treble.

## CONCLUSIONS

Despite the criticisms levelled at the treble, the *610* still sounds significantly better than its predecessor, and significantly good for a budget model, if a little short of the best examples. Nevertheless, the package is a persuasive one, particularly bearing in mind the company's good reputation, so a Best Buy rating is appropriate.

## TEST RESULTS

Test resolution (L/R av)		15.6 bits
Output level, source impedance	1.91V, —0.4dB, 900ohms	
Effective dynamic range		104dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	—84dB —82dB —86dB	
	(0.0063%) (0.0079%) (0.005%)	
Ref —70dB		—32dB
Stereo separation	83dB	74dB
Stereo balance L/R	0.04dB	0.15dB
Frequency response (20Hz to 20kHz)		±0.5dB
High frequency intermodulation		75/82dB
Electrical noise (CCIR ARM, 1kHz)		—94dB
Mechanical noise		average
Ultrasonic noise		—105dB
Error correction		1mm gap
Shock/vibration resistance		average
De-emphasis		+0.3dB at 5kHz
Track finding speed (15, YEDS 2)		4 secs
White noise overload test		OK
Size (w x d x h)		43.5 x 30.5 x 10.1cms
Typical price inc VAT		£199





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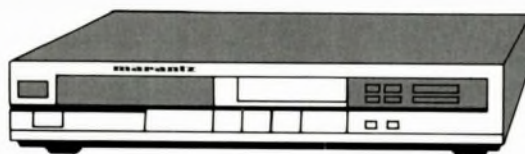
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# DENON DCD-810

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

RECOMMENDED



Initially respected for some rather good cassette decks that provide honest engineering rather than superficial glitz, Denon's UK progress has been one of the success stories of the 1980s. The brand's fine reputation has fed through into CD players where the build quality and presentation, supported by impressive sonic credentials, has created one of specialist hi-fi sector's best selling brands.

1988 sees a welcome rationalisation in the range. Three key models are priced at £200 (*DCD-610*), £250 (the *DCD-810* reviewed here), and £300 (the *DCD-910*, which you should find over the page). "Whatever happened to the '710'?", I hear you ask. Is there some ill omen in the numerology?  $7+1=8$  may not be auspicious in 1988 - who knows?

Compared with the '610, track skip and fast scan have been shifted to the main control section, leaving room for extra functions like random play (guaranteed by sod's law to play your least favourite track first). A row of eleven keys permit direct track entry from the player. A volume control now renders the headphone socket useful, and a few extra digits are added to the display.

But most important of all for many potential purchasers (excluding those who prefer to use their ears and aren't going to be fooled anyway), there is now a remote volume function available on the handset, via separate phono output terminals fitted on the rear.

Under the skin Denon's 'super linear' converter incorporates offset adjustment to improve low level linearity. Two *PCM56P* DACs are used with 4X oversampling and Sony control, error correction and digital filtering chips. The transport mechanism is a rather lightweight affair, albeit with some decoupling. The 'low tech' IC that governs the remote volume control makes a bizarre contrast with the LC-OFC windings in the inductors of the LC network that feeds the

fixed level outputs.

## LAB REPORT

The high frequency 'bump' seen on the '610's frequency response is eliminated here, and although the measurement set is pretty comparable elsewhere, there are a number of areas of improvement - shock immunity, dynamic range, low level linearity, intermodulation and signal-to-noise ratio.

The '810's output level is nearly 1dB below the CD standard, which might prejudice its performance in comparative listening tests if compensation is not made by the operator. Once again de-emphasis is 0.3dB out, which seems odd considering the Denon label discs tend to use emphasis (as do many Japanese CD pressings). Channel balance is fine, separation satisfactory, and phase is correct and linear. Distortion is reasonably low, but mechanical noise and error correction could both be improved.

## SOUND QUALITY

Whatever Denon has spent your £50 on, it isn't reflected in the sound quality, which received precisely the same 'fairly good' overall rating as the cheaper '610, even though the comments leading to such a rating were surprisingly dissimilar. If you want better sound in a Denon package, you'll have to start considering the '910.

That said, 'fairly good' is par for the price and the course. Bass is a little slow and 'soft', short of full extension and power, and the midrange also lacks speed and 'bite', the whole affair being a little 'lazy'. Dynamics seem a trifle odd, creating an impression of some inconsistency. The treble has mild 'grain' and 'edge', but is innocuous enough with reasonably good detailing.

Stereo images sound good through the midrange, but seem somehow de-focused and 'phasey' in the treble, though soundstage

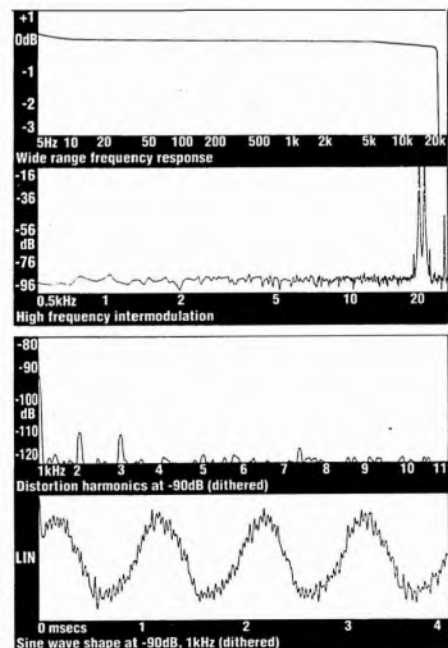
depth and width is adequate. Ultimately the '810 needs more dynamic 'life' to promote genuine listener involvement.

## CONCLUSIONS

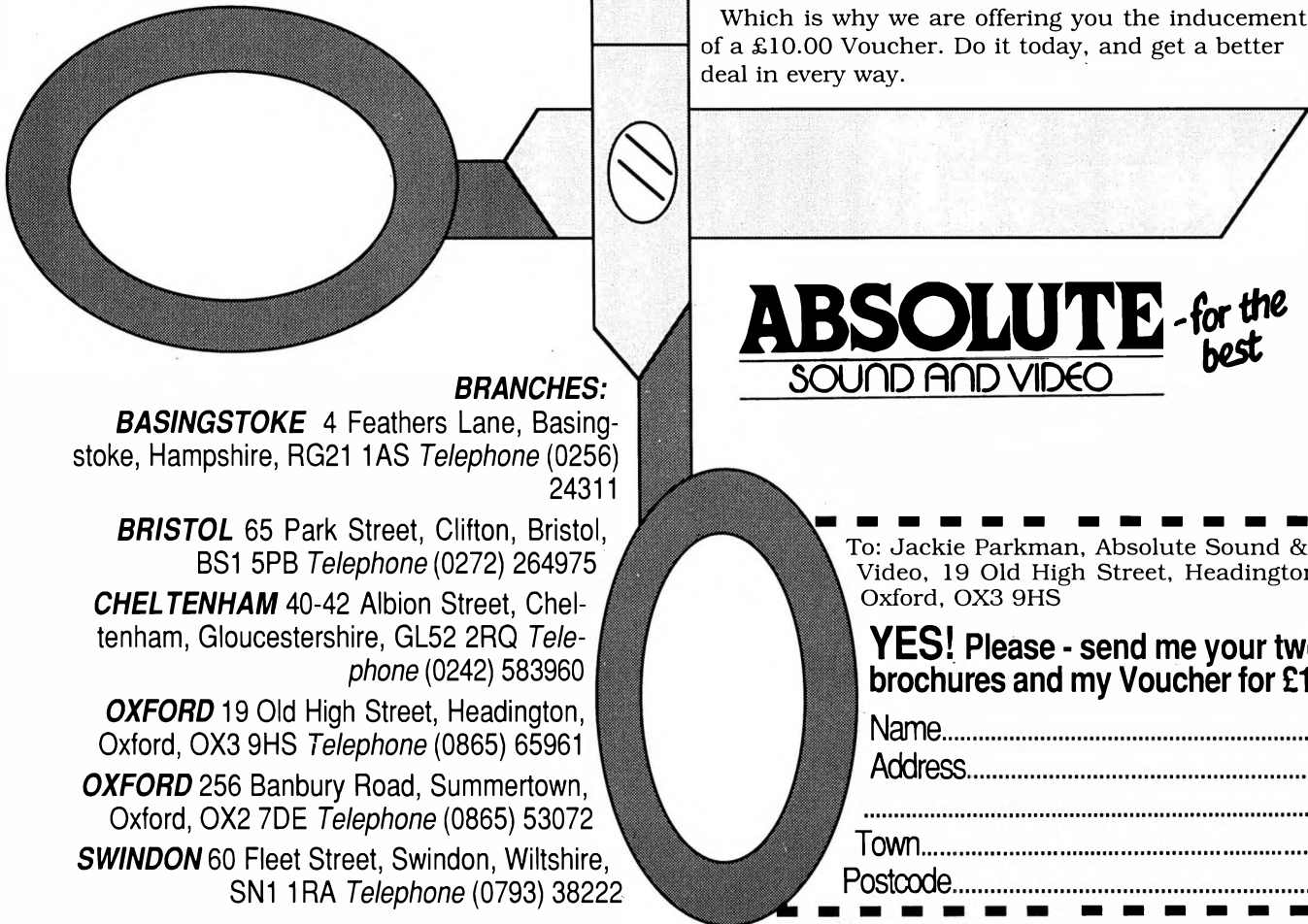
The middle 1988 Denon slips down slightly between the twin stools of subjective performance versus convenience. It does offer a few more twiddly bits than the '610, and certainly improves on the latter's measured performance in a number of areas. But it doesn't match the best in its price class sonically, merely managing sufficient for Recommendation, which by Denon's standards must be a mild disappointment.

## TEST RESULTS

Test resolution (L/R av)		15.9 bits	
Output level, source impedance		1.8V, 0.91dB, 570ohms	
Effective dynamic range		102dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-93dB (0.0022%)	-88dB (0.0040%)	-85dB (0.0056%)
Ref -70dB		-32dB	
Stereo separation	123dB	106dB	80dB
Stereo balance L/R	0.08dB	0.08dB	0.14dB+
Frequency response (20Hz to 20kHz)			±0.43dB
High frequency intermodulation			-89dB (0.0036%)
Electrical noise (CCIR ARM, 1kHz)			-101dB
Mechanical noise			average
Ultrasonic noise			-104dB
Error correction			1mm gap
Shock/vibration resistance			very good
De-emphasis			+0.34dB at 5kHz
Track finding speed (15, YEDS 2)			3 secs
White noise overload test			OK
Size (w x d x h)			43.5 x 31 x 11cms
Typical price inc VAT			£250



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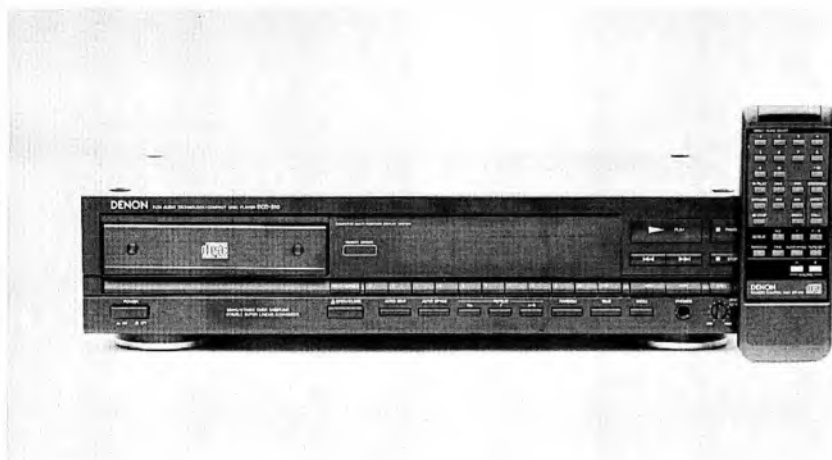
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# DENON DCD-910

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

BEST BUY



For £300 you're liable to get the kitchen sink thrown in these days, such has been the pace of price point erosion, propped up by extra features. The 910 certainly looks more impressive than its weight, despite the stupid looking gold feet inherited from generations of inbred ducks, and the metal and plastic enclosure with metal fascia is nicely damped.

It's certainly a busy looking machine with lots of controls, but underneath the complexity a good sense of order is maintained. Sometimes one gets a little weary of having one's powers of discrimination treated like those of a rat in a maze, but marketing determinism continues to demand that the 910 must add still more features to the already heavily burdened 810 package. On this occasion most of the folly is reserved for the handset, which justifies becoming larger by adding such fripperies as index, auto-space and auto-edit, and in so doing sacrifices the elegant ergonomic simplicity found in the handset that accompanies the cheaper models.

The elaborate display doesn't convey any more information, but does spread it over a slightly greater area. The extra features fitted to the 910 include index cue, and a third(!) repeat function, this time covering just the track which is actually playing – both of which may be accessed (along with everything else) from the handset.

However, to be strictly fair to Denon, much of the 910 activity takes place under the skin. Oversampling is increased to eight-fold, with digital filtering and dual 'super linear' DACs, while low order analogue output filtering has a short signal path and uses LC-OFC wiring. The casework seems better damped here, and the disc drive boasts 'visco elastic' decoupling. High precision de-emphasis is also claimed, so clearly Denon and ourselves are working to different cali-

bration standards here.

Remote volume circuitry (of dubious worth, despite Denon's claims to the contrary) is optionally accessed using a second set of output terminals, and an electrical (phono) digital bitstream is also provided.

## LAB REPORT

It is interesting to compare the three new Denon players' lab performances: in measurement terms the price hierarchy is clearly justified, and the 910 is obviously better in a number of respects – the flattest response, cleanest low level sinewave and least background 'hash', for examples. The figures tend to support the graphs, albeit with minor slip-ups here and there – the low level resolution is not as accurate as our sample of the 810 gave.

Rather average error correction is partly compensated by very good immunity to shock and vibration. Intermodulation distortion is very low. However, the output is a full dB below the CD standard – a factor that needs to be borne in mind if conducting listening comparisons. And the de-emphasis is a quite significant +0.4dB at 5kHz.

## SOUND QUALITY

The sound quality was rated a firm 'good' overall, which is significantly better than the cheaper Denons and very respectable for the price. But this is knocked back to only 'fair' when using the remote volume control facility, distributor's propaganda notwithstanding.

The bass is clearly better than the 810, with more convincing drive, power and extension. The midrange sounds attractively neutral and relaxed, while the treble is sweet and clear, with quite good definition. Dynamics are a mite sluggish – a touch too restrained in impact and attack – but the soundstage is big and spacious, with good depth,

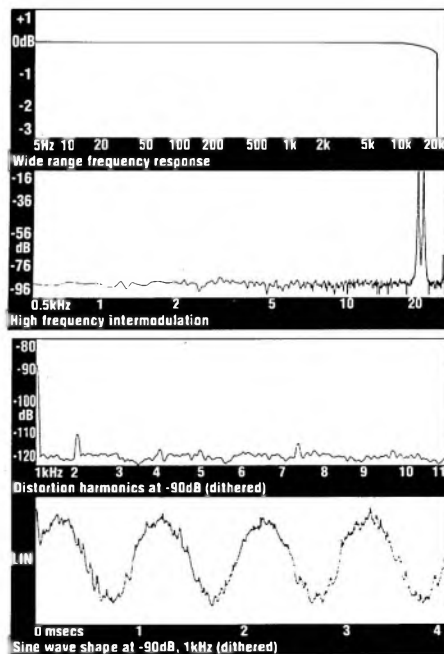
pleasing perspectives and decent focus.

## CONCLUSIONS

Although it doesn't set any new records for sound quality versus price, the 910 is an attractively well balanced package. Some may find the feature list a trifle intimidating perhaps, but few will argue with a Best Buy rating for the fine lab performance and decent sound, backed up by Denon's strong reputation for build quality. One thing that's particularly encouraging is the way Denon's three model hierarchy gives steadily improving lab and sonic performance alongside the feature count as one moves up the range.

## TEST RESULTS

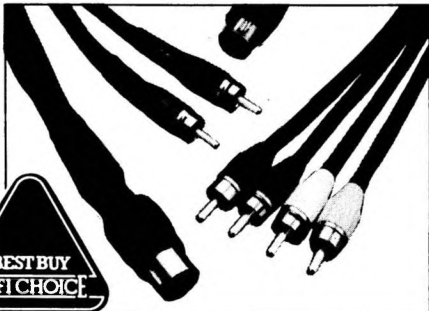
Test resolution (L/R av)	15.6 bits
Output level, source impedance	1.78V, -1.0dB, 570ohms
Effective dynamic range	104dB
Harmonic distortion	20Hz 1kHz 20kHz
Ref 0dB	-93dB -90dB -84dB
	(0.0024%) (0.0032%) (0.0063%)
Ref -70dB	-34dB
Stereo separation	129dB 104dB 79dB
Stereo balance L/R	0.04dB 0.04dB 0.02dB
Frequency response (20Hz to 20kHz)	-0.47dB
High frequency intermodulation	-100dB (0.001%)
Electrical noise (CCIR ARM, 1kHz)	-102dB
Mechanical noise	average
Ultrasonic noise	-104dB
Error correction	0.9mm gap
Shock/vibration resistance	very good
De-emphasis	+0.4dB at 5kHz
Track finding speed (15, YEDS 2)	3.5 secs
White noise overload test	OK
Size (w x d x h)	43.5 x 31 x 11cms
Typical price inc VAT	£300



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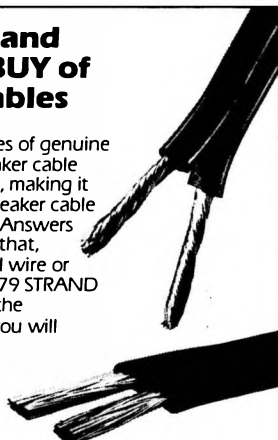
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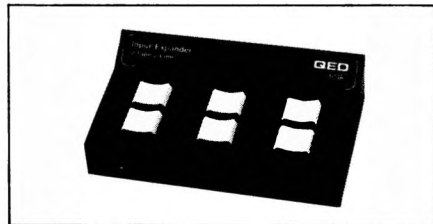
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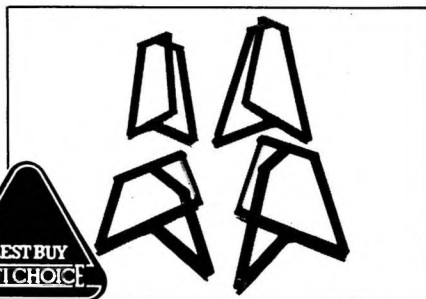
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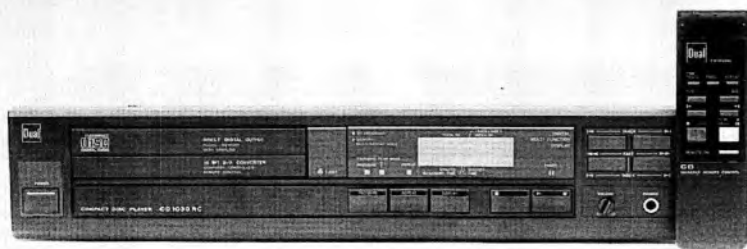
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# DUAL CD1030RC

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

RECOMMENDED



Now owned by the West German Schneider group, Dual was also controlled by French multinational Thomson for some years, and has consequently acquired the necessary expertise in sourcing competitive electronics from the Far East. UK Distributor Hayden Labs brought in the 'budget' range for the first time a year or so back.

The full width, remote control *CD1030RC* is clearly one of the 'budget' range, as it sells at a highly competitive £160. For the price it feels quite impressively heavy and solid, yet the metal panels seem reasonably well damped. There are precious few features beyond the usual basics on either machine or handset, but the Eurostyling makes a pleasant change, the plastic fascia featuring green highlights and a minimum of sensibly placed large buttons.

A single, rather small numeric display is mode switchable and backed by plenty of flags. The headphones socket (for those who want yet another one in their systems) at least has a volume control in attendance. Surprisingly at the price, the rear panel has a digital output alongside the analogue pair – you'd have to pay £300 for a Denon this upgradeable!

Betraying its Thomson links, and corresponding to the Ferguson models also covered in this review group, the *1030* comes from the same Malaysian factory, with the same pretty basic technology and build quality – components are not as neatly mounted on circuit boards as those made on Japanese insertion machines, for example. Using twice oversampling and a Sony digital filter, a single Burr Brown *ICM56P* DAC is shared between the two channels. The power supply is modest.

## LAB REPORT

Given the rather prosaic technology, it is not surprising that the measurement programme

threw up a few minor weaknesses and idiosyncracies, though on balance the lab performance is not bad for a cheapie. The frequency response shows an unwelcome if mild wiggle at high frequencies, which is not entirely consistent between the two channels. Phase is inverted with some ringing, and is not linear at high frequencies. Our first sample had poor low level linearity; although the replacement reached a very respectable 15.6bits there must be some question over sample consistency. The low level sinewave shape is also rather noisy (see graph).

Those indulging in pre-purchase auditioning should beware of the fact that the *1030*'s output is more than 1dB above the CD standard – the sort of situation that is inclined to fool even experienced ears into believing it sounds 'better' just because it is slightly louder. Dynamic range is moderate, harmonic distortion likewise, but intermodulation is quite good. Separation is a little below average, and channel balance shows some discrepancy at high frequencies. Noise filtering is comparatively poor, but both error correction and shock/vibration immunity are very good indeed.

## SOUND QUALITY

Although the Dual is considered a little below average, the 'fair' rating is perfectly respectable considering the modest price of the machine. Indeed the correspondence between the subjective findings of the *1030* and the Ferguson *CD-07* under 'blind' conditions proved a gratifying confirmation of listening test consistency.

The sound is lively enough but is also a bit 'loud', which doesn't help in maintaining long term listener interest. The treble is a bit fatiguing, with some brashness, 'tizz' and sibilant exaggeration on high level close-miked vocals. Bass is a little lightweight and could

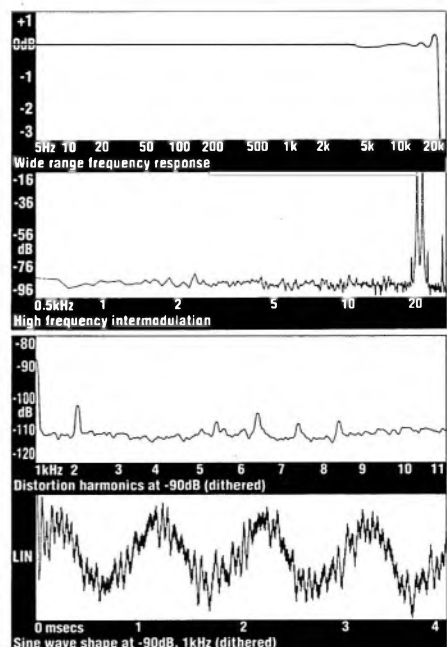
do with more convincing 'drive'. The mid-range is tonally a little 'thin'. Stereo images show good width and acceptable focus, but are a little short of depth.

## CONCLUSIONS

The Dual is a very competitive package judging by the inclusion of remote control in a full width player priced at £160. Under the skin it shows some limitations in technical performance, build and consistency (check out your own sample prior to purchase perhaps), but the sound is respectable enough considering the price, so Recommendation is well in order.

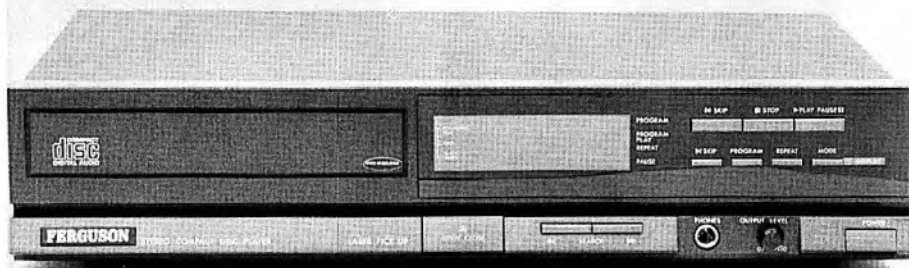
## TEST RESULTS

Test resolution (L/R av)		15.6 bits	
Output level, source impedance	2.26V, 1.06dB	920ohms	
Effective dynamic range		100dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-90dB	-90dB	-80dB
	(0.0032%)	(0.0032%)	(0.01%)
Ref -70dB		-30dB	
Stereo separation	82dB	82dB	83dB
Stereo balance L/R	0.03dB	0.1dB	1.2dB
Frequency response (20Hz to 20kHz)			+0.83dB
High frequency intermodulation			-83/70dB (0.015%)
Electrical noise (CCIR ARM, 1kHz)			-93dB
Mechanical noise			average
Ultrasonic noise			-79dB
Error correction			1.3mm gap
Shock/vibration resistance			excellent
De-emphasis			+0.13dB at 5kHz
Track finding speed (15, YEDS 2)			— secs
White noise overload test			OK
Size (w x d x h)			44.2 x 31.0 x 8.5cms
Typical price inc VAT			£160



## FERGUSON CD-07

THORN EMI, CAMBRIDGE HOUSE, CAMBRIDGE RD., ENFIELD, MIDDX EN1 1UC. TEL: (01) 363 5353.



The £130 CD-07 must be the cheapest CD player *Choice* has ever examined, and is also the cheapest model we know of from a so-called 'premium' brand (though in Ferguson's case the lack of a recent hi-fi track record probably makes ultra-sharp pricing a necessary part of re-establishing a presence). Under the skin the CD-07 resembles both its remote control CD-03 sister and the Dual 1030 (reviewed elsewhere), as all come from the same source, but each has its own personalised set of clothes.

The 07 is very compact and simple, with a grey plastic fascia that makes a welcome change from the almost ubiquitous black. The metal base and cover wrap are reasonably solid, if undamped. The unit lacks the presentation style as well as the remote control of 03, but all is commendably discreet nevertheless. The control button layout is a bit haphazard, in that track skip uses separate, different size buttons in different places on the fascia for each direction - with forward skip consigned to the subsidiary role!

Other basic features include search, program and repeat, but the headphone socket at least has a volume control, and the rear panel carries a digital output (which is something of a surprise considering the comparative cost of the player and that of an outboard digital processor). The display is simple and smallish, with a single numeric readout, half a dozen status flags and oddly labelled mode switching.

The CD-07 has much the same pretty basic technology and build quality as the other Ferguson and the Dual model which come out of the same Malaysian factory - components are not as neatly mounted on circuit boards as those built using Japanese insertion machines, for example. Using twice oversampling and a Sony digital filter, a single Burr Brown PCM56P DAC is shared between the two channels.

## LAB REPORT

As might be expected the lab performance shows close correspondence with the other two models from the same source. There are clearly limitations imposed by the price and technology, but the overall pattern is pretty respectable nonetheless. Resolution here was only 14.9bits, and some distortion is apparent on the -90dB sinewave, besides some noise, though in fact the signal is cleaner than that obtained with the CD-08. The frequency response shows some very mild unevenness through the treble region, while phase is inverted with some ringing, and is not linear at high frequencies.

The output is a dB above the CD standard, which is bound to help sales under comparative auditioning - *caveat emptor*. Separation is a little below average, channel balance shows some high frequency discrepancy, noise filtering is comparatively poor and the noise floor somewhat higher than usual, but both error correction and shock/vibration immunity are very good indeed.

## SOUND QUALITY

Although only rated 'fair', this is a perfectly respectable result considering the very low price of the machine. A similar rating to that of the Dual model acts as a useful check on the consistency of our listening tests. There are no obvious subjective defects, so although the overall attainment is certainly below average, at least it is also well balanced.

The bass sounds 'softened' and a bit lightweight, lacking the sense of dynamic power that the medium is capable of producing. The midrange is a little 'thin' and 'hard' with slightly 'wiry' strings, but satisfactory in terms of clarity and detail. The treble is limited by the traditional CD 'grain' and 'edge' which is typical of cheaper players (and many of the not so cheap players of a

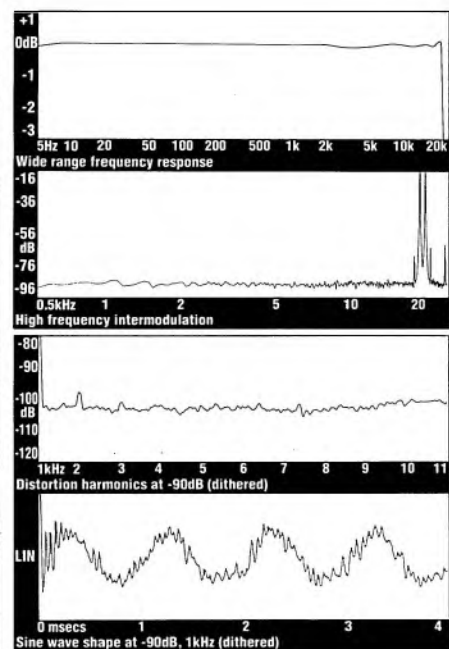
couple of years ago). Stereo images are about average all round, and dynamics likewise.

## CONCLUSIONS

Price is the main reason for Recommending this player. It certainly doesn't set any new records for build and sound quality or lab performance. But it does just about pass muster, and undercuts all the obvious alternatives by a significant margin. There remains some minor concern over consistency, so prospective purchasers are advised to check the particular sample they are offered.

## TEST RESULTS

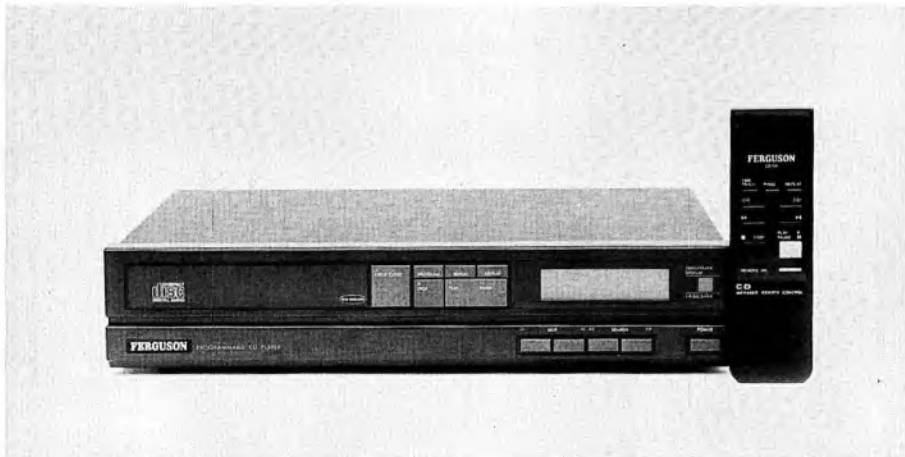
Test resolution (L/R av)		14.9 bits	
Output level, source impedance		2.25V, 1dB, 925ohms	
Effective dynamic range		97dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-89dB	-93dB	-77dB
	(0.0035%)	(0.0023%)	(0.014%)
Ref -70dB			-28/25dB
Stereo separation	82dB	82dB	82dB
Stereo balance L/R	0.03dB	0.10dB	0.87dB
Frequency response (20Hz to 20kHz)			-0.6dB
High frequency intermodulation			-72dB (0.02%)
Electrical noise (CCIR ARM, 1kHz)			-94dB
Mechanical noise			average
Ultrasonic noise			-87dB
Error correction			1.3mm gap
Shock/vibration resistance			excellent
De-modulation			+0.2dB at 5kHz
Track finding speed (15, YEDS 2)			— secs
White noise overload test			OK
Size (w x d x h)			35.5 x 30.5 x 7.5cms
Typical price inc VAT			£130





# FERGUSON CD-08

THORN EMI, CAMBRIDGE HOUSE, CAMBRIDGE RD., ENFIELD, MIDDX EN1 1UC. TEL: (01) 363 5353.



Ferguson is one of the giants of UK consumer electronics, claiming market leadership in both TV and VCR sales. However, its success has been largely restricted to the domestic market in an increasingly international world, so the brand's purchase by French multinational Thomson from Thorn EMI in 1987 was quite logical.

The new ownership should enable worthwhile economies of scale, even though Ferguson will retain its brand identity at least for the foreseeable future. But one new initiative already underway is to re-focus attention on the somewhat neglected domestic audio/hi-fi sector - Ferguson has kept its presence in the portable and personal sectors but has a fairly small market share in midi systems. As part of this strategy, two new standalone CD players are being introduced - midi sized, so as to partner the systems, and very modestly priced (thanks to sourcing from a part-Thomson-owned Malaysian factory) so as to help increase market share.

The £150 CD-08 is the more expensive of the two, featuring remote control and a custom 'designer' front panel. The latter is something of an object lesson which other manufacturers could well emulate, though the lurid orange illumination of the display is perhaps an unfortunate lapse in taste. The dark grey plastic fascia has light grey buttons with tiny orange highlighted arrows/symbols, which look good but feel a little tacky. Besides the remote control, there's the inevitable skip and scan, plus simple programming, repeat and that's the lot. The metal chassis and wrap is quite solid, sitting on its risible pseudo feet, and the package even includes a digital output - but for some reason (styling perhaps?) the headphone socket that graces the cheaper model is omitted here.

The internals include a die-cast laser chassis on a high quality spring decoupled

disc drive. Basic construction is budget quality single board, using a time-shared 16-bit DAC with twice oversampling.

## LAB REPORT

There is a close family resemblance between the measurement set recorded here and that for the CD-07 (and the Dual for that matter), though if anything the 08 performed slightly poorer than the others, particularly in terms of high frequency distortion. Resolution is a comparatively poor 14.8bits, and the low level sinewave looks somewhat unsavoury. The frequency response shows some very mild unevenness through the treble region, while phase is inverted with some ringing, and the time-shared DAC results in a high frequency interchannel phase shift.

The output is 1.2dB above the CD standard - significant enough to falsely fool anyone attempting comparative auditioning into favouring the Fergie. Separation is a little below average, channel balance shows some high frequency discrepancy, noise is a little worse than average, though it's better than 07 here. Once again the abiding ray of sunshine is the fine error correction and shock/vibration immunity - as good as any and better than most - confirming the good quality disc drive.

## SOUND QUALITY

CD-08 actually fell somewhat short of the overall rating for 07, indicative perhaps of the degree of inconsistency noted with the various samples assessed from this manufacturing source. 08 is no disaster, but it doesn't quite match the better qualities of its siblings, and the below average rating may not of course be typical of all examples.

Here the sound is 'boxy' and 'shut in'; stereo perspectives are flattened and narrowed, with comparatively poor focus. The mid-range lacks clarity, has a 'wooden' character

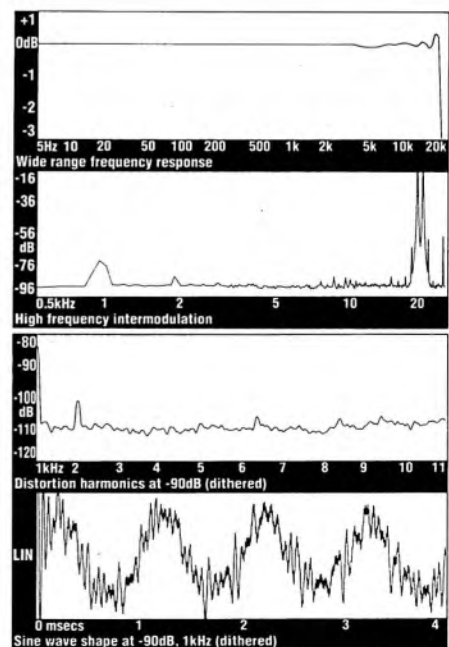
and 'wiry' string tone. Treble suffers from significant 'grain' and residual harshness, while the bass is softened and lacks real weight and impact - as do dynamics in general.

## CONCLUSIONS

This player is very reasonably priced and very prettily designed, making remote control available for only £150. But our sample was rather unimpressive in both lab and subjective performance, and for that reason Recommendation is hardly appropriate. That said, there may be some variation between samples, and the one you try might just be better...

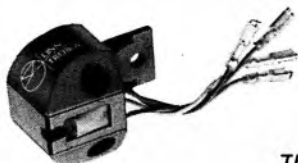
## TEST RESULTS

Test resolution (L/R av)		14.8 bits
Output level, source impedance	2.25V, 1.2dB, 925ohms	
Effective dynamic range		100dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-87dB -87dB -76dB	
	(0.004%) (0.004%) (0.015%)	
Ref -70dB	-28dB	
Stereo separation	81dB 82dB 84dB	
Stereo balance L/R	0.03dB 0.09dB 0.87dB	
Frequency response (20Hz to 20kHz)		-0.58dB
High frequency intermodulation		-73dB (0.025%)
Electrical noise (CCIR ARM, 1kHz)		-94dB
Mechanical noise		average
Ultrasonic noise		-79dB
Error correction		1.2mm gap
Shock/vibration resistance		excellent
De-emphasis		+0.2dB at 5kHz
Track finding speed (15, YEDS 2)		—secs
White noise overload test		OK
Size (w x d x h)		35.5 x 29.5 x 7.5cms
Typical price inc VAT		£150



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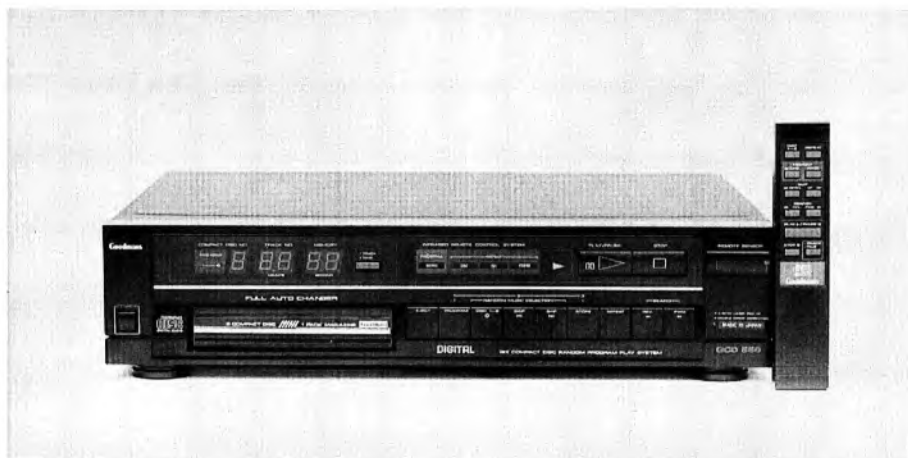




# GOODMANS GCD 550

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

BEST BUY



Goodmans' specialist hi-fi activity seems to be limited to the odd CD player, such as the competitively priced (£200) Japan sourced, remote control *GCD 550* autochanger featured here. It's not even midi sized to tie in with their systems, so clearly Goodmans believes there's a niche for them in this niche market, provided the price is nice.

£200 is a modest price for any Japanese built CD player in these high value Yen days, let alone a full feature autochanger. Presentation is slightly garish with rather messy graphics, but the major control layout is clear and intuitive and display large (as an autochanger's needs to be). Play/pause and stop are sensibly separated from the crowd of subsidiary functions on nine identical push-buttons – legibly labelled but with some odd and not too self evident multi-key functions (random music play, 1,2,3, search). The handset has only a few keys, but these are more conventionally configured for easy use.

Up to six discs may be loaded into the special supplied disc caddy, though you don't have to save up for all six before you start to use the player – one will do. You may have to spend a few hours mastering the instructions though... The front panel is a plastic moulding, but chassis and wrap are undamped pressed steel, giving a solid all up weight of more than 5kg. The unit sits on ludicrous and entirely cosmetic semicircular plastic 'feet', and only analogue signal level outputs are fitted (no digits or headphones).

The internals include a modest size transformer feeding standard quality 3,300µF capacitors and a competent minimum of discrete and IC regulators. The control micro-processor is from Funai (presumably the original manufacturer), but most of the 2X oversampling digital side features Toshiba chips – the digital filter and single 16-bit DAC which precede analogue filtering and an in-line output op-amp. The transport is quite

large and not too accessible, though the laser mechanism is on the top, its steel mounting plate decoupled by a rubber bush.

## LAB REPORT

The autochanger may autochange, but one needed some patience to wait through the 13 seconds needed for our test track to turn up. The lab performance as a whole is quite weak, particularly in terms of high frequency harmonic and intermodulation distortion. Both these are sufficiently substandard to indicate premature HF overload, particularly as low and mid frequency distortion is rather good.

The response shows some high frequency unevenness and a significant channel imbalance through the treble. Low level resolution is an acceptable 15.4bits, error correction is fine, shock/vibration resistance average and signal-to-noise rather below average. Absolute phase is inverted in this player, and there is some filter ringing, while the shared DAC creates interchannel phase discrepancies at HF.

## SOUND QUALITY

Notwithstanding the indifferent test results and the modest price, sound quality was quite respectable – even surprisingly good – rating 'fairly good' overall. Which is evidence enough that high energy high frequencies are pretty rare on music program, even though they do make life interesting for test engineers.

The strength of the *GCD550* lies less in the ability to do anything particularly well, more in the ability to avoid making a hash out of anything. The bass shows a mild loss of extension and power, while the midrange is attractively smooth, with an acceptable level of detail. Treble is also passable, with some 'sting' at very high frequencies whose subjective severity will depend somewhat on the

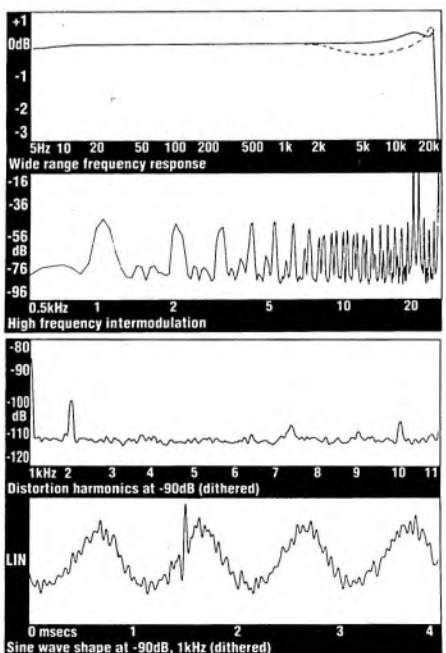
partnering amplifier and loudspeakers. Dynamics are very slightly compressed, and the soundstage sacrifices some width and depth, but focus is above average.

## CONCLUSIONS

The combination of a respectable sound quality at a very modest price for a full feature autochanger is sufficient for a Best Buy rating. But this design is still a little rough around the edges, both on lab performance and in the time taken to reach a specific track, and would also benefit from more user-friendly ergonomics on some of the subsidiary functions.

## TEST RESULTS

Test resolution (L/R av)		15.4 bits	
Output level, source impedance	2.05V, +0.05dB	1.8Kohms	
Effective dynamic range		102dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-95dB	-84dB	-36dB
	(0.0018%)	(0.0065%)	(1.5%)
Ref -70dB			
Stereo separation	96dB	90dB	67dB
Stereo balance L/R	0.17dB	0.17dB	0.24dB
Frequency response (20Hz to 20kHz)			+0.57dB
High frequency intermodulation			-47dB (0.45%)
Electrical noise (CCIR ARM, 1kHz)			-90dB
Mechanical noise			average
Ultrasonic noise			-100dB
Error correction			1.2mm gap
Shock/vibration resistance			average
De-emphasis			+0.17dB at 5kHz
Track finding speed (15, YEDS 2)			13 secs
White noise overload test			slight clip
Size (w x d x h)			42 x 34 x 10cms
Typical price inc VAT			£200



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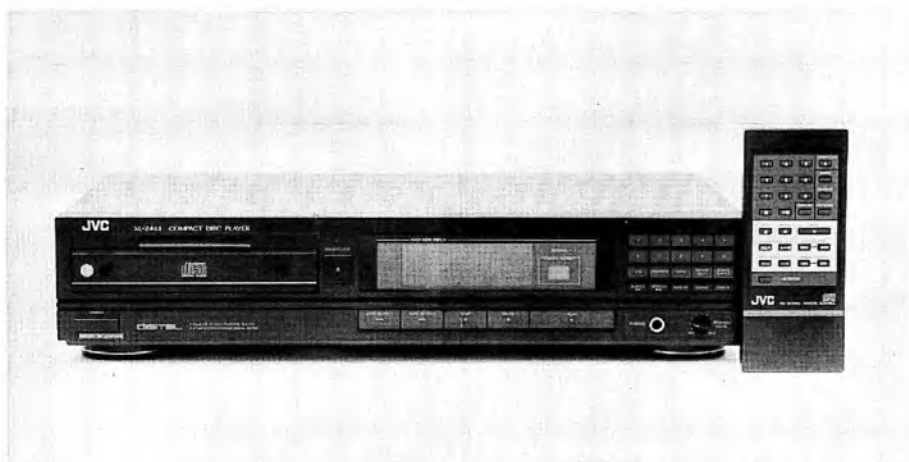
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# JVC XL-Z444

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



JVC is best known as the moving force behind the VHS videorecorder format, which the company invented and continues to develop – most recently with the Super VHS variant. Although part owned by the giant Matsushita organisation for many years, JVC operates quite independently, and has always maintained a significant presence in the hi-fi separates market, even when other broad based brands were cutting back and concentrating on high volume sales of portables and midi systems. The company was therefore well placed to take advantage of the CD-led boom of the last year or three, and the £230 XL-Z444 is a typical example of one of today's competitively priced full feature CD players.

For its price the remote control '444 is quite substantially built, the metal chassis and cover feeling reasonably solid. The fascia is plastic and has slightly sharp corners underneath, and the whole sits on largely cosmetic feet that might conceivably assist in promoting some mechanical isolation.

The front panel has a very intelligent layout, dominated by five large main operation keys. A 20-key grouping then provides 1–10+10 direct track entry plus program, intro, repeat (two versions), search, random and editing (which adds up to nineteen, but never mind), while the busy display includes a track menu. The power switch feels a bit clunky in operation, while the rear panel carries the usual analogue outputs, a switchable digital output socket plus another for the 'compulink' remote – the JVC name for integrating separate components into system remote control, and something of a company speciality.

The power supply transformer is about as small as one can get away with, alongside standard quality but generously rated 4X 4,700µF capacitors, feeding discrete and IC regulators. The digital chips come from a number of sources, a Yamaha digital filter

driving a single, time-shared Burr Brown *PCM56P*, followed by a deglitcher, and *JRC5532* op-amps, with RC networks filtering in the analogue domain. The digital output is screened by its own steel box bolted to the back panel, but all the remaining major components are mounted on a single large PCB. A standard type disc drive uses a rubber decoupled plastic mechanism on a rubber suspended steel base. The interior is neat and tidy, with good build quality.

## LAB REPORT

The test results are a bit of a mixed bag. The frequency response is nice and flat, gently tailing off in the extreme treble, though phase is inverted. All spurious are very well filtered; dynamic range, stereo separation and channel balance are all good; error correction and shock/vibration resistance is excellent. But the low level resolution is below par, and the low level sinewave looks pretty messy. Distortion measurements are about average, de-emphasis is accurate and the mechanism is quiet.

## SOUND QUALITY

The overall rating is fair, which is respectable enough for the price though not particularly distinguished it must be said. Bass is uneventful, sounding softened and a little 'dead', with some loss of impact. The mid-range has more than its fair share of muddle, with a noticeable loss of information; the balance is neutral enough, but transients are dulled.

The best bit is the treble, which has only mild grain and focus imprecision while sounding generally pleasant and well balanced. Stereo soundstages are a little 'shut in' and small in scale; there's a fair measure of depth but also some foreshortening of perspectives. In a sense this is one of those players which will pass muster – until

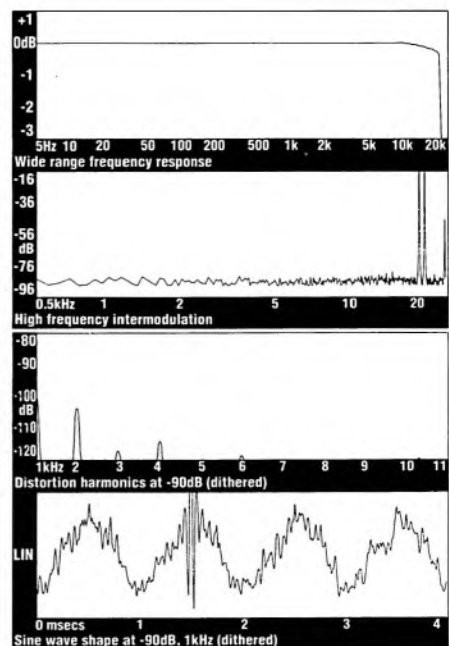
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## CONCLUSIONS

Ultimately JVC's '444 is an average machine at a (volume) averaged price. It's well built and performs perfectly adequately, though the sound was judged insufficiently distinguished for formal Recommendation.

## TEST RESULTS

Test resolution (L/R av)		14.8 bits
Output level, source impedance	2.1V, 0.4dB, 660ohms	
Effective dynamic range		105dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	–94dB –89dB –86dB	
	(0.0002%) (0.0035%) (0.005%)	
Ref –70dB		–29dB
Stereo separation	102dB	95dB 75dB
Stereo balance L/R	0.04dB	0.02dB 0.02dB
Frequency response (20Hz to 20kHz)		–0.54dB
High frequency intermodulation		–83dB (0.007%)
Electrical noise (CCIR ARM, 1kHz)		–100dB
Mechanical noise		low
Ultrasonic noise		–110dB
Error correction		1.3mm gap
Shock/vibration resistance		very good
De-emphasis		±0.23dB at 5kHz
Track finding speed (15, YEDS 2)		4 secs
White noise overload test		OK
Size (w x d x h)		43.4 x 29.5 x 9.5cms
Typical price inc VAT		£230



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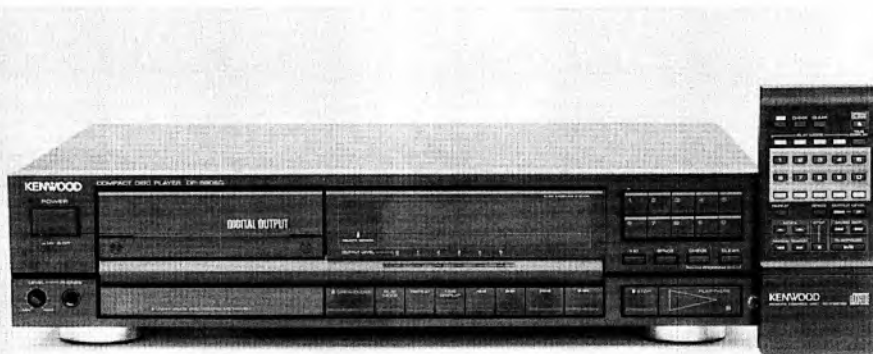
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# KENWOOD DP-880SG

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

BEST BUY



Kenwood, perhaps better known as Trio, has nothing to do with small appliances, but the Trio-Kenwood Corporation of Japan used the Trio brand in the UK for decades to avoid confusion with the then Thorn white goods brand. As a medium sized hi-fi specialist (excepting some dilettante dalliance with upmarket ICE and personals), T-K suffered financially from the pre-CD doldrums, but a helping hand from the giant Toshiba, plus the improved state of the hi-fi market has put the company back on its feet. This led to a relaunch worldwide under the rationalised Kenwood name, leaving the UK and Japan market to try and get used to the change.

The DP-880SG is very competitively priced at £250, considering that the package includes full remote control including a high quality motorised volume potentiometer. Substantial all metal build is reflected in a weight of nearly 6kg, though the top plate is rather resonant, and the feet (on this occasion) largely cosmetic. The remote volume has a 0-5 bargraph indicator to its setting, and may be bypassed if desired by using fixed o/p sockets. The controls are well enough laid out – though the large number of subsidiaries could put grandma off.

There's a 10-digit direct track entry pad, plus repeat and time display, and the somewhat more obscure 'play mode' and 'space' – the former cycling through four options (shown on the display) when it's held depressed, the latter inserting four second gaps between tracks: "useful when taping" comments the manual unashamedly. The headphone socket has a volume control, the rear carries a digital output, and a very complex display includes a 20-track menu, three numeric readouts and lots of flags – just in case you get bored listening to the music, no doubt.

Inside, a reasonable sized transformer feeds standard grade power supply capaci-

tors, followed by discrete regulators with isolation chokes. There are several Sony chips, but basically a Kenwood digital filter drives a pair of Burr Brown PCM56P DACs, the following analogue filtering using selected capacitors. Output muting and de-emphasis are relay switched, and the variable output is set using a motor driven potentiometer close by the output itself. Overall internal build quality is very good, and notably uncluttered. The largely plastic disc drive is mounted on a slightly decoupled steel subchassis. The pressed steel case has a plastic front finished in aluminium trim.

## LAB REPORT

Although the '880 is only a little more than half the price of the '1100, the lab performance is to nearly the same high standards, and indeed shows much of the same character. Response is flat, phase is linear and correct, distortion low to very low, spurious excellently suppressed and dynamic range and stereo separation both wide. Error correction is excellent and shock/vibration resistance good. Output level and de-emphasis is correct, channel balance very close and resolution a very acceptable 15.4bits, while the low level sinewave is quite clean.

## SOUND QUALITY

The sound quality falls a little short of its more expensive sibling, but still manages a 'good' overall rating, which is fair enough for the price. Though a trifle compressed compared to the best, dynamics are competently handled, while the stereo soundstage is wide and open, with good focus and above average depth.

Bass performance drew no specific comment, favourable or otherwise, while the mid is tonally a little 'thinned' and has some 'wiry-ness', with a touch of 'brittleness' in the lower

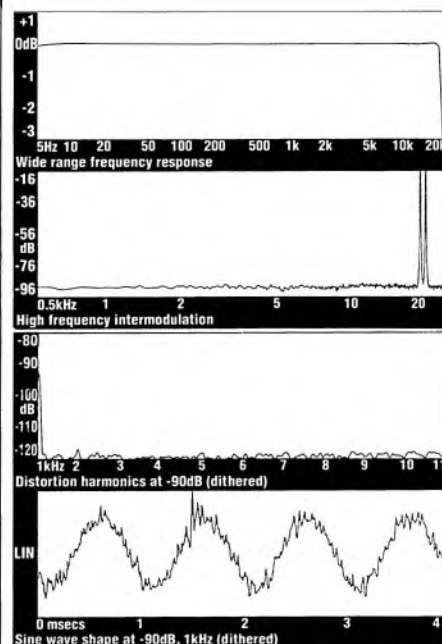
treble. The treble per se is somewhat forward and a bit 'splashy', attracting a little too much attention for its own good.

## CONCLUSIONS

The well built DP-880SG offers an impressive roster of well executed facilities, at least for those not daunted by the complexity of a large range of frills. It also sounds good and measures well – not far short of Kenwood's much more expensive 1100 in fact – so a Best Buy rating is logical.

## TEST RESULTS

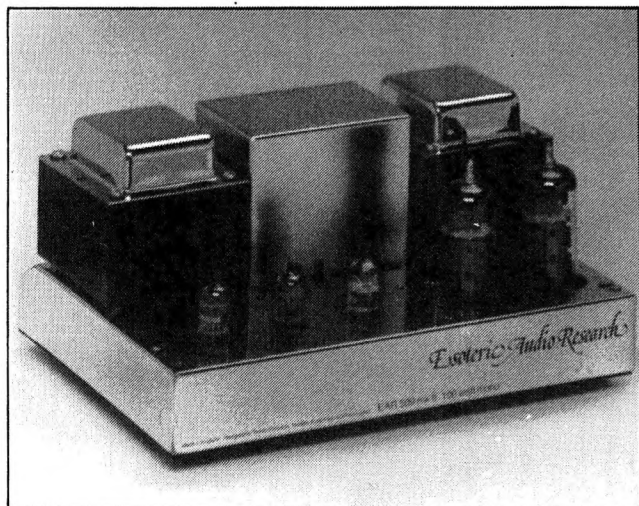
Test resolution (L/R av)		15.4 bits
Output level, source impedance	2.07V, 0.3dB, 100ohms	
Effective dynamic range		108dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-91dB (0.0028%)	-88dB (0.004%)
		-86dB (0.005%)
Ref -70dB		-38.5dB
Stereo separation	120dB	118dB
Stereo balance L/R	0.04dB	0.06dB
Frequency response (20Hz to 20kHz)		±0.14dB
High frequency intermodulation		-99dB (0.0011%)
Electrical noise (CCIR ARM, 1kHz)		-99dB
Mechanical noise		average
Ultrasonic noise		-108dB
Error correction		1.3mm gap
Shock/vibration resistance		good
De-emphasis		±0dB at 5kHz
Track finding speed (15, YEDS 2)		3 secs
White noise overload test		OK
Size (w x d x h)		44 x 31.5 x 10.5cms
Typical price inc VAT		£250



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# KENWOOD DP-1100SG

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



The £450 DP-1100SG is an upmarket 'flagship' model, with genuine heavyweight 'battleship' construction that goes to make up a weight approaching 12kg - DIY shelving beware! Metal casework used throughout is well damped to avoid rattles and shows no attempts to pare costs. Unlike virtually every other manufacturer who opts for the cynical cosmetic version, Kenwood makes a genuine attempt to provide real feet, with elaborate spring level decoupling and rubber inserts. The spring rates are too strong for the whole unit to float properly, its true, but at least this is a genuine attempt.

The front panel stresses OPTICAL DIGITAL OUTPUT (in gold capitals), just so's you know what the funny little doobrie on the back you're unlikely to use is for. Apart from that minor lapse of taste, all is sweetness and light - comprehensive without being too daunting. There's remote control of course, including a clever application for volume (duplicated on the front panel), plus a flag-ged digital output switch.

Main functions are sensibly laid out and distinguished (though labelling is a bit small), and the front isn't overburdened by too much propaganda. There's a chunky 10-button direct track entry keypad plus 5 more buttons adding 10 each (no it's not an auto-changer). The play mode cluster is contrasted in white translucent plastic for track, time, single and program, and another set of subsidiary buttons cover space, edit, time display, clear, check, 'TO', a-b, and repeat. The complex display has very small digits, and the rear panel has fixed and variable analogue gold plated phonos, plus electrical or optical digital outputs.

The power supply uses two separate transformers - one presumably for the digital circuitry the other for the analogue - while the unshrouded mains input is filtered. The analogue supply uses Elna 'for audio' 3,300µF

capacitors, and standard IC regulators are placed close to the sections they feed, neat chokes providing good isolation between stages.

Kenwood's own digital filtering feeds a pair of Burr Brown PCM56P DACs, followed by a string of selected dual JRC5532 op-amps, probably forming a GIC filter using copper foil polystyrene capacitors. Output muting and de-emphasis are relay switched, and even the crystal is foam mounted against vibration. The audio board is mounted above and partly screened from the digitals with a steel plate. The nicely decoupled disc drive has a fine looking cast alloy chassis and damped steel members, though the laser uses cog not linear drive.

## LAB REPORT

Given the foregoing, it's no surprise to find a fine lab performance. Response is near flat, output level close to standard from a low impedance, distortion varies from good to very good, with intermodulation products particularly low.

Phase is linear and absolute phase is preserved, de-emphasis is accurate and both error correction and shock/vibration resistance are very good. S/N ratios, filtering, separation and channel balance are all very good or better. Low level resolution is a respectable 15.5bits, with a clean sinewave to boot, but a first sample was rejected on grounds of poor linearity here.

## SOUND QUALITY

Undoubtedly a good player, the 1100 is ultimately unimpressive considering its price and the elaborate engineering techniques employed, rating a straight 'good' overall. Fine first impressions were marred by a certain lack of involvement. Despite a slightly 'obvious' balance, the treble delivers good definition and focus, but transients sound

'slowed' and slightly 'rounded' nevertheless.

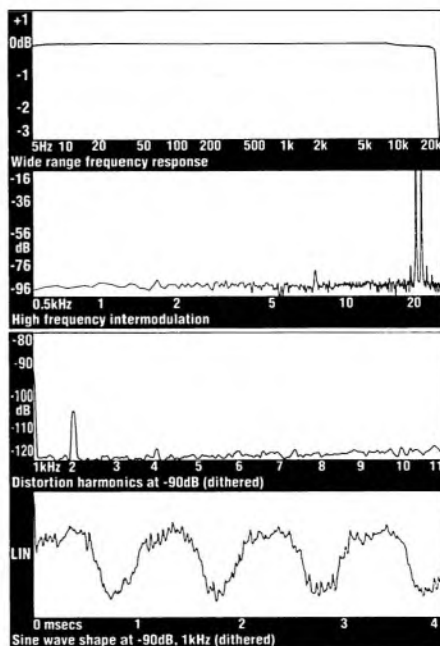
The midrange lacks full detail recovery, for example in the recorded acoustic, while bass is a bit slowed and slurred, and could benefit from more attack and precision. Stereo has good depth and width and excellent focus, but the overall effect is not totally satisfying, and the sound as a whole seems lacking in 'get up and go'.

## CONCLUSIONS

Although the 1100 is something of an engineering tour de force, the costs incurred do not seem justified by a sound quality that in our judgement is merely good, not exceptional.

## TEST RESULTS

Test resolution (L/R av)	15.5 bits		
Output level, source impedance	1.95V, -0.22dB, 112ohms		
Effective dynamic range	103dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-99dB	-96dB	-87dB
	(0.0011%)	(0.0016%)	(0.0045%)
Ref -70dB	-30dB		
Stereo separation	119dB	122dB	111dB
Stereo balance L/R	0.08dB	0.04dB	0dB
Frequency response (20Hz to 20kHz)	±0.25dB		
High frequency intermodulation	-103dB (0.007%)		
Electrical noise (CCIR ARM, 1kHz)	-104dB		
Mechanical noise	low		
Ultrasonic noise	-110dB		
Error correction	1.3mm gap		
Shock/vibration resistance	very good		
De-emphasis	-0.1dB at 5kHz		
Track finding speed (15, YEDS 2)	3 secs		
White noise overload test	OK		
Size (w x d x h)	44 x 36.5 x 12cms		
Typical price inc VAT	£450		



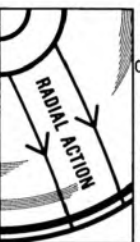
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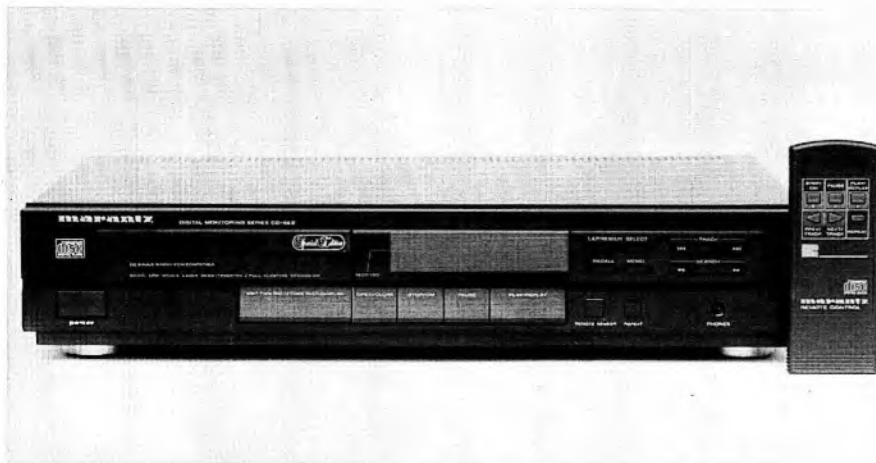
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MARANTZ AUDIO (UK) LTD., 15-16 SAXON WAY INDUSTRIAL EST., MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: (01) 897 6633.

BEST BUY



This £300 remote control *Special Edition* model doesn't bear all that much resemblance to the original '85, but the temptation to stick to the identity of a past commercial winner must be difficult to resist. It's a bit garish – Marantz has never lost the ability to use more typefaces than legends on the one front panel, and house style demands more than a fair share of curlicues and Gothic – and there's plenty of propaganda along the lines of "swing arm single laser beam tracking/full floating mechanism". Basic exterior build quality is just that, or adequate if you prefer, with plastic chassis and (damped) metal wrap, though the mechanical and electronic internals are rather more special.

There are five main transport buttons, labelled play/replay, pause, stop/CM, open/close and '16-bit twin DAC/4times oversampling' . . . all but the last (the big one) are actuated by pressing up against the top of the key; the big one moves too, but doesn't accomplish much in doing so (aside from raising questions over the build quality). There's also skip and scan, plus lap/remain, select, recall, memo and repeat. The mechanism is not amongst the quietest, nor the quickest in accessing tracks, but shock immunity is pretty good.

The display is fairly modest by today's standards, but Marantz has had the nerve to fit silly gold plastic feet – to an audiophile model, no less. After a quick chorus of "We shall not be fooled", we notice that the digital output has a shorting plug fitted, and are informed that the headphone socket is deliberately omitted for the sake of the sound quality. It all looks suspiciously like a culture clash.

Happily the best bits are where they count most – hidden from view. The mechanism is the latest Philips type, with a properly decoupled mineral loaded chassis, and the 'swing

arm' is a radial variation on the linear motor theme. The *SE* mods consist of a liberal sprinkling of classy electrolytic capacitors decoupling the multiple power supplies. 'A' grade 16-bit *TD1541* DACs are used, alongside standard grade 4X oversampling and digital filtering.

## LAB REPORT

The basic technology is so familiar and so established, the lab test results have an air of inevitability in their general overall competence. However, mild improvements were found in low level linearity, which is an encouraging sign, as this has always been a measurable (if not necessarily audible) weakness of the Philips package. In this instance the expansion at -90dB is held close to 6dB (1bit), and is balanced between the channels.

The accompanying data and graphs show there is no cause for concern in any respect, and that many of the parameters approach the state of the CD art, with mild general improvements over earlier models from the same stable.

## SOUND QUALITY

The hidden engineering has a big payoff in the sound quality, which comfortably beat all others in this thirty-odd test group – a truly remarkable achievement at £300. In the top class and a match for most at any price, the sound is crisp, clear and precisely defined across the full audio range. The sort of 'grain' and harshness that still characterises most affordable CD players is all but absent, giving the treble unusual purity and musicality.

A first rate bass – articulate, rhythmic with good definition and extension – underpins a neutral midrange with good clarity and detail. Excellent focus and generous soundstages characterise the stereo imaging, and the overall sound remains consistently good

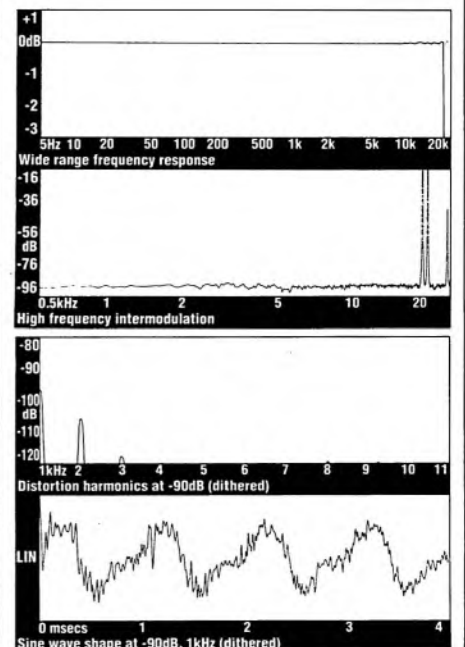
even with wide musical dynamic range variations.

## CONCLUSIONS

As has happened on more than one occasion previously, the Marantz magic redefines the subjective performance standards of affordable CD players. The basic sound is so fundamentally honest and well founded, it is somehow difficult to believe it comes from such a chintzy looking fascia, but a Best Buy is unavoidable for anyone whose lifestyle can accommodate the dichotomy.

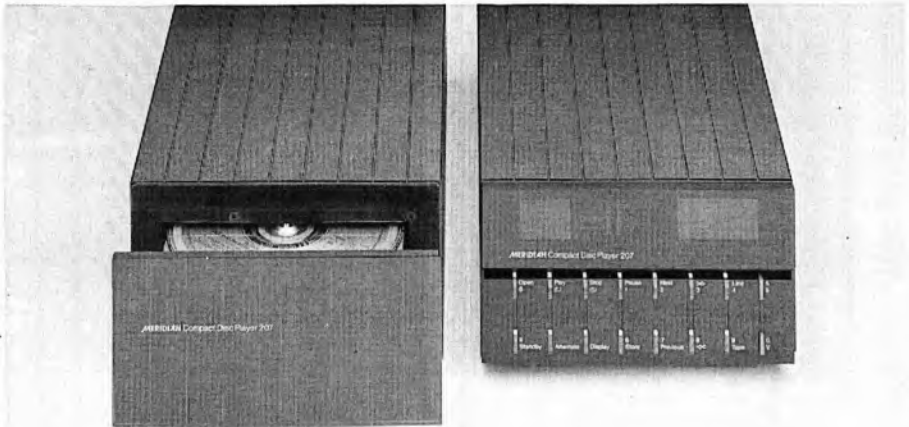
## TEST RESULTS

Test resolution (L/R av)		15.6 bits
Output level, source impedance	2.06V, +0.03dB, 200ohms	
Effective dynamic range		105dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-100dB (0.001%) -88dB (0.004%) -86dB (0.005%)	
Ref -70dB		-35dB
Stereo separation	124dB	111dB 101dB
Stereo balance L/R	0.06dB	0.06dB 0.05dB
Frequency response (20Hz to 20kHz)		±0.06dB
High frequency intermodulation		-99dB (0.00013%)
Electrical noise (CCIR ARM, 1kHz)		-104dB
Mechanical noise		average
Ultrasonic noise		-104dB
Error correction		1.0mm gap
Shock/vibration resistance		very good
De-emphasis		-0.11dB at 5kHz
Track finding speed (15, YEDS 2)		3.5 secs
White noise overload test		good
Size (w x d x h)		41 x 30 x 8.5cms
Typical price inc VAT		£300



# MERIDIAN 207

BOOTHROYD STUART LTD., 13 CLIFTON ROAD, HUNTINGDON, CAMBS PE18 7EJ. TEL: (0480) 57339.



Not only is the 207 indisputably the most elegant looking CD player around, it also has potential system capabilities only matched by B&O and Revox in providing full 'round the house' remote operation. And where the earlier Meridian MCDs (based on the early Philips 100 chassis) were sparse, the 207 is much better endowed with automatic/programming facilities.

This two-box player has separate 'half width' transport and electronics sections which can be sited side by side or stacked to taste. A pinstripe motif provides an attractive visual distinction which is reflected in the layout of the chassis controls and remote unit. The control keys are straightforward in the main, but utilise a shift-key system for less commonly used functions which takes a little learning - this is really just a matter of getting used to a different approach.

The electronics section also contains an impressive inbuilt preamplifier which includes a fine electronic volume control (suitable for remote operation), plus line level inputs; a high quality optional (£100) vinyl disc input is now also available. Therefore the 207 can be connected directly to a power amplifier or a pair of Meridian's active loudspeakers, while also accepting and switching additional signals from vinyl disc (MM or MC), tuner and tape sources. Both these functions are controllable from the optional 209 remote control unit, itself a substantial casting allowing, ultimately, armchair control throughout the house from different independent sources.

The CDM-2 transport section is Sorbothane mounted into a substantial slide-out drawer system, giving the stacking advantages of a front loader but on a more solid structural foundation than usual. The metal sleeve and glass front plate provide a measure of acoustic isolation during play, reducing vibration at the disc. Considerable care

has been taken over the various power supplies, separating analogue from digital and running the transport separately as well.

## LAB REPORT

The 16-bit chip set smooths out nearly all the (sonically innocuous) high frequency ripple. The mildest of HF rolloffs leaves 20kHz down some 0.4dB.

Channel balance is very close, with zero HF phase error, though stereo separation is a little asymmetric in the midband. A similar asymmetry is observed in the noise figures. Distortion results are generally good, albeit somewhat less than the best. Low level linearity has never been a strong point of this latest chip set, and the 15.3 bits measured here is pretty typical. Absolute phase is maintained, and can be inverted electronically from the control panel or remote unit.

The Sorbothane mounting is claimed to improve immunity to higher frequency vibration, though in point of fact resistance to mechanical shock seems to have been marginally impaired - this is an observation, not a criticism. The track access test took a reasonable 3.5secs. The fixed output meets the standard, while the output *via* the electronic volume control gives up to 9V, both from low source impedances. This volume control shows good channel tracking down to low levels and has a variable law to retain normal 'feel'.

The preamp section inputs showed carefully bandlimited responses. Sensitivity was sensible for most sources, though overload margins could have been a little better, and the line input impedance was a little on the low side, particularly for interfacing some valve equipment. Distortion, noise and other measured parameters were all fine.

## SOUND QUALITY

Providing a steady and significant though not

spectacular advance over the 14-bit original, the CD207 stays amongst the pack leaders at any price, notwithstanding its extra on-board preamp. Tried for the first time, the vinyl disc input came comfortably up to expectations, even the moving coil stage masking the sound only slightly.

The treble seems to be the main beneficiary of the upgrade. Mildly exaggerated and lacking air before; now it is sweeter, more transparent, and free of grain, providing unusually good focus besides. Depth is very good rather than exceptional, and stereo width marginally less than the best too. But the midrange balance was particularly well liked, and the bass sounds crisp, dynamic and articulate.

## CONCLUSIONS

The 207 delivers a sound quality in the very top class, comfortably ahead of most mass produced products and bettered only slightly by the odd competitor here and there. Clearly deserving strong Recommendation, not only is it arguably the prettiest model around, the on-board preamp - now vinyl disc ready at an extra £100 - makes it also one of the most practical and versatile, while Meridian's plans provide future-readiness to an unusual and attractive degree.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.07dB	0.07dB	0.08dB
Stereo separation	64/105dB	64/97dB	64dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-75dB	-83dB	-87dB
Total harmonic dist, -10dB	—	-79dB	—
Total harmonic dist, -60dB	—	-40dB	—
Total harmonic dist, -80dB	—	-14dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-79dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-81dB
Frequency response,			
left channel	-0.01dB	0dB	-0.34dB
Frequency response,			
right channel	-0.01dB	0dB	-0.34dB
Signal-to-noise, 20Hz-20kHz unweighted			100/108dB
Signal-to-noise, CCIR/ARM, 1kHz ref			99/106dB
Output level, 0dB, left/right			2.07V
Output impedance			270ohms
Track access time			3.5 secs
Error correction capability		>900µm gap, >800µm dot	
Mechanical noise			low
Spuriae up to 100kHz			-88dB
Resolution at -90dB			-101/-121dB
Headphone socket			yes
Dimensions (w x d x h)			(2x) 16 x 32 x 10cm
Estimated typical purchase price			£1050 (plus extras)

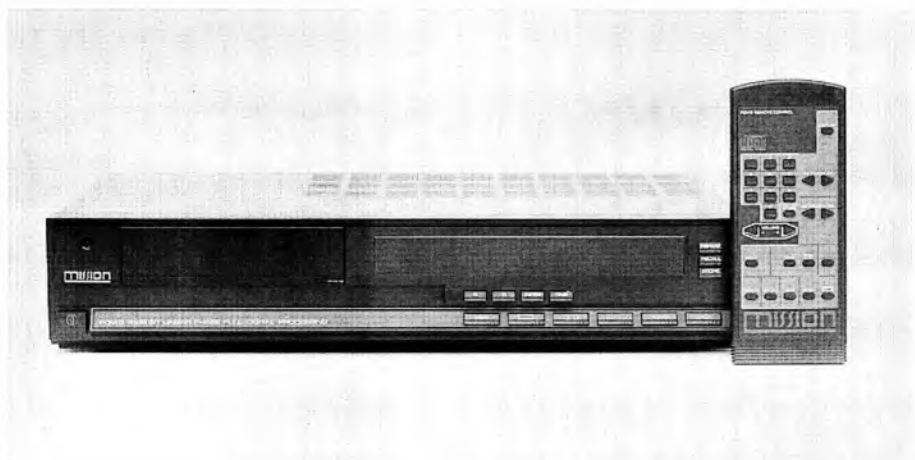
Reviewed by Alvin Gold  
Reprinted from *The Collection* 1988



# MISSION PCMII

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

RECOMMENDED



Mission started out only a decade or so back as a loudspeaker specialist, but with a combination of fierce ambition to succeed and considerable design flair the company has grown quickly to become one of the largest of the UK hi-fi specialists, and one of the few to manufacture a complete in-house system.

The £600 *Cyrus PCM II* is Mission's third CD model, and the first to be incorporated into the *Cyrus* stable. Successive models have increasingly distinguished the players from their Philips building block ancestry, mainly by incorporating ergonomic touches with particular appeal to audiophiles. The *PCM II* is a straight evolution from the *PCM 7000*, and is introduced at the latter's £600 price point, while the *7000* continues with a £200 price cut.

The *II* offers a number of extra features over its predecessor: besides offering a direct track entry capability, the remote handset can now phase invert the signal, which will allow absolute phase enthusiasts to choose the optimum setting for each of their discs, and also switch off the display for a further improvement in sound quality. The other new feature allows Mission's £200 *PSX* out-board power supply to be patched in to improve sound quality still further; such a *PSX* is normally used with *Cyrus II* in the ultimate *Cyrus* amplifier configuration, but has plenty of capacity to take on a CD player as well.

*PCM II* has most of the usual useful CD player facilities, while thankfully ignoring some of the more obscure and confusing frills that the marketing departments of the rising sun keep coming up with. One of the best features retained from *PCM7000* is the high quality remote volume control, using a resistor ladder to avoid compromise. This device covers a range of 63dB in 1dB steps up to a maximum of +4dB, so it's eminently suited for direct power amplifier drive – the route to

the best sound quality, for those prepared to fiddle around a bit with their connections.

Presentation is stylish if individualistic, being very black with small colour-highlighted buttons, and an unusually large display – possibly unique in actually being readable without eyestrain whilst operating the remote control from the comfort of your favourite chair on the other side of the room. The rest is basically 'tweaked' Philips, using a custom plastic fascia and chassis with substantial metal wrap, and improvements to the audio board side, the latest type *B 4X* oversampling digital filter and grade *A* DACs, plus the top *CDM4* disc drive with full mechanical decoupling.

## LAB REPORT

The response is nearly flat, tailing off gently at the treble à la mode Anglais, while phase is linear and remote switchable. Resolution is an excellent 15.8bits, though some noise is seen on the low level sinewave. The output level at switch on is half a dB below the standard, so direct comparisons will need careful level adjustment. Distortion, channel balance and stereo separation are less than the best, though still very good, while error correction and shock/vibration rejection are excellent.

## SOUND QUALITY

The sound quality does represent an improvement over its predecessor, though not perhaps quite to the degree that might have been expected, given the pace of CD development. In its standalone form the *PCM II* is at the upper end of the 'goods', moving into the 'very goods' with *PSX* added. And it is certainly the best powered volume player at anything like the price.

The bass is firm, crisp and articulate, providing a firm foundation for the clear, essentially neutral, if a touch 'lean' midrange,

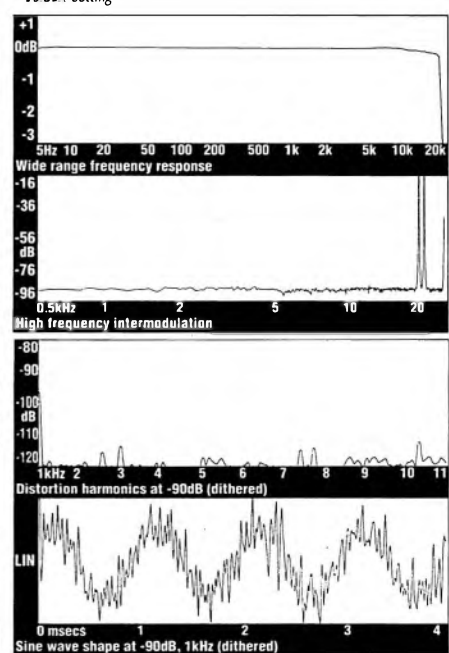
while the treble has little grain or propensity to sibilant exaggeration, and is well integrated into the whole. Dynamics are well up to scratch, and stereo nicely focused, with good depth and a generous soundstage, especially when using *PSX*.

## CONCLUSIONS

Mission is increasingly and successfully distancing its CD player from mainstream models by dint of some very clever features with particular audiophile appeal, and which in any case have irrefutable ergonomic logic. The sound remains competitive, particularly if the powered volume facility is valued, so Recommendation is fully in order.

## TEST RESULTS

Test resolution (L/R av)	15.8 bits	
Output level, source impedance	1.86V*, -0.63dB, 200ohms	
Effective dynamic range	105dB	
Harmonic distortion	20Hz	1kHz
	Ref 0dB	20kHz
	-96dB (0.0016%)	-89dB (0.0036%)
		-85dB (0.0056%)
Ref -70dB		-32dB
Stereo separation	108dB	99dB
Stereo balance L/R	0.01dB	0.06dB
Frequency response (20Hz to 20kHz)		-0.64dB
High frequency intermodulation		-98dB (0.0013%)
Electrical noise (CCIR ARM, 1kHz)		-100dB
Mechanical noise		low
Ultrasonic noise		-103dB
Error correction		2mm gap
Shock/vibration resistance		very good
De-emphasis		-0.04dB at 5kHz
Track finding speed (15, YEDS 2)		3.5 secs
White noise overload test		OK
Size (w x d x h)		43 x 30.5 x 8.7cms
Typical price inc VAT		£600 (PSX £200)



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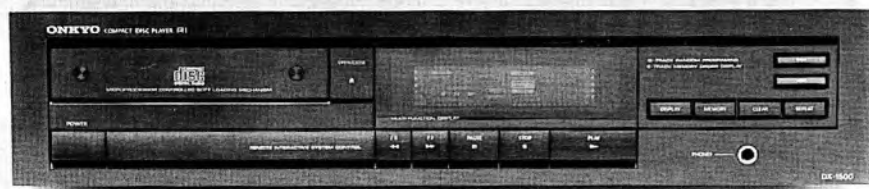


**AGFA**



# ONKYO DX-1500

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



Little is known of Onkyo in the UK, though one was inescapably impressed by the substantial stand space the company had taken at the 1987 Tokyo hi-fi show, and this is clearly an important specialist hi-fi brand on the Japanese domestic market – and quite an innovatory one to boot. UK representation has been pretty spasmodic over the years, the brand appearing for a short time only under more than one distributor's wings, so no real identity or market presence has yet had a chance to get established.

All that could well change now that Onkyo is coming in under Hi-Fi Markets – arguably Britain's most successful specialist hi-fi importer in recent times. There's already a fair range of all kinds of hi-fi separates available, though we haven't yet had all that many in to *Choice* for review. The £165 *LX-1500* is the cheapest CD player, one of a pair priced under £200.

This one doesn't appear to have remote control as such, but does do its best to duck the issue by emblazoning the front panel with an RI (remote interactive) logo, presumably in view of the ability to operate under remote control when integrated with a complete Onkyo system, connecting up via the special socket on the rear. It's a large, black all metal box with solid build for the price.

The power on/off switch feels rather indeterminate (now you feel it, now you don't), but the other switches are artfully sculpted with good feel and sensible layout. The feature array is a bit limited, but naturally this can only help the ergonomics, though the absence of a volume control on the headphone socket is, as ever, reprehensible. The largish display has three numerics and lots of flags, while the control switches give skip and scan plus display mode, memory, clear and repeat.

The supply consists of a smallish transformer and 2,200µV capacitors, plus various

IC regulators. Construction is neatly executed on a single board – which is clearly used for other models besides, judging by the gaps available for additional components. Most of the chips are Sony types, including the digital filter which drives a single time-shared Burr Brown *PCM56P* 16-bit DAC.

## LAB REPORT

When one has measured twenty nine CD players that at least pass muster despite occasional measurement weaknesses, it comes as a refreshing change to find a genuine lemon, pips and all. To be fair, the *DX-1500* is only really let down by a poor quality channel-shared DAC, but a 4bit (16dB) dynamic range error at -90dB is rather excessive, to the point where sonic repercussions are likely.

The frequency response is not particularly flat either, though the trends here are at least gradual. De-emphasis too is out by 0.3dB at 5kHz, and the low level sinewave shape is somewhat distorted. High level distortions are reasonable enough, and ultrasonic noise is well suppressed, but in-band noise is higher and effective dynamic range lower than usual. On a more positive note, error correction and mechanical shock/vibration immunity are very good.

## SOUND QUALITY

Despite the measured performance failings, the sound quality is rated 'fair', which is respectable enough for a low cost machine. The *1500* sounds better with rock than classical sources, as some grain is evident with massed strings, but the overall balance is basically sound with just an occasional hint of hardness.

The bass is considered a little slow and heavy handed, while there is some loss of detail and definition in the midband. The treble shows quite good detail and is gene-

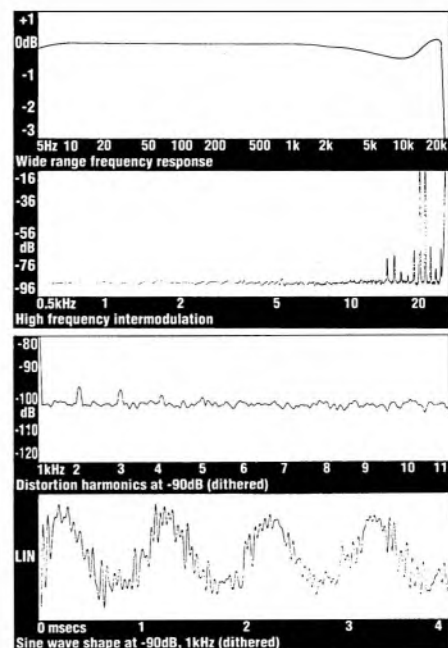
rally reasonably smooth. The stereo soundstage is slightly cramped and focus is only modest, while depth and ambience are both mildly curtailed. Dynamics show mild compression, but seem quite happy when blasting out rock music, and specific instruments are pretty well defined.

## CONCLUSIONS

The *LX-1500* is a fair sounding machine at a very reasonable price, but neither the (non remote) feature count nor the technology is particularly impressive, and the measured performance must raise questions over quality control, or at any rate DAC selection criteria.

## TEST RESULTS

Test resolution (L/R av)			12 bits
Output level, source impedance	2.14V, +0.15dB	370ohms	
Effective dynamic range			87dB
Harmonic distortion Ref 0dB	20Hz	1kHz	20kHz
	-82dB	-83dB	-70dB
	(0.008%)	(0.007%)	(0.032%)
Ref -70dB			-18dB
Stereo separation	90dB	91dB	83dB
Stereo balance L/R	0.02dB	0.03dB	0.29dB
Frequency response (20Hz to 20kHz)			±0.4dB
High frequency intermodulation			-87dB (0.004%)
Electrical noise (CCIR ARM, 1kHz)			-89dB
Mechanical noise			moderate
Ultrasonic noise			-110dB
Error correction			1.2mm gap
Shock/vibration resistance			very good
De-emphasis			-0.3dB at 5kHz
Track finding speed (15, YEDS 2)			4.5 secs
White noise overload test			OK
Size (w x d x h)			43.5 x 36 x 9cms
Typical price inc VAT			£165



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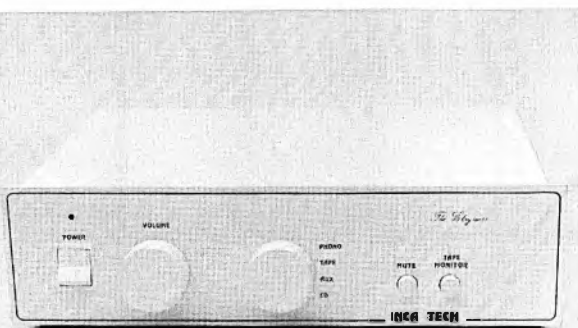


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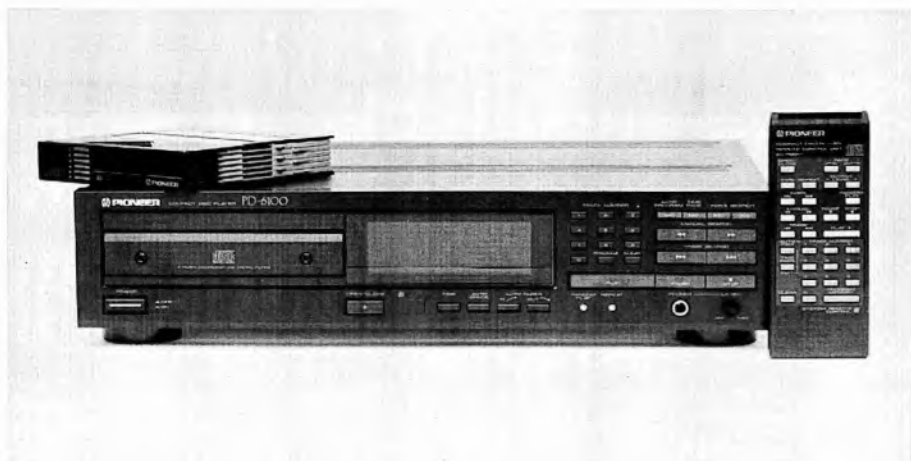
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# PIONEER PD-6100

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

BEST BUY



Pioneer started out as one of Japan's specialist hi-fi companies and has stayed true to its roots ever since, though it has also expanded sideways to become a major force in in-car hi-fi, and has acknowledged expertise in optical disc technology in its widest sense.

Years of producing Laservision players for the US and Japan markets provided good early practice for the arrival of compact disc, and Pioneer was certainly the first to produce a so-called 'combi' player, capable of playing both digital audio and video optical discs. It is not surprising that the brand will be Philips' main ally in the Autumn launch of CD Video, but in the meantime it still holds a key position amongst the conventional CD player market leaders, helped by a substantial midi system presence. The £250 PD6100 is an elaborately specified prime contender.

Black with muted gold lettering and lots of buttons gives the '6100 a vaguely menacing air - it definitely looks macho even if picking it up soon shatters any illusions (but they'd be funny neighbours if they tried to do that, wouldn't they?). It has Pioneer's honeycomb base to aid mechanical integrity, but has a rather rattly ribbed metal wrap.

The sensibly laid out control panel is plastic and the controls themselves feel a bit plasticky too, especially the on/off and headphone volume. There are large, cosmetic plastic feet and a largish and very complex display, so the whole might be rather overelaborate for some users. There are separate buttons for track and index skipping; there's auto edit, time, auto space, in/out auto fading, plus shiny little gold buttons for repeat and random play, and a 10 button track entry keypad for programming. All is duplicated on the remote handset, while the back panel provides a digital bitstream output alongside the conventional analogue phonos.

Inside, the small, single power supply transformer uses standard grade capacitors

but more than the usual number of separate regulator chips. The single board uses a Pioneer control microprocessor, Sony digital chips with 4X oversampling filter and two Burr Brown PCM56P DACs, with the normal analogue filtering and dual JRC5532 op-amps. The disc drive is mainly plastic, with a metal section for the laser mounting, while the CD clamp has a large built-in stabiliser, and the whole subchassis is decoupled on rubber mountings.

## LAB REPORT

The frequency response is very flat, absolute phase is maintained, and phase is linear, though de-emphasis measures 0.23dB dull at 5kHz (relevant with the pre-emphasised CDs, which includes many of those made in Japan). The output level is a full 1.7dB above the CD standard, and although the source impedance is on the high side, this will clearly favour the 6100 in comparative listening unless levels are carefully readjusted.

Dynamic range linearity is not too impressive, averaging 15bits but with a noteworthy discrepancy between the channels, and the low level sine wave shows significant nonlinearity. Dynamic range is reasonable, ultrasonic noise is very low and stereo separation and channel balance are both good. Harmonic distortion is fine but the intermodulation result is below average. Error correction and shock/vibration immunity are both good, and mechanical noise is low, but there is clearly room for some tightening up of electronic alignment standards.

## SOUND QUALITY

The 6100 sounds good overall, which is impressive for the price, with extended and powerful bass that has good pace, but is still a little short of 'attack' on transients. Mid-range vocals are clear and articulate, with good definition, but the treble has slight

'edge' and 'grain' despite being detailed, informative and well balanced.

Stereo images show very good focus and the soundstage is generous in scale, if less so in depth, though even this limitation would only be noticeable in top flight systems. Overall this is a well balanced, lively and articulate performer.

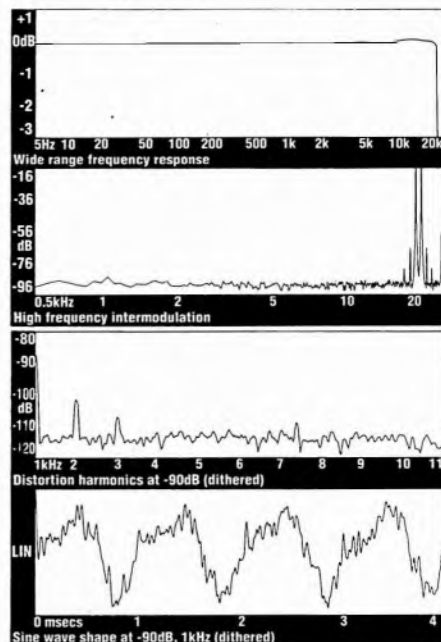
## CONCLUSIONS

This fine sounding, competitively priced, fully featured player has an impressive appearance (for those that are impressed by such things) and adequate lab performance, so it clearly deserves a Best Buy rating.

## TEST RESULTS

Test resolution (L/R av)		15 bits*	
Output level, source impedance		2.43V, 1.69dB, 1kOhm	
Effective dynamic range		102dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-93dB	-90dB	-83dB
	(0.0022%)	(0.0032%)	(0.0079%)
Ref -70dB		-30dB	
Stereo separation	115dB	108dB	92dB
Stereo balance L/R	0.01dB	0.02dB	0.24dB
Frequency response (20Hz to 20kHz)			-0.38dB
High frequency intermodulation			-86dB (0.071%)
Electrical noise (CCIR ARM, 1kHz)			-103dB
Mechanical noise			low
Ultrasonic noise			-113dB
Error correction			1.1mm gap
Shock/vibration resistance			good
De-emphasis			-0.23dB at 5kHz
Track finding speed (15, YEDS 2)			4 secs
White noise overload test			OK
Size (w x d x h)			42.1 x 33 x 9.9cms
Typical price inc VAT			£250

\*averaged; channels differ on linearity



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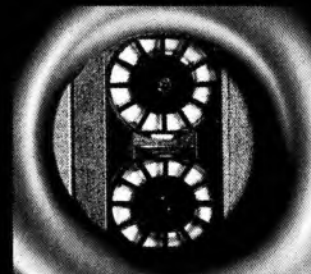
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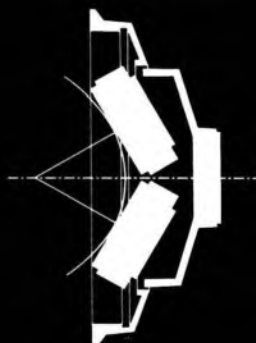


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# PIONEER PD-M500

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

BEST BUY



One of Japan's earliest hi-fi specialists, Pioneer has stayed true to the specialist and avoided becoming involved in downmarket consumer electronics for decades, though it has a major slice of the midi system, camcorder and upmarket in-car hi-fi markets, and an internationally respected track record on optical disc replay technology, including the Laservision video discs which preceded CD. Inevitably therefore it was well placed to take advantage of the CD format's success, and is certainly amongst the leading UK brands in sales. It also has much the largest share of the market niche for CD autochangers – to the point where the Pioneer 6-disc caddy could well become a de facto standard eventually.

The *FD-M500* is one such autochanger, and although it does cost rather more than the Goodmans (née Funai) model also reviewed, £270 is still pretty reasonable nonetheless. Having had plenty of practice, Pioneer is getting rather good at caddy changers, and the mechanism works smoothly and slickly while the remote handset, fascia control layout and display make a fine job of coping with the inevitable complexities.

The machine as expected sits on Pioneer's honeycomb base and silly cosmetic feet, with the plastic fascia surrounded by a slightly rattly ribbed wrap. The control surfaces more or less separate the drive functions (including random play and a volume controlled headphone socket) from the programming pad (1-0, time/fade/edit, time, repeat, discs 1-6). Display is detailed if rather cramped and small to read at a distance. The handset incorporates remote volume besides (0dB down to -25dB only), through the sole pair of analogue phono outputs.

The control system uses Pioneer's own microprocessor, while 4X oversampling Sony chips feed a dual 16-bit Sanyo DAC. Clean single board construction includes some

selected audio grade components, and build quality is good, with easy servicing but some exposed mains internally.

## LAB REPORT

The response shows very slight high frequency unevenness and boost, while phase is correct and linear, in spite of the shared DAC. Distortions are unexceptional throughout, with indications of mild limiting at high modulation levels – note the HFIM figure and graph. Background noise is also higher than expected, while error correction and shock/vibration rejection are only adequate. The dynamic range resolution is a pretty respectable 15.5bits, though the sinewave shape at -90dB is distinctly mucky. And 7.5 seconds for finding a designated track is pretty quick for an autochanger – half the time the Goodmans took.

## SOUND QUALITY

Perhaps predictably the *M500* fell a little short of the single play *6100*, but perversely it was rated a little better than the *M700* overall, though all three Pioneers fall in the broad good overall sound quality category.

A lively and solid performer, the bass here is pounding and powerful – nice and snappy in the upper bass if a little heavy lower down. The midrange has good tonal balance and definition, while the treble is decent enough, well detailed if slightly marred by mild 'edginess', 'grain' and 'tizz'. Stereo images have good width, depth and focus, and dynamics are also good, the overall sound being satisfying and involving.

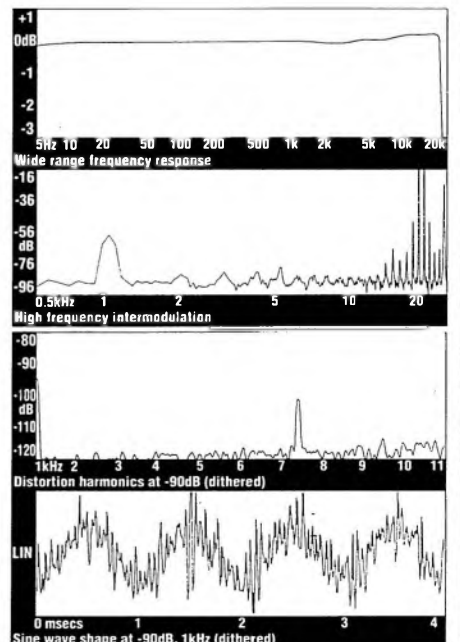
## CONCLUSIONS

As tends to be the case with Pioneers, this machine is somewhat complex, with a range of controls not for the technofainthearted. Nor did it perform too creditably in the lab, but the sound is good, the autochanger is

pretty slick, and the range of features is very impressive at the £270 price, so a Best Buy rating is inevitable, depending perhaps on the value attached to the multidisc facility.

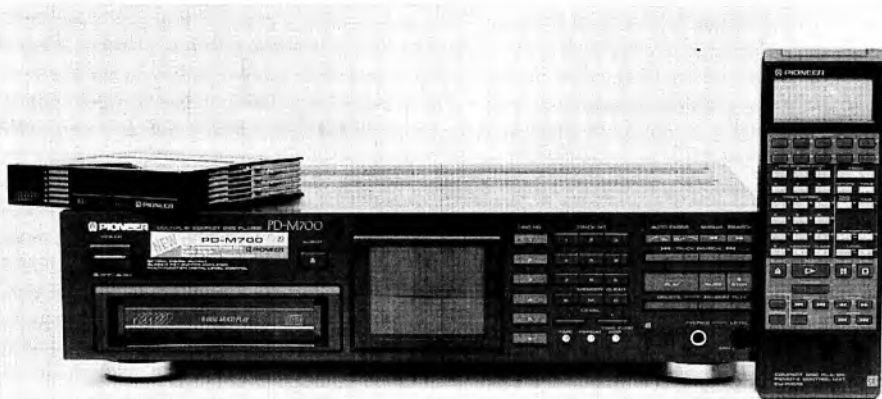
## TEST RESULTS

Test resolution (L/R av)	15.5 bits		
Output level, source impedance	2.17V, 0.7dB, 1Kohm		
Effective dynamic range	100dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-75dB (0.0168%)	-73dB (0.022%)	-61dB (0.089%)
Ref -70dB	-27dB		
Stereo separation	121dB	98dB	72dB
Stereo balance L/R	0.01dB	0.03dB	0.35dB
Frequency response (20Hz to 20kHz)	-0.56dB		
High frequency intermodulation	-56dB (0.16%)		
Electrical noise (CCIR ARM, 1kHz)	-95dB		
Mechanical noise	high		
Ultrasonic noise	-103dB		
Error correction	0.9mm gap		
Shock/vibration resistance	average		
De-emphasis	+ 0.04dB at 5kHz		
Track finding speed (15, YEDS 2)	7.5secs		
White noise overload test	OK		
Size (w x d x h)	42 x 33 x 10cms		
Typical price inc VAT	£270		



# PIONEER PD-M700

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



Long established Japanese hi-fi specialist Pioneer has a particular strength in optical disc products, having been involved in the technology since the early days of LaserVision. Indeed it was certainly the first company to master the difficulties in playing both LV analogue videodiscs alongside CD digital audio discs in the same machine.

The company's other CD specialisation is in multidisc autochangers, based on a 6-disc caddy which is inserted into the machine – and which is also compatible with an in-car autochanger system the company sells.

The £400 *M700* is a luxury, upmarket model, costing £150 more than the *M500*, yet even that player is virtually overburdened with facilities, so where has the extra money gone? Well it's not in the weight, which has only gone up 10 per cent or so. But the under-skin engineering is distinctly heavyweight, technologically speaking (see below), and the handset is something else – worth a paragraph (if not a feature article) all of its own!

It's a transmitter LCD display handset, a little like those that are already popular amongst mid-price videorecorders from Hitachi and many others. This means you punch in your chosen program (covering all six discs if desired) into the handset from the comfortable seating of your favourite armchair, assisted by the LCD display. When you're satisfied that the programming is correct you 'squirt' the data at the machine so it can start carrying out the instructions. It also has ten on-board memories, the idea being that you can keep your CDs in caddys and memorise pre-programmed instructions for ten caddys of discs – 60 discs in all, and with an eight character caddy identification title facility built into the handset. It is also likely (and logical) that the handset and transmitter programming, as well as the caddys, are compatible with the multidisc in-car player, so that track programming can be carried out

indoors and then transferred to the car.

As for the rest, if you want it, chances are the *M700* has it – electronic remote volume, elaborate high quality display, fades, repeat, edit etc. etc. And the rear has switchable electrical and optical digital outputs alongside the variable only analogue pair.

Beneath the ridged metal cover and built on one of Pioneer's proprietary honeycomb embossed bases are quite extensive power supplies. Sony servo and error correction chips plus Yamaha 8X oversampling and digital filtering, are followed by two 16bit Burr Brown *PCM56P* DACs with MSB (most significant bit) adjustment. The whole construction is very solid.

## LAB REPORT

The upgraded engineering in this upmarket autochanger is clearly reflected in a superior lab performance over the *M500*. With just one exception the *700* measures significantly better, and indeed delivers a very fine overall technical performance.

The exception is an output level more than a dB above the standard, which is a trap for wary comparative listeners to avoid. The effective dynamic range might have been better too, but all harmonic and IM distortions are under very good control. Dynamic range linearity is a very good 15.8bits and –70dB distortion is very good, but the –90dB sinewave is a bit rough. Ultrasonic noise is very low and error correction very good, while the track access time is the fastest yet for an autochanger.

## SOUND QUALITY

Despite the fine lab performance, the sound quality was considered a little disappointing considering the £400 price tag, and although still just falling in the 'good' category, in fact it was rated below the *M500* overall. The bass sounds strong and powerful, deep and solid –

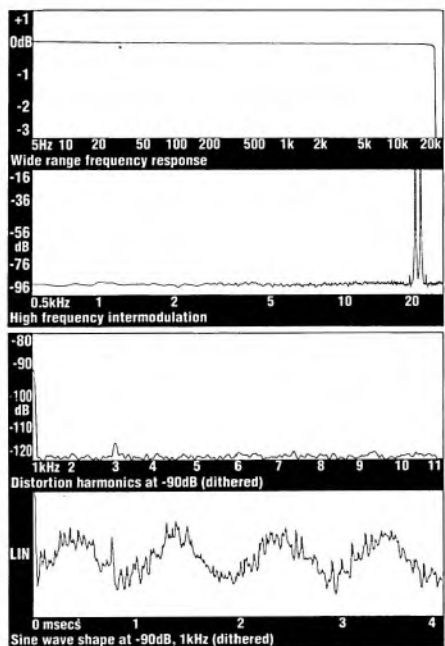
something of a Pioneer trait – but midrange transients seem a trifle 'deadened' and there is some 'hardness'. The treble band sounds a shade old fashioned with mild 'fizz' and 'edge'. Dynamics and detailing are fairly good while stereo imaging is above average.

## CONCLUSIONS

This is a fascinating player due to the extraordinary handset's unique programme storage and transmitter capability. It also has a fine, fast autochanger, good build quality and excellent lab performance. But the price is a shade high considering the listening test findings, which are mildly disappointing.

## TEST RESULTS

Test resolution (L/R av)		15.8 bits	
Output level, source impedance		2.33V, 1.33dB, 1Kohm	
Effective dynamic range		97dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	–95dB	–92dB	–85dB
	(0.0017%)	(0.0025%)	(0.0056%)
Ref –70dB		–37dB	
Stereo separation	125dB	121dB	101dB
Stereo balance L/R	0.06dB	0.05dB	0.13dB
Frequency response (20Hz to 20kHz)		–0.26dB	
High frequency intermodulation		–103dB	(0.0007%)
Electrical noise (CCIR ARM, 1kHz)		–104dB	
Mechanical noise		average	
Ultrasonic noise		–114dB	
Error correction		1.3mm gap	
Shock/vibration resistance		average	
De-emphasis		–0.17dB at 5kHz	
Track finding speed (15, YEDS 2)		6.5 secs	
White noise overload test		OK	
Size (w x d x h)		42 x 32.5 x 10.6cms	
Typical price inc VAT		£400	

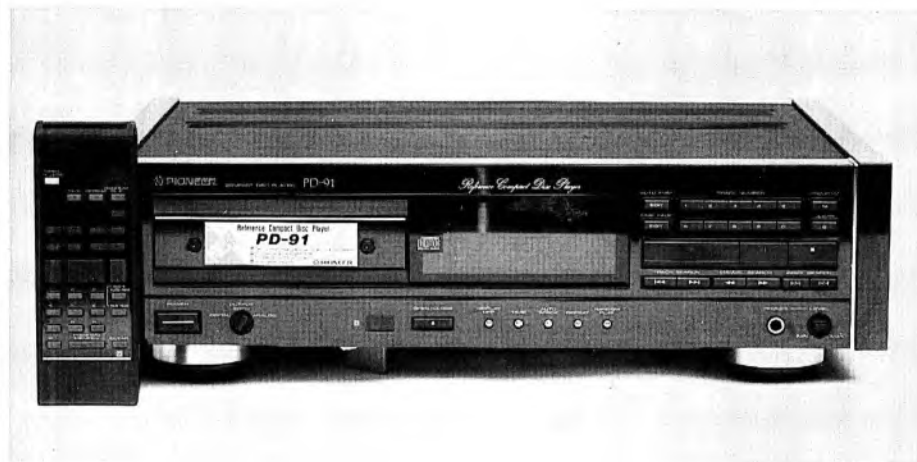




# PIONEER PD-91

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

RECOMMENDED



An imposing player with an overhanging mains transformer at the back, Pioneer's flagship *PD-91* is dressed to kill in very Japanese home market style – flowing typefaces on the fascia, wood end cheeks made to look like real plastic, shiny trim, and so on. Predictably well endowed, features include optical and electrical digital outputs, a 20 track calendar readout and 24 track memory, index search, random access track on the player and the remote handset, phrase repeat, auto-space, various tape editing aids and many, many more. There is no volume control on the output except on the headphone line, but it is possible to switch either digital or analogue sections off where appropriate, and also the display, in the cause of improved sonics.

## LAB REPORT

The *PD-91* is a sophisticated beast. Starting with the physical aspects, real efforts have been made to reduce microphony and deal effectively with electrical and magnetic interference. The transformer is decoupled on anti-vibration mountings, while the chassis is copper plated and the base strengthened by being pressed in a honeycomb shape. The top plate is damped too. The *91* also has quite extensive internal screening, and transport metalwork is copper plated – as are the various screws used to hold the unit together. Although a single PCB is used for all circuit functions, the audio section is divided off with its own power supplies and mains output filter. The output sockets are of good quality, and optical coupling is used where appropriate.

The Pioneer is fitted with two new type Burr Brown PCM65P DACs, one per channel. Conversion is true 18-bit with 8x oversampling – not, it seems, the range switching type pseudo-18-bit conversion used elsewhere. The anti-aliasing filters are low order

analogue networks using high grade components.

The DACs can be trimmed for linearity to improve low level resolution, which measures almost perfectly on both numerical and waveshape grounds. Other circuitry comes mainly from Pioneer and Sony. It's nearly all good stuff, with plenty of good quality electrolytics and film caps, including copper foil polystyrenes. Muting and de-emphasis are controlled by solid state switching, which on the face of it is not a wonderful idea.

Lab test results were state of the art with the exception of full level intermodulation which rates just plain 'good'. Output voltage is quite high but source impedance only moderate, which could affect installations using long interconnects. Tracking ability was good on the official test discs but less so on some naturally marked discs where the ability to stay with the music was if anything slightly below average.

## SOUND QUALITY

This is a player that actually lives up to its billing and genuinely is state of the art – or close to it. The player has tremendous class – it is poised, refined and gives a large, positive image of the music, but with first class control and definition. I was particularly impressed by the frequency extremes, the bass for its tunefulness and the ease with which individual bass lines could be followed, and the top end for its clarity and cleanliness. In a more general way, I was impressed by the sheer amount of detail that was pulled off disc, and the quality of organisation, the way the detail was presented and held together in a neutral and believable manner. The only obvious failing, if it can be called that, is in the upper midband which by the best standards was inclined to sound a touch strident, or at least obvious.

Shutting off the display had a surprisingly

beneficial effect, reducing a trace of low frequency 'waffle' and sharpening up the precision with which the images of individual instruments were placed in the arc between the loudspeakers.

## CONCLUSIONS

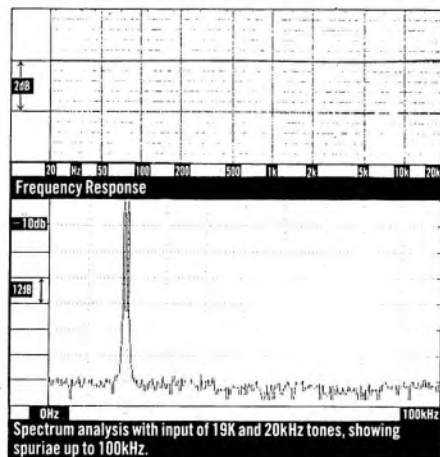
This is a very impressive product, and a flagship CD player Pioneer can be proud of. Construction and 'feel' is first-rate. Recommended.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.20dB	0.22dB	0.14dB
Stereo separation	130dB	128dB	114dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-104dB	-102dB	-85dB
Total harmonic dist, -10dB	—	-89dB	—
Total harmonic dist, -60dB	—	-49dB	—
Total harmonic dist, -80dB	—	-29dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-87dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-93dB
Frequency response, left channel	-0.02dB	0dB	0.02dB
Frequency response, right channel	-0.02dB	0dB	-0.04dB
Signal-to-noise, 20Hz-20kHz unweighted	110/112dB with/without emphasis		
Signal-to-noise, CCIR/ARM, 1kHz ref	106/109dB with/without emphasis		
Output level, 0dB, left/right	2.31V		
Output impedance	460ohms		
De-emphasis 1kHz, -0.38dB; 5kHz, -4.52dB; 16kHz, -8.50dB			
Track access time	1.5 secs		
Error correction capability	>900µm gap, >800µm dot		
Mechanical noise	very low		
Spuriae up to 100kHz	-106dB		
Resolution at -90dB	-90.2dB/90.1dB		
Headphone socket	yes, variable - 120ohm		
Dimensions (w x d x h)	46 x 43 x 12.6cm		
Estimated typical purchase price	£800		

Reviewed by Alvin Gold

Reprinted from issue No. 61



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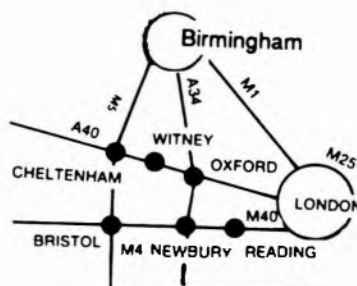
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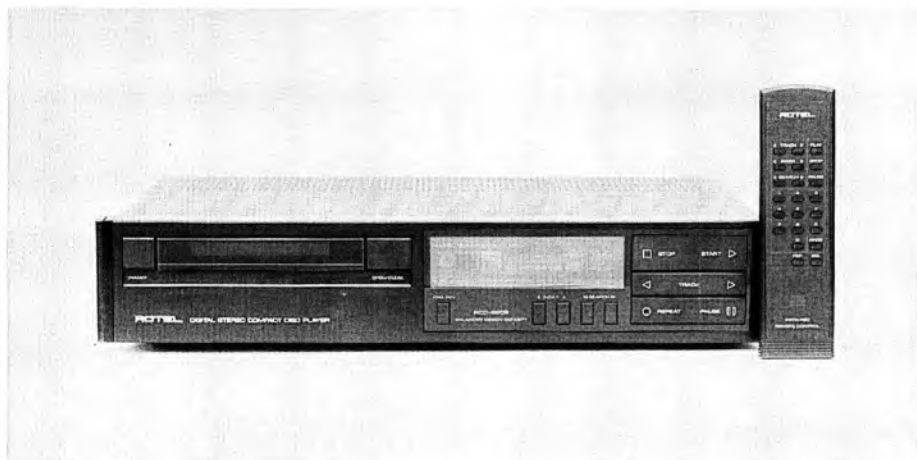




# ROTEL RCD-820B

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

BEST BUY



Like the superficially identical though sonically more distinguished *820EX2* (reviewed May '88, see *Directory*), the £210 *820B* is mostly sourced from Philips' Hasselt factory, which is no bad thing, and is differentiated from other Philips clones by custom display and front panel components from the Far East – notably the little plastic 'ears' at each end of the fascia.

It's a very lightweight affair with plastic base and front and metal wrap. All feels rather flimsy, but the important controls for start/stop, track skip and repeat/pause are large and clearly labelled. Smaller buttons cover index skip and fast search, plus the unfortunately marked 'prg rev' (which in practice is probably best ignored in favour of the direct track entry remote handset). The display is small, and at least 15 per cent is wasted by the infra red logos. The whole affair feels very plasticky, particularly the on/off button, though there's no reason why that should adversely affect the performance in any way.

The rear panel has a little heatsink, gold plated analogue phono sockets plus a single digital bitstream phono. Odd knockout panels like those found at the back of 13amp or telecom sockets to allow optional wire routing are incorporated in the rear panel plastic moulding, for some unrevealed yet presumably innocent reason.

The internals comprise the normal 4X oversampled, digitally filtered Philips double DAC chips. There's no evidence of any audiophile type components, which are presumably restricted to the significantly more expensive *BX2* variant.

## LAB REPORT

The number of permutations available from the Philips parts bin is now quite extensive, but close examination of the lab test findings usually shows up the basic formula adopted

for any particular model. The *820B* clearly lacks the shock immunity of the latest mechanism fitted to the more expensive Marantz *65SE*, and falls a little short in distortion and channel separation too. But the low level linearity is similarly an improvement over earlier Philips models, suggesting that the latest DACs are fitted here.

The recent changes in measurement procedures makes direct comparison to the *BX2* a bit tricky, but where possible it is hard to detect any difference between the two. If anything the steady improvement over six months of production is probably responsible for slight improvements in noise, both in and out of band, while stereo separation splits the differences and is now more consistent across the frequency band. There is nothing much to cause any concern, though the output level is nearly 1dB above the standard (and the *BX2*), which might be just sufficient to shift the odds unfairly in its favour during comparative auditioning.

## SOUND QUALITY

The overall rating for this model sits on the boundary between the 'goods' and the 'fairs', which suggests that 'fairly good' might be a fair summary – or a little above average if one wishes to split a few hairs. Whatever, it's pretty much the sort of result one might have expected from Rotel's baseline model, and impressive enough considering the modest price.

The midrange sounds a touch 'hard', though quite clear, and the treble is a little softer and sweeter than equivalent Philips/Marantz models, though whether this is a good or bad thing will be open to question, and perhaps a matter for the subtleties of system fine tuning. The bass is also a shade 'softened', with some unwelcome overhang and heaviness – not to any substantial degree, but sufficient to slacken the subject

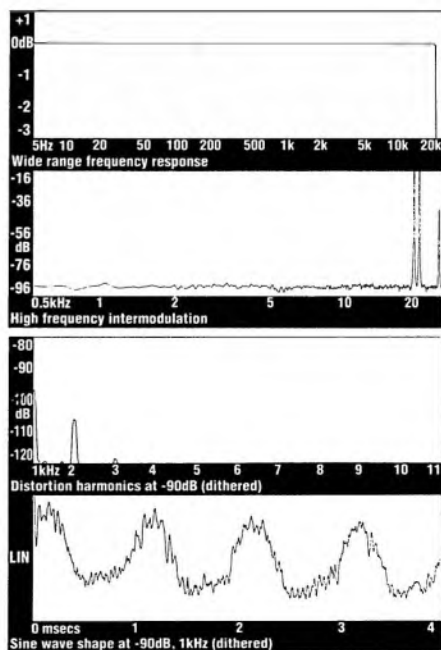
tive pace of music a little. Stereo soundstages are thoroughly respectable, with pretty good depth resolution and overall dynamics.

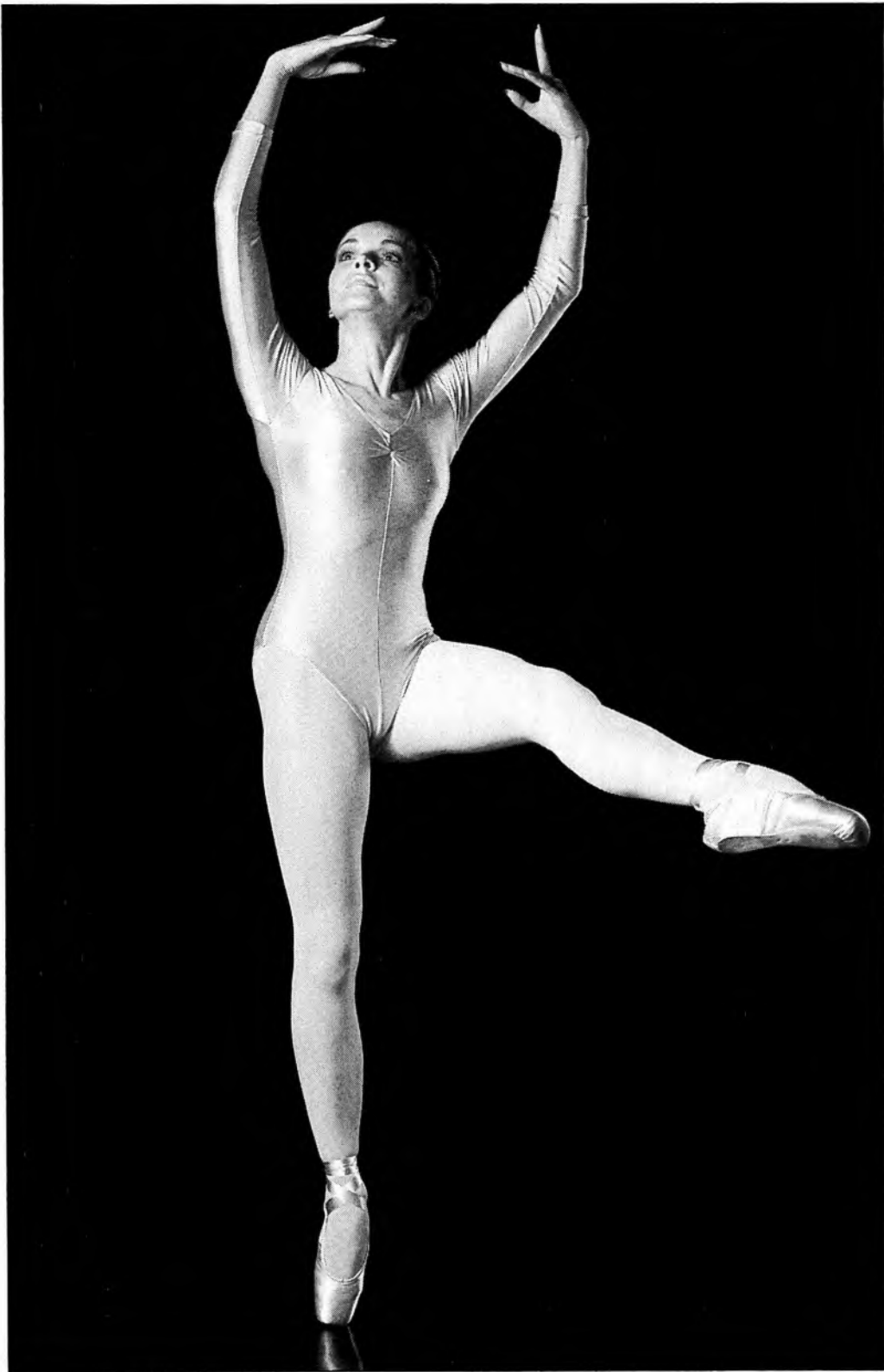
## CONCLUSIONS

Although it isn't a sonic match for the £300 *BX2*, the standard 'cooking' *820B* model is still a very competent performer that delivers above average sound quality at significantly below average price, which is sufficient to generate a Best Buy endorsement. The build quality is a touch on the tacky side of neutral, but the operator only needs to rise from his/her chair in order to change the discs, so why pay more?

## TEST RESULTS

Test resolution (L/R av)		15.4 bits	
Output level, source impedance		2.2V, 0.82dB, 200ohms	
Effective dynamic range		103dB	
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-96dB	-87dB	-86dB
	(0.0015%)	(0.0045%)	(0.005%)
Ref -70dB		-32dB	
Stereo separation	107dB	106dB	100dB
Stereo balance L/R	0.05dB	0.05dB	0.09dB
Frequency response (20Hz to 20kHz)			±0.03dB
High frequency intermodulation			-94dB (0.002%)
Electrical noise (CCIR ARM, 1kHz)			-106dB
Mechanical noise			average
Ultrasonic noise			-111dB
Error correction			>1mm gap
Shock/vibration resistance			average
De-emphasis			±0.1dB at 5kHz
Track finding speed (15, YEDS 2)			4 secs
White noise overload test			OK
Size (w x d x h)			44.5 x 30 x 8.6cms
Typical price inc VAT			£210





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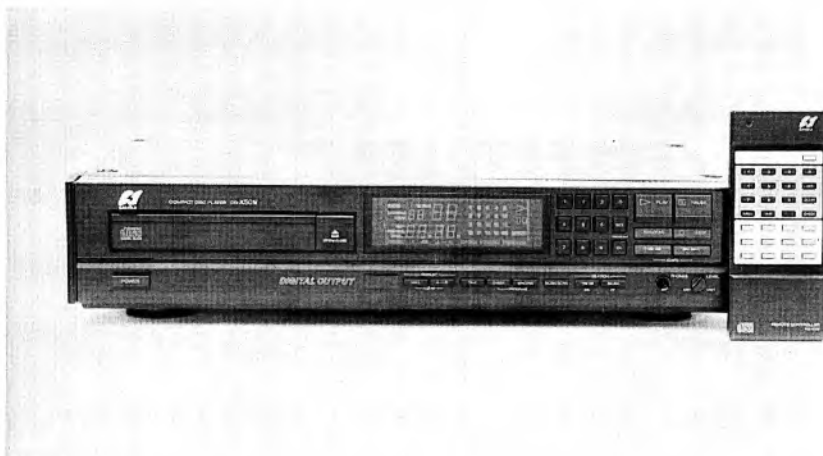


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# SANSUI CD-X501i

SANSUI ELECTRONICS UK LTD., AXIS 4, RHODES WAY, WATFORD, HERTS. WD2 4YW. TEL: (0923) 226499.



Sansui has held a strong reputation for good sound quality since the very early consumerisation of the UK hi-fi market. However, its fortunes have been less happy in the past few years, the company suffering financially from being significantly smaller than many of its rivals. In 1987 the Japanese parent embarked on a major facelift, complete with a pretty new logo, while UK distribution shifted from a subsidiary company to one of Britain's leading specialist hi-fi distributors. But even these initiatives don't yet seem to have generated the extra sparkle needed to restore the brand's earlier strength.

Given a little more time and a 'hit' model or two all that could change, though the *501i* doesn't seem a particularly likely candidate. Superficially it's a pretty and potentially promising package, competitively enough priced at £299 considering the substantial metal casework and beautifully finished glossy black plastic fascia, all sitting on large – and largely cosmetic – gold feet.

The generous feature count includes a big (if far from discreet) display with track calendar and lots of detail, direct track entry keys and a nice control layout that is instinctively easy to use. There are two repeat functions, and switches for time, check, spacing and music scan. A digital output socket accompanies the analogue pair on the rear, and the front panel headphone socket has its own volume control. The remote handset is similarly well equipped, with its own set of track entry keys and the potential to impress the neighbours by instructing the drawer to open or close.

Neatly built on a single PCB, the internals owe much to the Sony 2X oversampling chip set which covers digital filtering and error correction. Separate Burr Brown 16-bit DACs have pre-set MSB (most significant bit) adjustment, so decode accuracy ought to be high. Analogue filtering uses multiple op-

amp ICs, with no evidence of audio oriented component selection. Rubber grommets on the metal chassis help isolate the disc transport from vibration effects.

## LAB REPORT

Dual DACs ensure there is no interchannel phase discrepancy at high frequencies. Channel balance is excellent, while separation measures very well at lower frequencies, but deteriorates to an average of only 62dB at 20kHz. The frequency responses are certainly flat enough, with just a mild rolloff at very high frequencies. Harmonic distortion figures are satisfactory at 0dB and -10dB, while the high frequency IM distortion is very good indeed – the -93dB figure at -10dB level is close to the theoretical minimum.

Low level measurements are rather less satisfactory, showing significant compression – 1.6dB at -70dB, 4.5dB at -80dB and 9.5dB at -90dB. Although the low level sine wave signals were certainly recognisable (which is not always the case), odd order distortion products are at a highish -23dB (7 per cent). Linearity is only really maintained until the 14th bit, though information is still recovered below this level. Basic signal-to-noise ratios are fine, as is the de-emphasis circuitry.

## SOUND QUALITY

Despite promising physical presentation and mostly competent test results, the sonic performance of the *501i* was something of a disappointment considering the price. Pleasantly rich and 'creamy' – rather resembling the balance of a good vinyl disc source – the sound is also distinctly 'laid back' and listeners commented on a 'sleepy' pace, lacking in dynamic interest.

Yet despite the somewhat distant presentation, the treble sounds a little 'splashy' and the upper mid adds some unwelcome 'grain'.

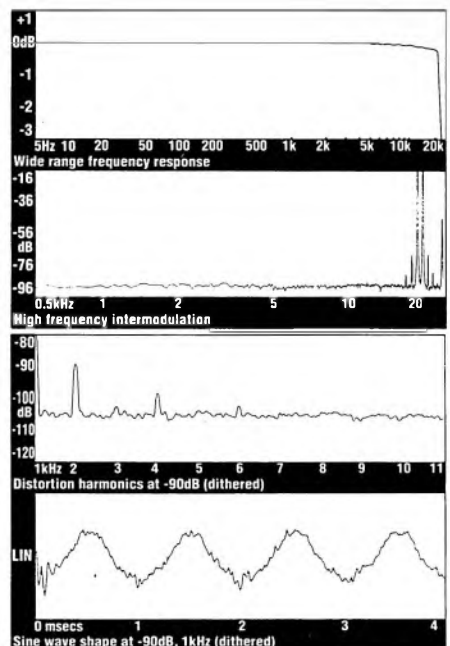
Transparency is clearly below the best, stereo images are a little vague and the soundstage falls short of the full depth and width the CD medium is capable of delivering. The bass sounds powerful yet is also a little heavy and ponderous, lacking both timing and agility in comparison to reference players at a comparable price.

## CONCLUSIONS

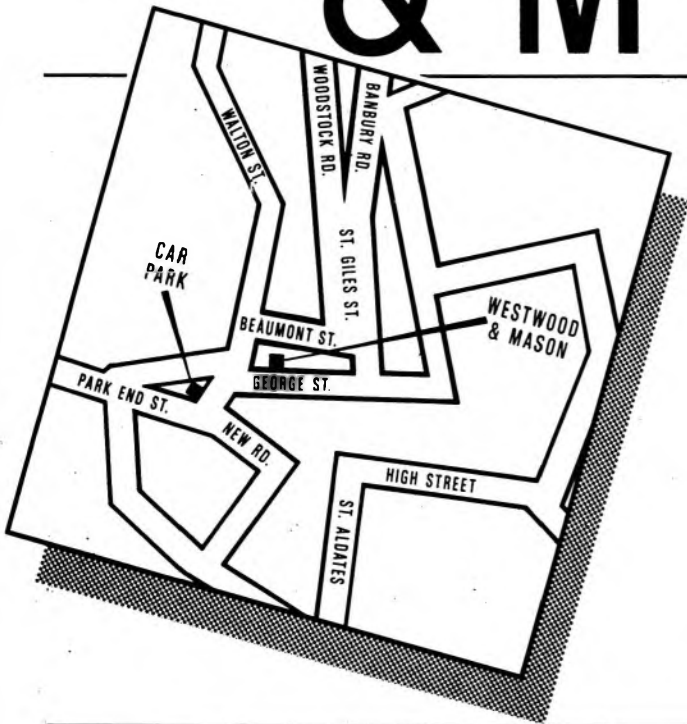
Beauty in this case goes insufficiently far beneath an admittedly very pretty exterior. The *501i*'s technology lags behind the current market leaders – and so for that matter does its sound.

## TEST RESULTS

Test resolution (L/R av)	14.2 bits		
Output level, source impedance	2.04V, 960ohms		
Effective dynamic range	93dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-86dB (0.005%)	-88dB (0.004%)	-86dB (0.005%)
Ref -70dB	-23dB		
Stereo separation	107dB	87dB	63dB
Stereo balance L/R	0.02dB	0.01dB	0.01dB
Frequency response (20Hz to 20kHz)	±0.35dB		
High frequency intermodulation	-99dB (0.0011%)		
Electrical noise (CCIR ARM, 1kHz)	-102dB		
Mechanical noise	low		
Ultrasonic noise	-112dB		
Error correction	>1mm gap		
Shock/vibration resistance	good		
De-emphasis	+0.03dB at 5kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	OK		
Size (w x d x h)	45 x 32 x 9.7cms		
Typical price inc VAT	£299		



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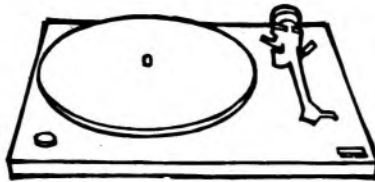
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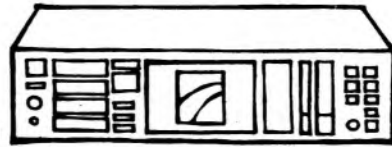
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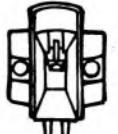
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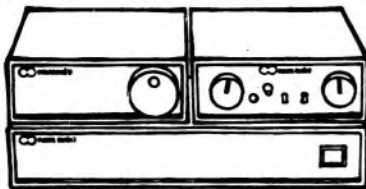
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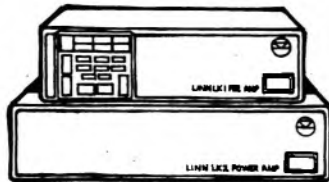
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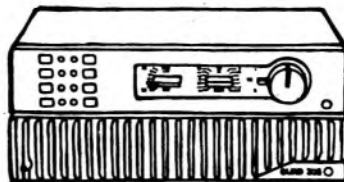
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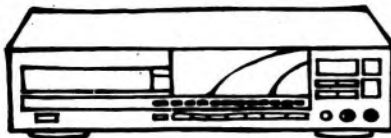
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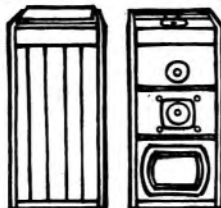
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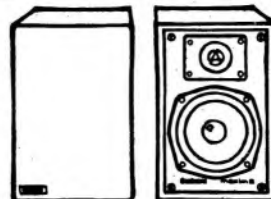
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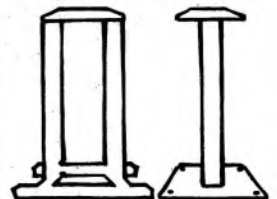
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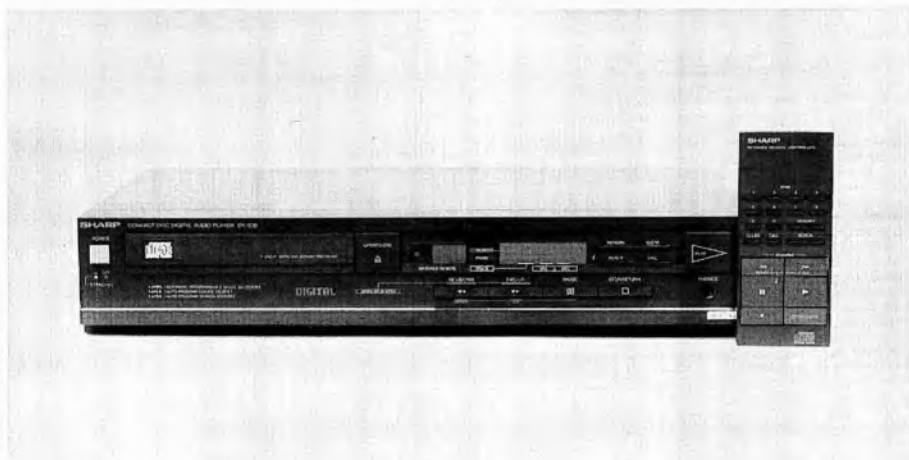
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# SHARP DX-620

SHARP ELECTRONICS (UK) LTD., SHARP HOUSE, THORP ROAD, MANCHESTER. TEL: (061) 205 2333.

BEST BUY



Sharp has never been a strong force in the hi-fi separates market, though attempts were made to establish an Optonica brand a number of years ago. Since that time the company has stuck to mainstream consumer electronics, operating across a broad front covering audio, video and even innovative kitchen appliances, with notable success in portable audio. The company is also an acknowledged leader in the exciting field of colour liquid crystal display technology, and has a number of good quality midi systems to add credibility to this £200 full width player.

Designwise it must be one of the prettiest players on the market, and the remote handset is a genuine tour de force amidst the morass of identikit mediocrity that best characterises the design thought normally given to handsets. Colour-coded transport controls are an innovation in themselves, and the fact that these buttons are similar in size to those on the machine itself makes one wonder why on earth nobody has done this before.

The player itself is a smartly presented slimline with basic metal chassis/wrap and moulded plastic front, and is built in Japan. There are shades of the same stylishness that distinguishes the handset, notably the large play button with its green triangle logo. Other large buttons cover open/close, stop, pause and 'fwd up/rev down', while tiny buttons are used for memory, clear, repeat and call. There's a headphone socket but no attendant volume control, so it's best forgotten about.

Sadly this potential ergonomic delight is marred, partly by the very tiny display but also by Sharp's determination to take its own route to the search and find functions - readers with long memories of cassette decks or recent experience of midis and portables will recognise this long held company obsession. Various combinations of cue, review and pause buttons are used to obtain such fea-

tures as APMS (auto program music selector), APLD (auto program locate device) and APSS (ditto search system). All of which is fine for those prepared to learn the codes and/or unfamiliar with current CD player practice, but it's less intuitive than more familiar single button operations.

The power supply uses a small transformer to feed standard grade Nichicon capacitors, with the basic minimum of IC regulators. The digital section is a mixture of Yamaha and Sharp chips, driving a time-shared NEC DAC with 2X oversampling, the subsequent analogue signals passing through standard LC filters and op-amps.

## LAB REPORT

There's not much special about the lab performance here. The response is reasonably flat overall, but with some shaping towards the band extremes. Phase is inverted, though reasonably linear despite the channel-shared DAC. The output is half a dB over the standard, but the high output impedance will compensate with many amplifiers.

Dynamic range is below average, and while it shows good linearity, the low level sine wave is notably mis-shapen and the distortion at low levels is also unimpressive. While error correction works well, shock/vibration rejection is only average and noise too is a little below current standards, both electrical and mechanical, while track accessing is a shade slow.

## SOUND QUALITY

Rather contradicting the inauspicious test results and lack of technical sophistication, not to mention the modest price, the DX-620 rated a straight 'good' on the listening tests.

The overall sound is eminently plausible, with no apparent rough edges to disturb the sonic composure. Stereo images are large and well focused, with decent depth and

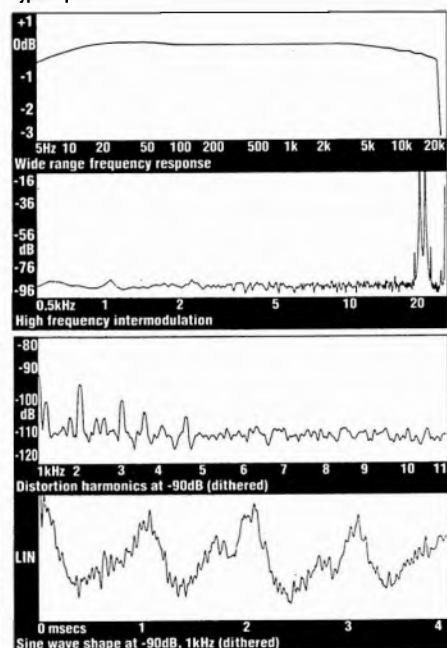
scale. The sound has good pace and above average dynamics. The bass is maybe a little 'hazy', but the midrange is quite neutral and open with only very mild hardness. There is some untidiness on sibilants, but the treble is both lively and detailed.

## CONCLUSIONS

It is always pleasant to discover an unexpected Best Buy amongst the review products, and this pretty Sharp model certainly makes the grade subjectively and stylistically, despite the paradox of very ordinary internals and lab performance. Which just goes to show we still can't reliably predict the sound of a CD player from its measured performance!

## TEST RESULTS

Test resolution (L/R av)		15.6 bits
Output level, source impedance	2.11V, 0.46dB, 1.65Kohms	
Effective dynamic range		94dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-86dB -84dB -80dB	
	(0.0050%) (0.0063%) (0.01%)	
Ref -70dB		-21dB
Stereo separation	81dB 85dB 69dB	
Stereo balance L/R	0.06dB 0.06dB 0.13dB	
Frequency response (20Hz to 20kHz)		-1.8dB
High frequency intermodulation		-83dB (0.0071%)
Electrical noise (CCIR ARM, 1kHz)		-88dB
Mechanical noise		average
Ultrasonic noise		-100dB
Error correction		1.2mm gap
Shock/vibration resistance		average
De-emphasis		+0.1dB at 5kHz
Track finding speed (15, YEDS 2)		4.5 secs
White noise overload test		OK
Size (w x d x h)		42.9 x 31 x 7.8cms
Typical price inc VAT		£200



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# SONY CDP-550

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

BEST BUY



There are few brands better known than Sony, which is widely regarded for innovative engineering and design across a broad range of audio and video consumer electronics (not to mention dominating the world of professional audio and video). As co-developer (and co-marketer in the vital initial stages) of compact disc alongside inventor Philips, Sony has stayed in the leading pack through the format's subsequent progress, and has a very strong market share.

The £275 full width, remote control CDP-550 featured here is one of no fewer than four machines which share the same instructional manual. The CP-350 is apparently a non remote version, while a similar midi width pair are designated the M35 and M55. However, past experience has shown that Sony is apt to ring the technical changes even amongst nominally similar models, so it would be incautious to assume that all these models will perform in precisely the same way.

Frankly, the 550 lacks the sort of design flair normally associated with Sony products – it all looks rather prosaic and ordinary. The control layout is sensible and well labelled, though presumably company ego is responsible for labelling the track skip functions AMS (automatic music sensor) and RMS (random music sensor) – don't ask me why! There are three play modes – program, shuffle or continue/single. It is naturally CD single compatible and has auto space, repeat, plus programming and headphones with volume. The display is small but very busy, with two digital readouts, menu track display and loads of flags. The handset effectively duplicates the front panel, adding a direct track entry keypad, while the rear has analogue outputs only.

A small on-board transformer with the minimum of capacitors and regulators comprises the simple power supply arrange-

ments. Sony control and 4X oversampling digital filters drive Sony DACs and hence to in-line op-amps, with selected grade Nichicon capacitors in the output stage. The disc drive is a low cost type with a plastic tray mounted over a decoupled steel sub-chassis which incorporates the laser mechanism. The plastic base has moulded box sections to improve rigidity, while the steel panels elsewhere are undamped.

## LAB REPORT

The frequency response is exemplary, and phase is both correct and linear, with good filtering. However, high level signals create premature overload, suggesting some silly design error – note the -51dB figure for HFIM and the sidebands on the relevant graph. Some clipping is also seen with white noise. Full level harmonic distortion is also comparatively indifferent, though the -70dB figure is rather good.

Dynamic range linearity is pretty good, but the resolution of the low level sinewave is quite poor, and the effective dynamic range is also lower than average. Output level is pretty accurate, albeit from a highish source impedance, and the de-emphasis error is slightly greater than expected. In all this is not a particularly auspicious set of test results.

## SOUND QUALITY

Despite the lab performance, the sound quality still rates good overall, which is encouraging enough at the price. Soundstages have above average transparency and quite good stereo depth and focus, though the image is a little narrowed and some coarseness was detected on loud passages of complex music.

The bass is tidy and 'punchy', albeit with a slightly 'bumpy' quality. There is some 'brittleness' in the midband, but it is generally pleasantly neutral with nice string tone.

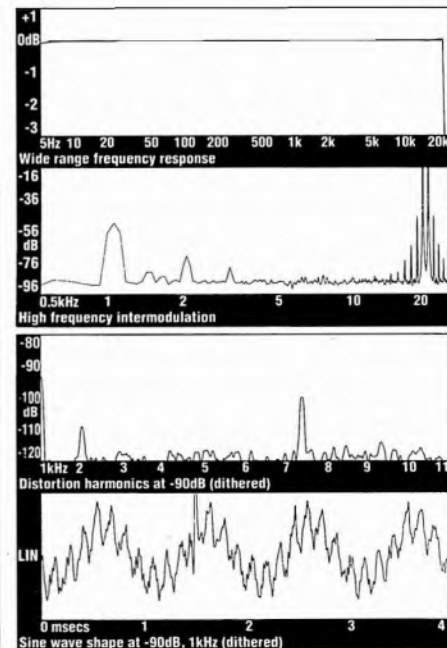
Treble is lively and open, detailed and tidy.

## CONCLUSIONS

Taking price, build, feature count and sound quality into account, the CDP-550 comes out with a Best Buy rating, despite some reservations over the lab performance and a feeling that some of the Sony magic is missing from the presentation.

## TEST RESULTS

Test resolution (L/R av)	15.6 bits		
Output level, source impedance	2.06V, 0.28dB, 2Kohms		
Effective dynamic range	96dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-75dB (0.018%)	-74dB (0.02%)	-76dB (0.16%)
Ref -70dB	-33dB		
Stereo separation	122dB	106dB	79dB
Stereo balance L/R	0.03dB	0dB	0.01dB
Frequency response (20Hz to 20kHz)	-0.2dB		
High frequency intermodulation	-51dB (0.28%)		
Electrical noise (CCIR ARM, 1kHz)	-96dB		
Mechanical noise	good		
Ultrasonic noise	-103dB		
Error correction	1mm gap		
Shock/vibration resistance	good		
De-emphasis	-0.22dB at 5kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	some clipping		
Size (w x d x h)	43 x 33.5 x 9.6cms		
Typical price inc VAT	£275		



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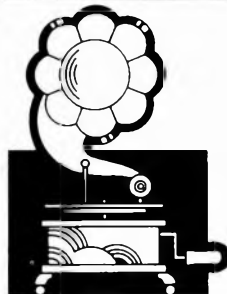
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# SONY CDP-M95

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

RECOMMENDED



Sony was in at the start of compact disc, helping Philips in the later stages of the format's technical development and responsible for much of the initial launch marketing push. The company has therefore added CD to the large roster of products in which it holds a strong international market share, and continues to be responsible for more than its fair share of innovation.

The *CDP-M95* sits out on its own in the range, as a chunkily styled, full feature, midi size player. Selling at a mildly upmarket £280 price point, the *95* has no full width equivalent and is more expensive and heavily featured than all but the three *ES* models, which start at £400. Presumably it will attract standalone sales, though the current fashion here is for full width components, and one notes that the *95* is a strong feature of the upmarket *Series 1000CD* midi system package, which is surely its natural home. By the same token it is the only non-*ES* Sony to have a digital output – both electrical and optical – and this is clearly to tie in with the *770D* 'digital' amplifier which forms part of said system. However, there is no apparent means of switching off the on-board DACs and analogue circuitry if using the player in this way.

All metal in build, if a shade ratty with it, the unit sits on entirely futile though stylistically pretty, large shiny feet. Besides the digital interface, it is also the only non-*ES* Sony with the new Custom File display feature, which has parallels with Philips' FTS (favourite track selection) system but (naturally) goes one stage further. A limited amount of on-board RAM (random access memory) enables users to 'customise' the various CDs in their collections, storing a selection of favourite tracks, adding personalised index points and programming a 10/character (alpha numeric) message for the special display (see front cover). For the rest it's got all the usual features, nicely laid out

for intuitive operation with the main functions on an angled section of the fascia. There are twenty keys for direct track entry on both machine and handset.

Under the skin the power transformer is modest, feeding pretty ordinary supply capacitors – in fact normal commercial grade components are used throughout. Based on one of Sony's standard CD player boards, Sony control and digital filter chips feed a Philips *TDA1541* dual DAC using 4X oversampling. Filtering is the normal RC network around an IC op-amp current-to-voltage converter output stage. The transport is one of Sony's cheaper plastic efforts, but still works smoothly, is quite well decoupled and uses steel to improve the rigidity of the laser head drive.

## LAB REPORT

The overall lab performance is very good, with flat frequency response, linear and correct phase. Harmonic distortion is moderate, intermodulation results are rather below average and the de-emphasis characteristic is a little bright. Although the sinewave shape is rather undistinguished at low levels, the dynamic level resolution is a very good 15.8bits.

Separation and channel balance are both around average, background noise is low and shock/vibration rejection very good. The output level is 0.79dB too high, which is rather naughty, yet perhaps only indicative of a trend in which a number of manufacturers who should know better are allowing output levels to creep up, presumably to out-demonstrate (or avoid being out-demonstrated by) their competitors.

## SOUND QUALITY

The overall rating straddles the 'fair' and 'good' ratings, which is round about average for the group, and might not unreasonably be

described as fairly good. Stereo images are well focused, with unexceptional width and depth. Dynamics and transparency could be better too, and the sound as a whole might have had a little more 'get up and go'.

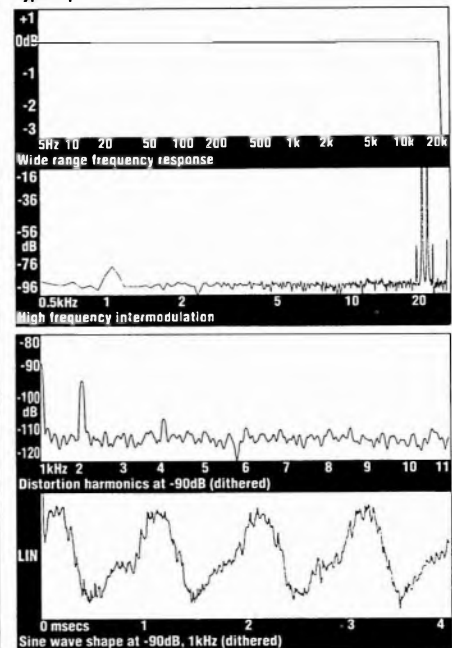
The bass might have had more attack and definition, while the midrange is a little 'rounded', smooth in tonal quality terms but with some loss of detail and low level ambience. Treble is a shade 'dulled' and 'laid back', lacking some transient 'bite' and 'life'.

## CONCLUSIONS

This is a very well equipped midi machine, well built and finished and offering a decent sound quality for the price, so Recommendation is clearly deserved, particularly for those attracted by the wealth of features on offer.

## TEST RESULTS

Test resolution (L/R av)		15.7 bits
Output level, source impedance	2.19V, 0.79dB, 1Kohm	
Effective dynamic range		103dB
Harmonic distortion	20Hz 1kHz 20kHz	
Ref 0dB	-97dB -90dB -87dB	
	(0.0014%) (0.0032%) (0.0045%)	
Ref -70dB		-30dB
Stereo separation	89dB	86dB
Stereo balance L/R	0.07dB	0.16dB
Frequency response (20Hz to 20kHz)		±0.16dB
High frequency intermodulation		-75dB (0.018%)
Electrical noise (CCIR ARM, 1kHz)		-106dB
Mechanical noise		average
Ultrasonic noise		-110dB
Error correction		1.1mm gap
Shock/vibration resistance		very good
De-emphasis		+0.2dB at 5kHz
Track finding speed (15, YEDS 2)		1.5 secs
White noise overload test		OK
Size (w x d x h)		35.5 x 31 x 9.2cms
Typical price inc VAT		£280



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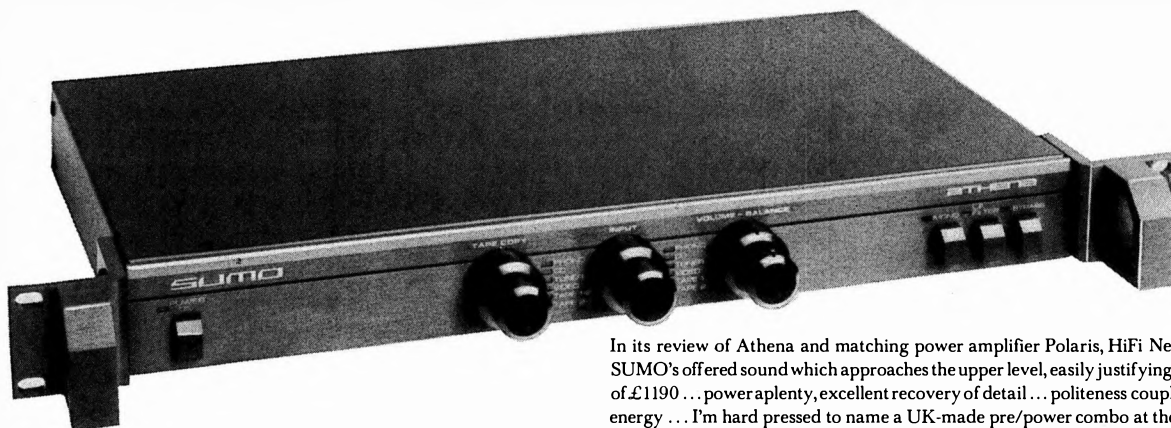
Athena's high-end sound is the result of painstaking

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SUMO products are designed and made in California, and backed by parent company Califone International, a major US manufacturer of educational electronics. SUMO's sound quality is matched by impeccable standards of finish, construction and reliability, and a three year guarantee.



In its review of Athena and matching power amplifier Polaris, HiFi News said 'the SUMO's offered sound which approaches the upper level, easily justifying a total price of £1190 ... power aplenty, excellent recovery of detail ... politeness coupled with real energy ... I'm hard pressed to name a UK-made pre/power combo at the same price point which inspires the same confidence'.

development of every design detail, coupled with the use of the highest grade components. All discrete, Class A circuitry uses 1% metal film resistors and metallized polypropylene capacitors with oxygen free copper leads. Components are mounted on a military grade glass epoxy printed circuit board, and external connections are made via gold-plated sockets. A muting circuit prevents switch-on 'thumps'.

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POLARIS power amplifier: £595

2 x 100w into 8 ohms, 2 x 175w into 4 ohms, 2 x 250w into 2 ohms. MOSFET output stage with active bias correction for transconductance error. No current limiting.

ANDROMEDA power amplifier: £995

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THE NINE PLUS Class A power amplifier: £1195

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## Acoustic Gold



# SONY CDP-557ES

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



The Sony brand needs little introduction, though it is sometimes not appreciated that it is a comparatively young company which is significantly smaller than many Japanese rivals. Productwise Sony is about design flair and innovation, and in fact co-developed CD alongside inventor Philips.

The *ES* series has been one of the more successful hi-fi marketing initiatives in recent years, covering a full range of upmarket components. The *557ES* is the standalone flagship of what is currently a three model *ES* range, costing an extravagant £1,000. This model is enormously heavy and solid, all metal in construction with solid well damped panels and special ceramic feet.

There's all the facilities you can think of and a few more besides, though control of the frilly bits is nicely arranged so as not to interfere unduly with basic operation. To take an inevitable shopping list from the top, there's timer operation, display mode, space/pause, repeat, index (x2), check, clear, file, index mode, plus a 1-20+ keypad for track and Custom file entry, three play modes and headphones with attendant volume. Custom File enables users to pre-program and permanently store both personal favourite track selections from specific discs but also brief written messages, which come up on the large display when the disc is inserted (see front cover). The rear panel carries fixed and variable line out sockets, the latter under remote vol, plus optical and electrical digital outputs.

Examined internally, the superb heavy-weight build is created using properly damped castings throughout - very expensive stuff! Eightfold oversampling is used alongside 18-bit dual linear DACs and Sony's virtually ripple free digital filters. The high speed linear motor laser head is fitted to a solid, well decoupled disc drive. High quality electronic components are seen throughout,

from the generous power supply via the selected audio grade components through to a motor driven remote volume control potentiometer.

## LAB REPORT

For £1,000 one is entitled to expect an exemplary lab performance, and both the figures and graphs speak for themselves. The response is basically ruler flat, with just the suggestion of mild bandlimiting at the extremes, while phase is linear and correct. Resolution is bang on 16bits and the low level waveform is unusually clean and well formed.

The effective dynamic range is very wide, and all distortions are vanishingly low, with superb stereo separation and precise channel balance. Both error correction and shock/vibration rejection are excellent, and background noise is very low, in and out of band. The only quibble is that the output is three quarters of a dB above the standard, sufficient to stack comparative auditioning cards slightly in Sony's favour - surely unnecessary in a prestige model.

## SOUND QUALITY

Despite the encouraging signs thus far, the listeners were slightly disappointed with the *557's* sound quality, rating it on the border between 'good' and 'very good' overall - no mean result in isolation, but not quite the anticipated 'excellent', and in fact somewhat behind the less costly *335ES* assessed for last summer's *Collection* edition. That said, to some extent value judgement at this esoteric level comes down to personal taste, so those interested should take the trouble to make their own minds up.

Ultimately easy on the ears, the sound is perhaps a little too undemanding, and dynamics seem a shade soft and 'slowed'. Stereo soundstages are excellent throughout, with

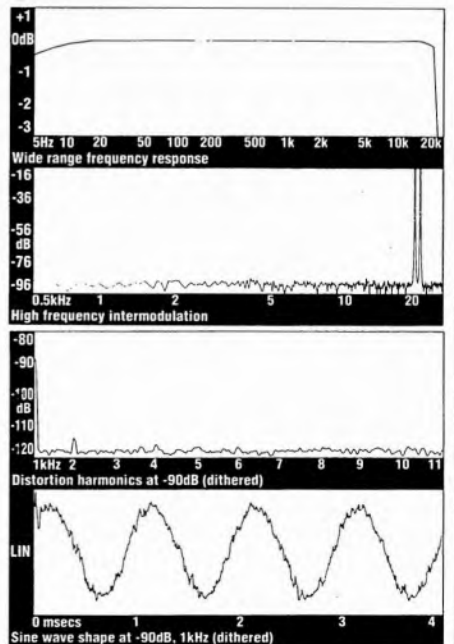
great transparency, fine focus and depth. Bass is very good, both powerful and tuneful but also with a slight loss of crispness. The midrange sounds very sweet, neutral, pure and detailed, while the treble is delicate and well differentiated.

## CONCLUSIONS

This is a superbly built flagship machine with many luxury features. The lab performance is exemplary and the sound quality is very good, but the overall value for money can be questioned, at least as far as those that value their money are concerned. Those who are not price sensitive should certainly give it serious consideration.

## TEST RESULTS

Test resolution (L/R av)	16 bits		
Output level, source impedance	2.18V, 0.75dB, 200ohms		
Effective dynamic range	112dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-103dB	-103dB	-92dB
	(0.0007%)	(0.0007%)	(0.0025%)
Ref -70dB		-36dB	
Stereo separation	130dB	125dB	105dB
Stereo balance L/R	0.01dB	0.01dB	0.04dB
Frequency response (20Hz to 20kHz)			-0.12dB
High frequency intermodulation			-100dB (0.001%)
Electrical noise (CCIR ARM, 1kHz)			-112dB
Mechanical noise			very low
Ultrasonic noise			-110dB
Error correction			1.3mm gap
Shock/vibration resistance			very good
De-emphasis			-0.7dB at 5kHz
Track finding speed (15, YEDS 2)			1 sec
White noise overload test			OK
Size (w x d x h)	43 x 37 x 12.5cms		
Typical price inc VAT	£1,000		



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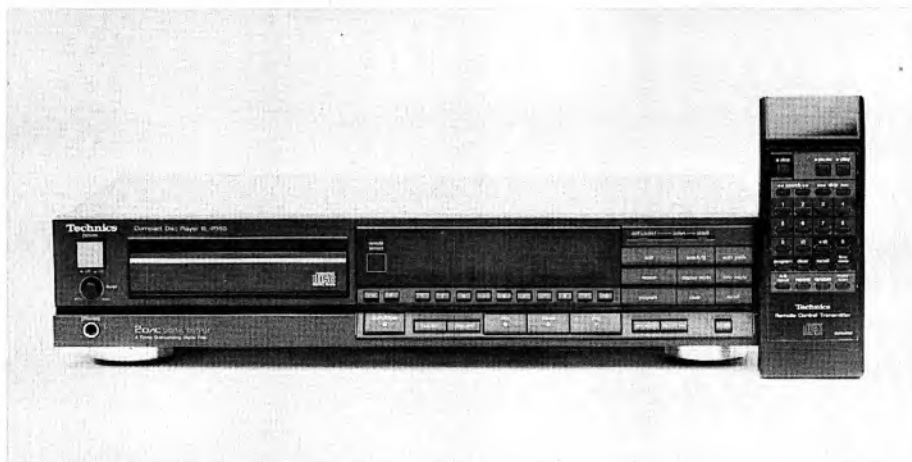
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# TECHNICS SL-P350

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

BEST BUY



Technics is the (largely autonomous) specialist hi-fi division of the mighty Matsushita organisation, probably the world's largest electrical company, and even better known for the Panasonic consumer electronics brand. Technics is UK market leader in hi-fi separates, and has maintained its commitment through good times and ill. The company is jockeying for top slot in CD players too, the *SL-P350* being a typical example of a mainstream model, right on the market's current £250 average price.

The remote control *350* has classy presentation and good build for a low cost model, with a metal chassis/wrap. The high quality fascia moulding has slightly sharp corners and edges, while the essentially cosmetic large feet do contain rubber type inserts, which might have some benefit. The front panel is in Technics' traditional camouflage brown, with darker operational areas.

The main control strip, angled slightly for access from level or above, includes skip search and A-B (program repeat play), as well as play, pause, stop and open/close. 12 keys are used for direct track entry and the display is large, with comprehensive flags and track menu etc, but each individual digit is quite small. Nine further pushbuttons cover program, clear, recall, repeat, display mode, time mode, edit, side a/b, and auto peak. Edit control and 'sides a/b' are the buttons that help you transfer CD onto tape for (personal) use outside the home, or other less honourable purposes. The handset duplicates the main functions and adds random and repeat play, while a volume controlled headphone socket and analogue and digital outputs are also fitted.

The power supply is not exactly generous, a small transformer feeding a 3,300µF reservoir with IC regulation. The digital ICs are Technics own, the 4X oversampling filter feeding a pair of 16-bit Burr Brown *PCM56Ps*.

Interestingly, there is no 'class AA' output stage, as is Technics' wont, instead the output is handled by surface mount op-amps. Almost all is mounted on a single SRBP board, which is neatly built. The disc drive is also typically neat Technics, with plastic drawer and clamp on a steel pressing, using a linear tracking laser mechanism decoupled on spring and rubber bushes.

## LAB REPORT

Technics products tend to deliver a pretty dependable lab performance, and the *350* is no exception. Response is flat, phase linear and correct, de-emphasis accurate and distortion low. The only real niggle is the error and channel imbalance at -90dB, -3dB left and -10dB right, leading to a computed resolution of only 15bits. Stereo separation deteriorates somewhat at high frequencies, and channel balance likewise, but distortion is low, dynamic range good, and in and out of band noise low. The output is two-thirds of a dB above the CD standard, so comparative listeners need to beware not to be fooled. The transport is uncommonly fast and slick in operation.

## SOUND QUALITY

The straight 'good' rating recorded on this occasion actually represents the best sound we have yet heard from a Technics player. Quite lively and dynamic, string tone is particularly liked and clarity is good too, with a nice sense of focus within a good sized, ambient soundstage.

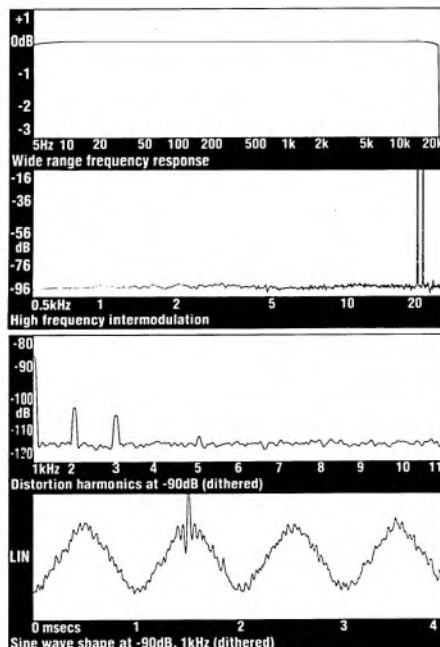
Treble is detailed, with little subjective distortion; the midrange sounds neutral, smooth and clear; the bass is well controlled and tidy. The overall sound is coherent and well balanced, capable of a convincing musical performance.

## CONCLUSIONS

This Technics is well built, delivers a fine lab performance and sounds good too. It probably has rather more operating features than most people are likely to want, and therefore may not be the best choice for ageing relatives, but that apart it's clearly the stuff of which Best Buys are made.

## TEST RESULTS

Test resolution (L/R av)	15 bits		
Output level, source impedance	2.16V, 0.67dB, 650ohms		
Effective dynamic range	107dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	-96dB	-92dB	-92dB
	(0.0016%)	(0.0025%)	(0.0025%)
Ref -70dB	-34dB		
Stereo separation	118dB	105dB	78dB
Stereo balance L/R	0.06dB	0.07dB	0.14dB
Frequency response (20Hz to 20kHz)	-0.13dB		
High frequency intermodulation	-92dB (0.0025%)		
Electrical noise (CCIR ARM, 1kHz)	-101dB		
Mechanical noise	low		
Ultrasonic noise	-111dB		
Error correction	1.2mm gap		
Shock/vibration resistance	average		
De-emphasis	-0.1dB at 5kHz		
Track finding speed (15, YEDS 2)	1.5 secs		
White noise overload test	OK		
Size (w x d x h)	43 x 29 x 8.9cms		
Typical price inc VAT	£250		



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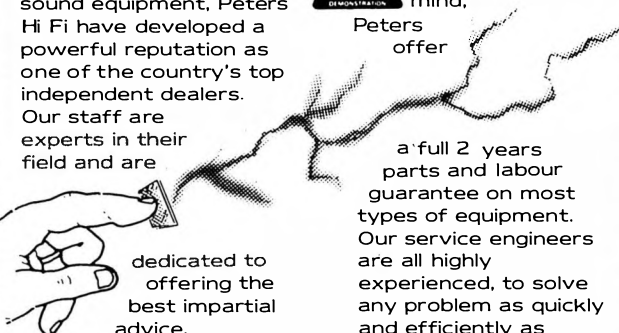
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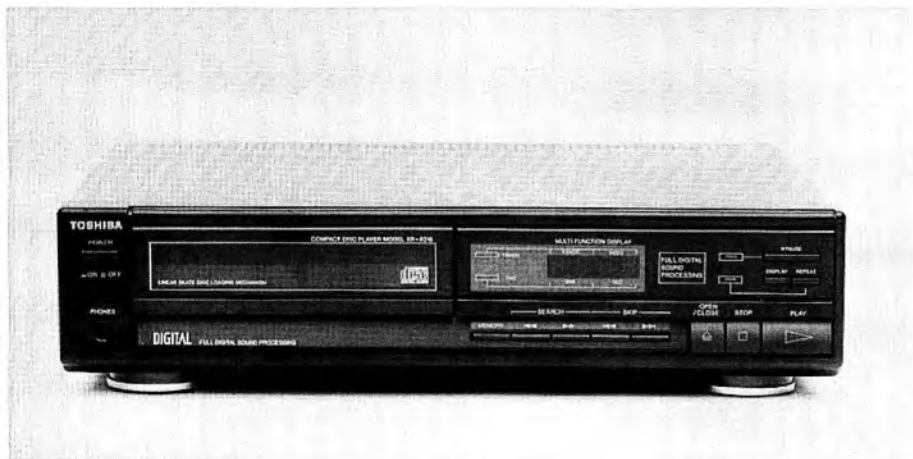
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# TOSHIBA XR-9318

TOSHIBA (UK) LTD., TOSHIBA HOUSE, FRIMLEY ROAD, CAMBERLEY, SURREY. TEL: (0276) 62222.

BEST BUY



Giant multinational Toshiba has fingers in many electrical and electronic engineering pies, with particular strengths in IC, computer and general consumer electronics manufacture, though without a very obvious presence in specialist hi-fi separates since dropping the Aurex brand a number of years ago. That said, Toshiba played white knight to a struggling Trio Kenwood a couple of years ago, so who knows where that relationship might lead.

It therefore came as something of a surprise to receive no less than four new Toshiba branded CD players for this issue, even though they are really just reclothed Philips'. Four from one brand is really too many from our point of view, but fortunately the variations are limited, so by picking the top and bottom models we are effectively covering those in between as well. Essentially there are two 'lower tech' midis, one with and one without the remote control – the 9318 covered here and the 9328 with remote. Then there are two higher tech full width models, again with or without remote (9118, 9128).

This little midi goes to market at around £150, which is pretty close to the standalone bottom line. As mentioned it's Philips sourced and has a plastic chassis and fascia with a rather rattly metal wrap cover, and sits on cosmetic feet that might just conceivably offer a touch of isolation. It has only the usual very basic features, and should be straightforward and simple to operate, though the well labelled buttons could have been larger, particularly search and skip (especially skip). There's also memory (programming), pause, display (mode) and repeat, plus a fixed level headphone socket for what it's worth (not much, unless you have level control headphones around).

'Neath the budget exterior lurks a new generation of Philips budget level compo-

nents. There's no oversampling, and a new TDA1543 dual DAC is employed to give direct 16bit linear conversion. Multistage discrete capacitor filtering feeds the analogue output. The disc drive is a budget version of the current CDM4, mounted on a good suspension. The plastic case and chassis is neatly executed, if unavoidably lightweight in feel, and power supplies are distinctly skimpy.

## LAB REPORT

The frequency response is rather rounded off at the band extremes, particularly in the bass, and phase linearity is not fully maintained, though absolute phase is preserved. Low level resolution is a remarkably good 15.6bits (even more remarkably good for a Philips-based machine!), although the low level sinewave does show quite severe distortion.

High level intermodulation distortion is good, but ultrasonic spurious could be better suppressed at this modulation level. Error correction and shock-vibration rejection are both good. Separation is a little weak in the bass and dynamic range is somewhat restricted. The various in-band distortions pass muster without setting any records. On balance it's hard to argue with a basic lab performance that would have been respectable at twice the price a year ago.

## SOUND QUALITY

This player may have both modest pretensions and a low price, but it nevertheless scrapes a 'good' rating overall, which is very creditable under the circumstances. Despite the lack of oversampling, it possesses much of the classic Philips sound, being essentially musical and dynamic. Output is nearly half a dB too loud.

The bass is somewhat undistinguished, it's true, but there are no special faults to attract criticism here either. The midband is reason-

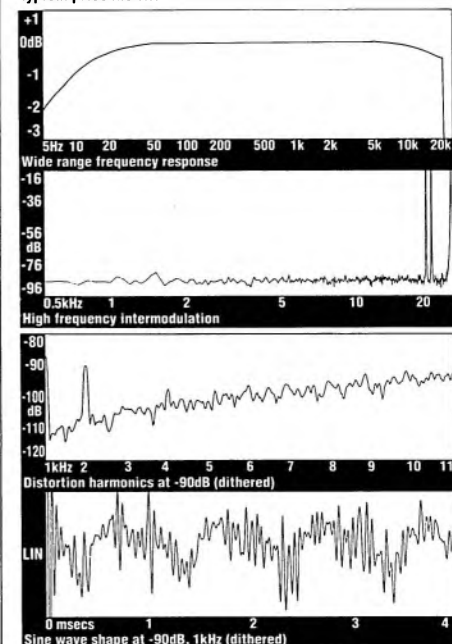
ably neutral and clear, while the treble sounds a little 'flat' and 'dead' and could do with more 'sparkle' and 'life', plus more precise definition. Stereo images show fair depth and average width and focus.

## CONCLUSIONS

Although the lab performance is nothing special, it is nonetheless adequate, and much the same may be said for the basic construction and build. Moreover the sound is unusually good for a price that's very nice. So even though the Toshiba brand is not likely to appear on the shelves of many specialist hi-fi dealers at this point in time, a Best Buy rating is entirely appropriate.

## TEST RESULTS

Test resolution (L/R av)	15.6 bits		
Output level, source impedance	2.1V, 0.42dB, 1Kohm		
Effective dynamic range	86dB		
Harmonic distortion Ref 0dB	20Hz	1kHz	20kHz
	-83dB	-82dB	-82dB
	(0.0071%)	(0.0079%)	(0.0079%)
Ref -70dB	-12dB		
Stereo separation	77dB	100dB	85dB
Stereo balance L/R	0.04dB	0.04dB	0.2dB
Frequency response (20Hz to 20kHz)	±0.6dB		
High frequency intermodulation	-88dB (0.004%)		
Electrical noise (CCIR ARM, 1kHz)	-97dB		
Mechanical noise	low		
Ultrasonic noise	-100dB		
Error correction	1.3mm gap		
Shock/vibration resistance	very good		
De-emphasis	-0.17dB at 5kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	OK		
Size (w x d x h)	34 x 28 x 8.3cms		
Typical price inc VAT	£150		



# ESSENTIAL NUMBERS.



## NEW HORIZONS IN ANALOGUE TRANSDUCING

In the constant perfection of record reproduction, Audio Technica unveil their latest numbers . . . AT-OC7 and AT-OC9. Having an almost identical 'on paper' specification, both incorporate varying elements of the newest technology in materials and micro-engineering, many of them developed originally in applications for NASA and the hi-tech aerospace industry. The result is a sound quality previously considered unattainable in the sub £500 category.

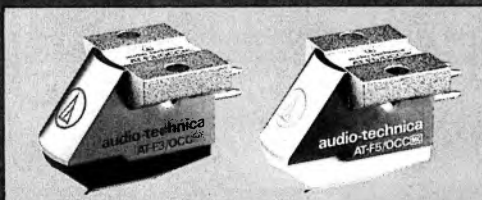
Whilst the list of technical achievements is endless, the true test is in the listening. Press comments include . . . *'the OC7 is a superb sounding cartridge; there's no other way of looking at it. Its treble articulation and dynamics are exceptional'* — *NEW HI-FI SOUND*. *'I will say with certainty that the OC9 is one of the very best cartridges I know, and can give it my strongest and most enthusiastic recommendation'* — *HI-FI REVIEW*.

Please contact Audio Technica for complete reprints of these together with the reviews of Hi-Fi Answers, Gramophone and Hi-Fi News. Better still, call in for a personal audition at BADA and specialist audio retailers and find out why AT-OC7 and AT-OC9 are now essential numbers in today's top flight analogue systems.

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	AT-OC9	AT-OC7
Frequency Response (Hz)	15-50,000	15-50,000
Output Voltage (1 KHz, 5cm/sec)	0.4mV	0.3mV
Tracking Force (gm)	1.25-1.75	1.25-1.75
Weight (gm)	7.8	7.8
Stylus	Square shank elliptical	Square shank elliptical
Magnet Mould	Titanium-Oxide/Potassium mix	Ceramic
Yoke-Piece	Vanadium based metal	Soft Iron
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# TOSHIBA XR-9128

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BEST BUY



Toshiba is one of the Japanese broad-based electrical giants, with extensive interests in IC, computer and general consumer electronics manufacture. At one time an Aurex hi-fi brand was available in the UK, but that petered out some years ago, since when the occasional hi-fi product has poked its head above the morass of mainstream consumer products – portable, personals, TV, video, midi system et al.

It was something of a surprise therefore to receive no less than four new standalone CD players for review in this project, all apparently sourced from Philips' Hasselt factory (and so avoiding upsetting the EEC trade watchdogs). Space prevents us reviewing all four, but the differences between the models are clearly fairly slight – there are only two instruction manuals for starters. Two are midis (9318, 9328); two are full width (9118, 9128); two are manual (9118, 9318); two are remote (9128, 9328) – all understood? Or shall I repeat that...

The 9128 is a simple remote control player with full-width plastic chassis and sharp cornered fascia, and a rather rattly metal wrap. Clearly Philips-sourced, it has a straightforward and sensible control layout and a smallish but quite comprehensive and mode switchable display. Open/close is tucked away beside the loading drawer while the two large buttons cover play and stop. A row of smaller subsidiaries provide skip, scan, pause, memory, repeat and display modes. A headphone socket has no attendant volume control, which will restrict its practicality – so why bother, one asks, given that most amplifiers and cassette decks already have such sockets (probably because it avoids retooling the fascia). The handset offers a number of extra features, notably a direct track entry keypad and index point search.

The Philips building blocks include the latest production techniques with 4X over-

sampling digital filtering and selected 'A' grade dual 16bit conversion. The good quality CDM4 disc drive mechanism is well decoupled from the plastic chassis and steel cover. Selected Nichicon capacitors feed the output, the power supply and provision of regulation is generous, and a superior fluorescent type display is fitted.

## LAB REPORT

Frequency response is good, while phase is linear and absolute phase maintained. Someone deserves a slapped wrist for allowing an output nearly a dB above the CD standard – was it accidental, or is it intended to make the player sound just that little bit louder in order to be perceived as better by the comparative listener?

Low level resolution is not bad at –90dB, and the player still works (with the same error) at –100dB, while the low level sine-wave is pretty good – significantly better than that produced by the non-oversampled cheaper Toshiba, for example. Dynamic range is good and stereo separation is excellent, channel balance is consistent enough (if c 0.1dB out), and the various measured distortions and S/N ratios are low. Shock/vibration rejection is very good, as is the lab performance taken as a whole.

## SOUND QUALITY

After taking the precaution of inserting a shorting plug in the (unswitched and in this instance unnecessary) digital output, this modestly priced player proceeded to rate 'good' overall on sound quality, with a performance able to put many more costly rivals, if not to shame, at any rate down a peg or two.

The treble is airy and pleasant, showing fine detail and little 'grain' or 'edge' but a touch of exaggeration on close-miked vocal sibilants nevertheless. The midrange is a little too 'forward' perhaps, but is impress-

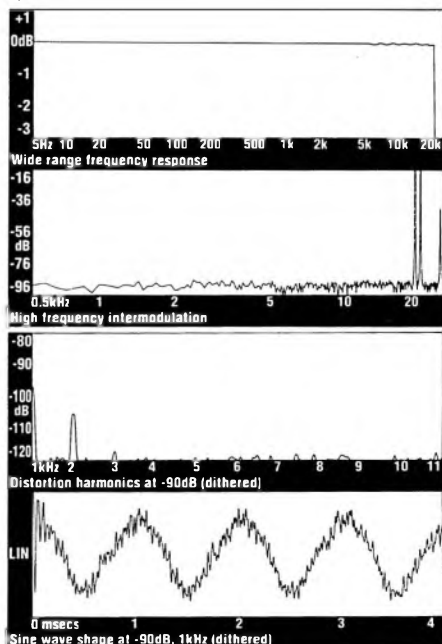
ively lively and clear, while the bass has plenty of solid weight and drive, underpinning a fine dynamic performance. Stereo images are good too, particularly in terms of depth resolution, but with fine focus and width besides.

## CONCLUSIONS

Toshiba has not been a prime brand in the hi-fi separates sector for some time, and availability through specialist dealers may consequently be limited. But it is impossible to argue with the fine measured or subjective performance and a respectable feature package at a very competitive price.

## TEST RESULTS

Test resolution (L/R av)	15.6 bits		
Output level, source impedance	2.2V, 0.83dB, 200ohms		
Effective dynamic range	103dB		
Harmonic distortion	20Hz	1kHz	20kHz
Ref 0dB	–99dB (0.0011%)	–89dB (0.0035%)	–87dB (0.0045%)
Ref –70dB	–33dB		
Stereo separation	127dB	112dB	100dB
Stereo balance L/R	0.11dB	0.10dB	0.08dB
Frequency response (20Hz to 20kHz)	–0dB		
High frequency intermodulation	–100dB (0.001%)		
Electrical noise (CCIR ARM, 1kHz)	–104dB		
Mechanical noise	low		
Ultrasonic noise	–101dB		
Error correction	1.2mm gap		
Shock/vibration resistance	very good		
De-emphasis	–0.1dB at 5kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	OK		
Size (w x d x h)	42 x 28.5 x 8.8cms		
Typical price inc VAT	£200		



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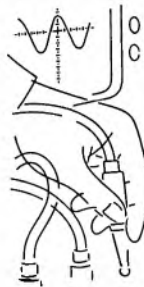
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## TECH TALK

*Our test programme included complete laboratory analysis as well as thorough auditioning of each player. Here we explain the review approach and test methods.*

The sound quality of top of the range black disc players remains beyond question, but CD players are winning more and more sales from analogue.

The general consensus seems to be that CD provides an improving baseline of audio quality, which is now more than satisfactory for the majority of non-enthusiast applications. Given this baseline the more critical listener can discern significant and important differences in CD player sound quality. In context, a CD player can be auditioned much as one investigates an audio preamplifier; indeed many of the subjective effects may be described in amplifier sound parlance.

The advantages which are indisputably offered by Compact Disc players over vinyl disc playing equipment can be summed up as follows:

- 1) Up to 1 hour 15 minutes uninterrupted playing time.
- 2) Freedom from surface noise, clicks and pops.
- 3) Discs are comparatively damage and wear-proof (provided care is taken).
- 4) No complications of stylus wear, contamination or alignment.
- 5) Full automatic facilities, track programming etc, many players having comprehensive remote control.
- 6) All the usual 'cheap turntable' problems such as pitch stability, wow and flutter etc, are absent.
- 7) CD players can be small.
- 8) High level 'flat response' output can obviate the pre-amplifier, and many players also have competent headphone outputs.
- 9) High lab specifications for distortion, balance, separation and signal-to-noise ratio.
- 10) Some immunity to acoustic feedback and reasonable

levels of shock and vibration resistance.

- 11) The sound is relatively neutral, with a wide open frequency characteristic as well as notably good bass, since arm/cartridge subsonic resonances are avoided. Stereo is usually very stable and well focused, with much separate detail.

That said, there remain enthusiasts who continue to prefer their music from vinyl LP sources, complaining of a slightly 'amusical' quality about the sound of CD. The enormous new and secondhand repertoire and much lower disc prices remain further major vinyl incentives.

As regards the more subtle aspects of sound reproduction, CD players can vary in their stereo presentation – some have a more relaxed 'distanced' perspective while others seem more direct and 'up-front'. Differences can be found in the far space or depth region behind the frontal image plane, while some players may also show a softening of definition in the bass or treble extremes. The treble may also appear a touch 'grainy' and fatiguing. The mid can vary in tonal quality, with a thinner, 'harder' effect on some players, and a sweeter, more natural balance on others.

### LABORATORY TESTS

In this issue I'm presenting a new format for the presentation of the CD test programme, replacing the existing version which has been used for some years now. Incorporating the best of the old, the new method includes additional tests which relate more closely to subjective clarity, transparency and stereo depth. Using a new presentation, four graphs are now published. Those for high resolution frequency response and the high frequency intermodulation have been continued, but in an improved form.

The frequency response test now runs over a test range of 5Hz to 22.5kHz replacing the original 20Hz to 20kHz span, while the intermodulation graph is now presented on a logarithmic frequency scale from 500Hz to 25.5kHz, to reveal more closely the audible band distortion products and also the presence of nearby higher frequency components. Scaling and ranging improvements also offer a better test sensitivity than the older 0-100kHz intermodulation graph, which incidentally is still taken for reference.

The new graphs include a readout of the -90dB recovered sinewave, achieved by triggered time averaging. The encode signal is dithered (from CBS disc CD1) which means that any deviations from a pure sinewave are very much the responsibility of the players. Accompanying the replay sinewave is a spectrum analysis of that signal clearly showing both the distortion harmonics present and the audible noise floor. The graph runs from 1 to 11kHz and hence the fundamental is set at the starting vertical line while the peaks shown are the harmonics themselves. Shown on a high resolution scale, it runs from -90dB relative to peak modulation to a low -130dB probing deep into the lower levels of CD replay resolution.

The data sheet now includes a figure for effective dynamic range, the amplitude window available from MSB peak or a nominal 2 volts down to the practical noise and distortion floor. Distortion results are given in dB and percentage to aid comparison with other tests and specifications, and player resolution is expressed directly in bits, this estimated from a combination of low level distortion and linearity and the accuracy of level recovery from -70 to -100dB recorded modulation at 1kHz.

The standard surface gap error test has been expanded from the previous maximum of 0.8mm up to 4mm, and while most players do pretty well these days, with error protection for 0.8 to 1.2mm of data gap loss, a few examples are still quite amazing, with enough processing power to stay audibly clean on up to 3mm of missing data – a huge chunk in context of the very high density of data storage on the disc.

### FREQUENCY RESPONSE

For frequency response, a high resolution graph has been used, to the same scale as the RIAA equalisation accuracy charts in the *Choice: Amplifiers* issues. Left and right channels are both assessed to ensure that no balance errors occur. Other tests include checking for correct de-emphasis; testing response alignment; output impedance (important when using passive control units); output level; track location speed (assessed as the time taken to access track 15 on the Sony test disc YEDS2). Weighted and unweighted signal-to-noise ratios were measured with and without pre-emphasis and each player's mechanical noise was also assessed.

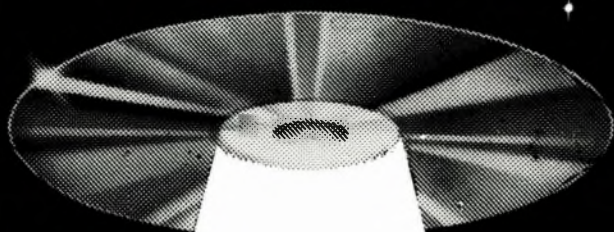
### LISTENING TESTS

After a reasonable conditioning/warm-up period, each player was auditioned by a small group of experienced listeners using a wide range of source material, paying particular attention to establish consistency of rating against previous reviews.

The basic reference system included bi-wired Celestion SL700 loudspeakers on Celestion stands, driven via exotic home made cables from Goldmund *Mimesis 3* power amplifiers, fed by a Musical Fidelity *MVX* preamplifier. Reference was made to vinyl reproduction from Goldmund *Studio 4* turntable and arm combination with Koetsu *Red Signature* cartridge.

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# CD PLAYERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

*Summing up this month's reviews of compact disc players, keeping a keen eye on price versus performance.*

For reasons of space the following list of Best Buys and Recommended models refers only to those machines reviewed in this issue. For earlier models please refer to the *Directory*. And for reasons of scheduling, it has not been possible to update earlier directory entries to take account of the improving standards of new models; a full revision will be incorporated in next month's *Directory*.

The new CD players clearly show that respectable subjective performance is now available from around £150, remote control for under £200 and full feature packages for only £50 more. Sound quality is improving at an impressive rate, and manufacturers appear to be learning the art of getting away with mild technical compromise while still delivering decent sound. Indeed, the general improvement in sound quality itself seems much more to do with learning and subtleties of board and component layout than any quick technical fix like multiple oversampling or extra digital bits.

## BEST BUYS

**Toshiba XR-9318** (£150)  
Although availability through specialist dealers may be limited, it is impossible to argue with the decent measured and subjective performance plus a respectable feature package at a very competitive price.

**Denon DCD-610** (£200)  
Despite the criticisms levelled at the treble, the '610 still sounds significantly better than its predecessor, and significantly good for a budget model, if a little short of the best examples, particularly bearing in mind the company's good reputation.

**Goodmans GCD 550** (£200)  
The combination of a respectable sound quality at a very modest price for a full feature autochanger is irresistible, though this design is still a little rough around the edges, both on lab performance and in the time

taken to reach a specific track, and would also benefit from more user friendly ergonomics.

**Sharp DX-620** (£200)  
This pretty Sharp model certainly makes the grade subjectively, despite the paradox of very ordinary internals and lab performance, and it's nice to find another new name in the Best Buy lists.

**Sony CDP-550** (£200)  
Taking price, build, feature count and sound quality into account, the *CDP-550* comes out with a Best Buy rating, despite some reservations over the lab performance and a feeling that some of the Sony magic is missing from the presentation.

**Toshiba XR-9128** (£200)  
Not known for its hi-fi separates, the Philips-sourced Toshiba nevertheless more than makes the grade with its measured and subjective performance, and includes a respectable feature package at a very competitive price.

**Rotel RCD-820B** (£210)  
Although it isn't a sonic match for the £300 *BX2*, the standard 'cooking' *820B* model is still a very competent performer that delivers above average sound quality at significantly below average price, even though the build quality is a touch on the tacky side of neutral.

**Akai CD-52** (£250)  
Given a feature and facility count well up to its price, a lab performance that comfortably passes muster, and a sound quality which many more expensive players could do well to emulate, this impressive looking Akai is also well built.

**Kenwood DP-880SG** (£250)  
The *DP-880SG* offers an impressive roster of well executed facilities, at least for those not daunted by the complexity of the large range of frills. It also sounds good and measures well – not far short of Kenwood's much more expensive '1100.

**Pioneer PD-6100** (£250)  
This is a fine sounding,

competitively priced, fully featured CD player of impressive appearance (for those that are impressed by such things) and adequate laboratory performance.

**Technics SL-P350** (£250)  
This Technics is well built, delivers a fine lab performance and sounds good too. It probably has rather more operating features than most people are likely to want, so therefore may not be the best choice for ageing relatives.

**Pioneer PD-M500** (£270)  
This machine is somewhat complex, with a range of controls not for the technofainthearted. Nor did it perform too creditably in the lab, but the sound is good, the autochanger is pretty slick, and the range of features is quite exceptional.

**Denon DCD-910** (£300)  
Although it doesn't set any new records for sound quality versus price, the '910 is an attractively well balanced package. Some may find the feature list a trifle intimidating perhaps, but few will argue with the fine lab performance and decent sound, backed up by Denon's strong reputation for build quality.

**Marantz CD65HSE** (£300)  
As has happened on more than one occasion previously, the Marantz magic redefines the subjective performance standards achievable with affordable CD players. The basic sound is so fundamentally honest and well founded, it is somehow difficult to believe it comes from such a chintzy looking fascia. A *Choice Best Buy* rating is unavoidable for anyone whose lifestyle can accommodate the dichotomy.

## RECOMMENDED MODELS

**Ferguson CD-07** (£130)  
Price is the main reason for recommending this player. It certainly doesn't set any new records for build and sound quality or lab performance. But it does just about pass muster, and undercuts all the obvious

alternatives by a significant margin.

**Aiwa DX-M45** (£150)  
This is a thoroughly workmanlike manual budget midi player, using a number of Philips building blocks in a budget-oriented Aiwa application built in the UK. The presentation is attractively simple and solid, and both the measured and sonic performance perfectly respectable considering the price.

**Dual CD1030RC** (£160)  
The Dual is a very competitive package judging by the inclusion of remote control in a full width player priced at £160. Under the skin it shows some limitations in technical performance, build and consistency (check out your own sample prior to purchase perhaps), but the sound is respectable enough considering the price.

**Denon DCD-610** (£250)  
The middle 1988 Denon slips down slightly between the twin stools of subjective performance versus convenience. It does offer a few more twiddly bits than the '610, and certainly improves on the latter's measured performance in a number of areas. But it doesn't match the best in its price class sonically.

**Sony CDP-M95** (£280)  
This is a very well equipped midi machine, well built and finished and offering a decent sound quality for the price, so Recommendation is clearly deserved, particularly for those attracted by the wealth of features (including the gimmicky Custom File).

**Mission PCMII** (£690)  
Mission is increasingly and successfully distancing its CD player from mainstream models by dint of some very clever clever features which will have a particular appeal to audiophiles, and which in any case have irrefutable ergonomic logic. The sound remains competitive, particularly if the powered volume facility is valued, so Recommendation is fully in order.

# INDICES

**fide'li'ty** n. strict conformity to truth or fact; exact correspondence to the original; precision of reproduction.

**a'ccū'rate** a. careful, precise; in exact conformity with a standard or with truth.

**dēfīnī'tion** n. stating precise nature of thing, meaning of word; making or being distinct; degree of distinctness, in outline.

**dŷna'mīc(s)** a&n.pl. (usu. treated as sing.) 1 + a. of motive force (opp. static); of force in actual operation (opp. potential) relating to volume of sound. 2 + n. amount or variation of volume of sound.

**rē'al'ism** n. fidelity of representation, truth to nature; insistence upon details; showing of thing as it is without glossing over what is disagreeable.

**sy'stem** n. 1 + complex whole, set of connected things or parts; organised body of material things. 2 + method, organisation, considered principles of procedure.

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A selection of guaranteed second-hand and demonstration items are constantly available and currently include a Musical Fidelity A370 (£1699), a pair of **Audioplan** Kontrapunkt (£675, inc. stands), a Michell Gyrodec II with RB300 tonearm (£499, s/h) and a late Musical Fidelity A100 (£299, s/h).

From **Manticore** to **Voyd**, **Musical Fidelity** to **Matisse**, we're listening. For details contact:

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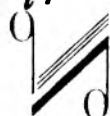
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# CHOOSING AND USING . . . DIGITAL AMPLIFIERS

*In today's marketing terms, a 'digital amplifier' is one which has an on-board digital-to-analogue convertor allowing direct digital connections with your CD player. Paul Messenger explains the complexities . . .*



Digital is one of the key buzzwords of this decade. In much the same way that 'biological' gives apparent technocredence to washing powder, so 'digital' enhances the high tech appeal of electronics products, and is applied wherever possible.

Compact disc is a digital audio medium to be sure, storing music as a digital bitstream, and the same is true of various digital tape formats like DAT and the semi-pro Sony F1/Betamax systems. But the term 'digital' as currently applied to the amplifiers tested here (and recent upmarket video recorders for that matter) is sufficient of a half-truth as to verge upon misinformation – not that that is likely to deter any self-respecting marketing department.

Perhaps I'm being pedantic, but genuine digital amplifiers and video recorders (which actually process data in the digital domain) do exist, even though they're both about five years away from the consumer marketplace. And if the term has been devalued by the pseudo-digital devices of the late 'eighties what on earth are we going to call them when they do arrive?

The current rash of 'digital' amplifiers are a logical enough development if viewed from the

perspective of a product planning department trying to get one up on the competition three years ago. But the intervening period has robbed them of much validity.

Three years ago CD was taking off nicely; Japan Inc was on the point of launching DAT; and various DBSS (direct broadcast satellites) were about to lift off, carrying digital radio channels alongside their TV programmes. CD has continued its steady progress but both the others have slipped their schedules or gone into the pending tray.

Had there been three different sources of digital audio, one of which was record capable (DAT), the logic for the current 'digital' amplifiers would have been inescapable. (Indeed, three digital sources would have led eventually to one-piece midis feeding digital bitstreams to a single shared DAC, alongside the single shared power supply. But since DAT is still very much a maybe and isn't allowed to record direct-from-digital – and since no one knows what or when any digital audio is likely to come down from the satellites – the need to switch signals in the digital domain prior to conversion and power amplification is largely illusory.

These current 'digital' amplifiers are effectively

conventional amplifiers fitted with on-board DACs (digital-to-analogue converters) – effectively the electronics half of a CD player. They therefore allow a CD player to be connected from its digital output socket, ignoring the player's DAC(s) and carrying out the D-to-A conversion inside the amplifier. (Electrical/coaxial digital output sockets are fitted on about 50 per cent of CD players at a guess, though at present only five per cent or so have optical digital outputs.)

Whether there is any particular benefit to be gained from 'moving' the DAC to the amplifier is difficult to establish. Many CD players tend to sound a little or even a lot better if used with an external processor such as the Arcam *Black Box*, and two-box players like some top Sony, Marantz and Cambridge Audio models are about the best sounding of the lot. But it does seem curious that so few CD players have the ability to switch off their own DACs and analogue circuitry, even given a feature list that stops just short of boiling an egg and putting the cat out.

At least the digital amplifiers don't have their DACs running all the time – the possible interference of 44.1kHz clocks on sensitive MC cartridge inputs doesn't bear thinking about. The DACs come on only when the

digital inputs are selected.

The real problem in trying to assess whether the 'digital' feature is worthwhile, is simply that none of the assessed amplifiers rated very highly on sound quality in analogue mode, so the performance and any potential advantage of the digital sections becomes largely irrelevant.

For similar reasons it is difficult to ascertain whether 'optical' digital links offer any real advantage over electrical/coaxial connection. Certainly the optical connection acts as an electrical isolator, preventing any digital 'hash' being transmitted through the earth path for instance. But it also requires the additional intervention of electrical-to-optical and optical-to-electrical conversion in the signal path, which doesn't sound a particularly wonderful idea.

In other respects these amplifiers resemble and function like any normal commercial amplifier with analogue inputs and outputs, albeit with perhaps rather more features than the current UK norm. Ultimately their complexity limits sonic competitiveness in comparison with simpler models offering fewer facilities, but that overlooks the importance many users attach to the comprehensive and flexible switching configurations provided here. At the same time it should be noted that the complex switching is essentially audio only, whereas other manufacturers are offering alternatives with added TV and video versatility which could prove more useful than a spare DAC or two in the long run.

Of the tested models the Technics pre-/power combination is sufficiently interesting to merit Recommendation. Despite being the most expensive, it offers fine material value particularly in the generous 'double mono' power amplifier, and makes a respectable enough sound besides.

# AKAI AM-73

AKAI (UK) LTD., UNIT 12, HASLEMERE HEATHROW ESTATE, SILVER JUBILEE WAY, HOUNSLOW, MIDDLESEX. TEL: (01) 897 6388.



Originally a tape recording specialist, Akai has long been involved in full range and component system manufacture, and has a natty line in videorecorders besides. After running into financial trouble a few years ago, the company came under the control of the giant Mitsubishi conglomerate which has provided a new lease of life. Akai and Mitsubishi's Diatone brand have been merged as A&D on the Japanese home market, while elsewhere Akai's traditionally export-oriented products seem to be benefitting from the restructured company's strenuous attempts to re-establish an upmarket hi-fi presence – in this instance with *Reference Master* series components.

Digital amplifiers are currently cropping up amongst the prestige products of a number of manufacturer's ranges – and in fact appearing in upmarket midi systems too. The £450 *AM-73* is pretty typical of the breed in terms of price and presentation. In effect it consists of a conventional enough analogue amplifier that handles all the usual (analogue) signals from pickup cartridges, cassette decks, CD players and the like, but also incorporates the electronics side of a CD player.

Digital sources such as CD players – specifically those fitted with a digital output socket and/or optical connector – may therefore feed the digital datastream direct to the amplifier, rather than converting the data into conventional analogue signals beforehand. Note that the single connection is all that is needed to carry both channels of a stereo pair, in contrast to analogue signals.

Although there is an inevitable cost penalty in doubling up the CD player electronics, since those in the player will no longer be needed, there are also certain potential benefits – most obviously that any negative influence of connecting cables and connec-

tors should be bypassed, while any possibility of earth interaction is also avoided if an optical link is used. A further advantage for the owner of an early (D-out-equipped) CD player is that this can continue in use but be effectively upgraded by the latest digital/analogue converters (DACs), filters and other circuitry.

That's the simple version. In fact digital amplifiers are a little more complicated, and incorporate various digital input and output sockets to handle possible future developments – such as DAT (digital audio tape) and satellite radio or TV soundtrack broadcasts. And because these alternative digital sources have different sampling rates – 32kHz for broadcasts, 44.1kHz for CD and 48kHz for DAT – there is also the circuitry for switching between these different standards.

On the rear panel of the *73* is one row of digital sockets, another (two) rows of analogue, and a third of the power output (loudspeaker) terminals; each group has corresponding switches on the front. Taking the digitals from the top, there is a single optical and a single electrical for (stereo) replay, then two pairs of record/replay sockets for DAT recorders. The amplifier contains DACs but not ADCs (analogue-to-digital), so those wishing to use DAT machines to record from vinyl or FM radio will also have to make normal analogue connections from amplifier to DAT.

The analogue sockets are all phono pairs, covering vinyl disc (nominally for MM cartridges, though sensitive enough to handle higher output MCs), CD, tuner and 'aux', plus three tape recorder in/output quartets and a fourth with bridging links for patching in an external processors such as an equaliser between pre and power sections. Two sets of substantial loudspeaker binding posts are also fitted.

The front panel consists of no less than seven rotary selectors, laid out logically enough but inevitably confusing to use – a by-product of the extreme flexibility. The master input selector has a D/A setting which brings in the digital 1-4 selector (and a little 'digital' light), and a 1-3 tape selector. A 'direct' selector links the DAC or analogue source directly to the power amplifier, bypassing tone controls. Independent selection of sources for recording is provided on two more rotaries, while the speaker output has A, B, A+B or off (for 'phones only'). There's also of course volume, balance, bass and treble rotaries, a –20dB muting switch and a headphones socket.

The unit has lovely presentation and feel in a massive physical package with piano finished wooden endcheeks. The heavily ventilated case feels quite solid with little rattle, though the whole thing sits on silly cosmetic feet. A legend proclaims 'digital noise reducing construction', perhaps referring to the internal shielding between analogue and digital sections.

The large power transformer supplies a generous 2X10,000 $\mu$ F of reservoir capacitance, but there are no fewer than 12 separate PCBs, and layout is tight, so servicing could be tricky in the unlikely event etc. The electronic relay protected power amplifier uses two pairs of discrete complementary transistors per channel. The preamplifier circuitry is likewise largely discrete components, with good quality parts including selected copper foil polystyrene capacitors etc. Good internal screening throughout is confirmed. Switching is hard-wired, using ordinary cable but good switches and sockets.

## LAB REPORT

Although the power output seems pretty gen-



erous – note the  $\pm 25A$  peak current delivery, which should ensure good dynamic behaviour – but some of our measurements were foiled by the protection relay, which should not pose a problem with normal music program.

Distortion and noise measurement are all acceptably low, though far from state of the art, while the vinyl disc input overload and IM distortion could both be improved. The frequency responses are generally flat, with the suggestion of a slight downward tilt from bass to treble. The power supply does show a few harmonics when pressured, and the noise floor is not as clean as some.

The digital side is pretty damn good – note, however, that the older test programme was used for these products, so direct comparison with the CD player reviews in this edition are not possible. The response and channel balance are exemplary, low level resolution is good and distortions and in- and out of band noise are fine. De-emphasis is a shade too severe, and stereo separation deteriorates somewhat at high frequencies, but low level resolution is reasonable enough.

## SOUND QUALITY

Although the '73 struggles rather in comparison to genuine audiophile products, it nevertheless does sound quite respectable, and may be fairly compared to 'budget audiophile' competitors. By the same token it is certainly the best Akai amplifier we have encountered, and must rank well up amongst the better Japanese integrated types. It certainly worked best amongst the integrated 'digitals' tested here – and a long way ahead of the first generation models of a year or so ago.

Best sound of all was straight into the analogue auxiliary inputs, whereupon the sound is quite atmospheric. Tidy and powerful, it can be driven to high levels without coarsening or hardening. The bass has 'slam' and 'drive' and pretty good dynamics. Stereo depth and focus are both good.

Assessed using top quality components, naturally both the on-board processor and the vinyl disc input add a degree of masking and character, the latter slightly preferred to the processor, which sounds a little lean and lightweight with a mild loss of fine detail and stereo precision.

## CONCLUSIONS

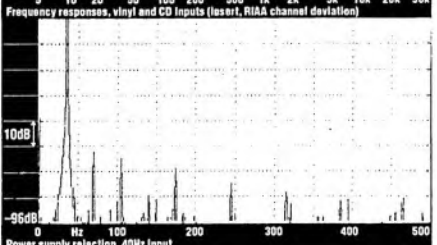
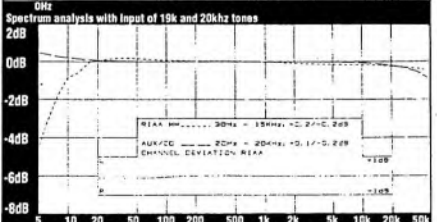
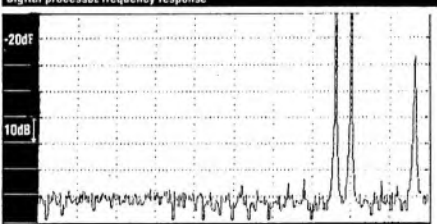
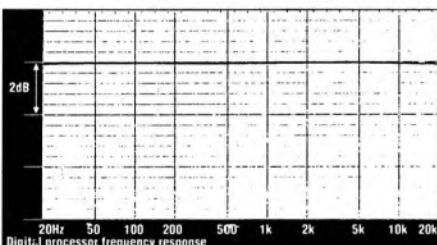
In many ways the AM-73 is a brave and quite successful attempt at an integrated 'digital' amplifier, though ultimately it is something of a victim of its own complexity – and the limited current value of the digital feature.

## TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		100W (=20dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	21.3dBW 21.7dBW *dBW		
Both channels, 4ohm load	*dBW 19.0dBW *dBW		
One channel, 2ohms, pulsed		*dBW	
Instantaneous peak current		+25A	-25A
Distortion			
Total harmonic distortion, 20Hz 1kHz 20kHz			
at rated power, aux/CD input	-71dB -70dB		
Intermodulation, 19/20kHz, rated power, aux input			-73dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-40dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-60dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-73dB
Aux/CD input (IHF, CCIR weighted)			-73dB
Residual, unweighted (volume control at min)			-79dB
DC output offset		left -10mV, right -4mV	
DC offset, preamp		left 0mV, right 0mV	

Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	24.7dB	24dB	21.5dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Aux/CD input	77dB	76dB	54/63dB
Output impedance (damp)	0.06ohm	0.07ohm	0.16ohm
Channel balance, disc, at 1kHz			0.22dB
Volume/balance tracking, aux/CD input	0dB	-20dB	-60dB
Aux/CD input	0.16dB	0.45dB	2.13dB
Disc (MM) input	socket type	sensitivity	loading
Aux/CD input		0.14mV	47kohms 270pf
Output, preamp (tape)		12mV	95kohms 250pf
Disc equalisation error, 30Hz-15kHz			6.0V max, 2.2kohms
Digital Section			+0.2dB, -0.2dB
Channel balance, disc, at 1kHz	20Hz	1kHz	20kHz
Stereo separation	0.08dB	0.08dB	0.07dB
Total harmonic dist, 0dB	106dB	92dB	66dB
Total harmonic dist, -10dB	-96dB	-92dB	-86dB
Total harmonic dist, -60dB		-83dB	
Total harmonic dist, -80dB		-40dB	
Total harmonic dist, -80dB		-20dB	
Intermodulation, 19kHz/20kHz, 0dB			-98dB
Intermodulation, 19kHz/20kHz, -10dB			-98dB
Frequency response,			
left channel	-0.01dB	0	-0.36dB
Frequency response,			
right channel	-0.01dB	0	-0.36dB
Signal-to-noise, 20Hz-20kHz unweighted			103/106dB
Signal-to-noise, CCIR/ARM, 1kHz ref			98/101dB
Output level, 0dB, left/right			1.88V
Output impedance			3kohm
De-emphasis	1kHz, -0.37dB, 5kHz, -4.7dB, 16kHz, -9.2dB		
Spurious up to 100kHz			-102dB
Resolution at -90dB		L, -87.9dB; R, -85.6dB	
Headphone socket			variable
Dimensions (w x d x h)			46 x 18 x 46cm
Estimated typical purchase price			£450

\*overload cutout operates



# JVC AX-Z911

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



Originally a medium size hi-fi specialist, JVC struck gold as the inventor of the now almost universal VHS video system, and has significant experience with digital audio technology through its professional audio and video activities. The company is actually owned by the mighty Matsushita (the initials actually standing for the Japanese Victor Company, and tracing back to US roots), but has always operated entirely autonomously.

Hi-fi separates is now just one of a wide range of activities across the whole gamut of audio and video consumer electronics, but nevertheless embraces a vast range of products, particularly if the midi systems are taken into account. Most of JVC's effort has been concentrated at the lower, budget end of the market in recent years, but like a number of Japanese companies (threatened at the bottom end of the market by other Far East competition), the company is strengthening its upmarket products, under the marketing logo *Digifine*.

This is highly appropriate for a 'digital' amplifier, a fairly new species of component that is something of a cross between a CD player and an amplifier, or more precisely a conventional amplifier with the electronics of a CD player built in. This is claimed to offer a number of advantages, though the greatest of these is the ability to handle and distribute several different digital sources and recorders without converting back to analogue – an advantage that is still very much in the future, relying first upon the establishment of DAT and satellite broadcasting.

At the present time it is merely an alternative way of connecting a CD player, with certain rather nebulous benefits and no little expense. Note that the single (coaxial or optical) connector is all that is needed to carry both channels of a stereo pair in the digital domain, and that this sort of digital

amplifier can only 'send' (to record) a signal that is already digitally encoded – no A-to-D converters here – and to a digital recorder equipped to operate at that sampling frequency. However, the D-to-A converter is equipped with the control chips to adjust to the different sampling frequencies being used by current and planned formats.

Of some eight JVC amplifiers on the market at present, the top two are 'digital', and the very top £600 remote control integrated '911' is featured in this review. It's a massive integrated amplifier, very solidly built with no rattles and decorated by veneered chip-board endcheeks and silly cosmetic feet. The small, and in contrast rather delicate *RM-S4911U* remote handset covers volume and input/output switching, the former by means of a motor driven potentiometer – the preferred solution.

Just so's you and the salesman don't forget, the front panel continually reminds that this is a 'digital reference integrated amplifier superDIGIFINE', though elsewhere the electronic switching keeps the panel neat, if not discreet. The tiny mechanical pots for bass level and balance contrast with the large motorised volume control. Although the on/off switch is mechanical, the remote control facility naturally requires electronic controls elsewhere. Pushpads, bars and buttons cover a wealth of functions – DAT2/tape2 monitor, D/A converter direct, analogue input selector and digital input selector, all backed by elaborate status displays behind a window.

It's Japan built and copper screws hold it all together. The rear panel has four large speaker binders plus various digital inputs – optical, coaxial, plus in and out DAT coaxial. Vinyl has MM/MC switching plus 6dB extra gain available, while analogue sources have three line inputs plus two tape in/outputs, all

on phonos. And there's also the 'Compu Link-1 Synchro' system-remote interface socket, and a headphone socket (on the front).

Inside it's nicely made, with a well screened and very large mains transformer plus 2X16,000 $\mu$ F capacitance. Multiboard construction is linked using ribbon cables, the aluminium heatsink helps divide off the audio section, and the digital processor has extra screening. The power amplifier uses good quality components with double pairs of complementary output transistors and pretty good symmetry between left and right channels. The processor has dual BB '56P DACs preceded by oversampling digital filtering, the Yamaha digital demodulation chip plus JVC microprocessor control.

## LAB REPORT

Although we have no figures for specification power, and JVC's PR department is reluctant to return calls, it seems pretty safe to assume that this is a 100W amplifier. It has respectable enough power delivery, but also some restriction on maximum current delivery, due to the action of the protection relays. Distortions are all very low and responses are impressively flat. All amplifier parameters measure well, though low level volume/balance tracking and stereo separation symmetry show mild room for improvement.

The digital side shows poorer than average separation and noise figures, but low level dynamic range linearity is pretty good and distortions are modest enough. The output inverts absolute phase and shows some phase shift at high frequencies. In all, it's not as good as a number of CD players, but passes muster nonetheless.

## SOUND QUALITY

Although there is no disgrace about the sound quality, comparatively speaking it is



pretty ordinary, particularly in view of the £600 price tag. Admittedly results were reasonably close between the different inputs, the ratings fall somewhat short of more audiophile oriented products and line up towards the top of the consumer electronics mainstream.

Through the optimum (analogue line) input the sound is fairly neutral with a reasonably sweet treble and a soundstage of about average dimensions. The vinyl disc input is pretty nondescript, the treble a bit forward and obvious and the midrange slightly veiled, if still capable of delivering a convincing vocal line.

The direct digital link proved rather disappointing, resulting in a sound no better than a budget amplifier and CD player, though certainly there is no complaint regarding the loudness capability of what is a pretty powerful amplifier. The treble shows some 'wispieness' and 'grit' on choral material, while the bass sounded a little confused dynamically - sometimes under good control, sometimes not. Stereo perspectives are forward and 'flattened', and detail is rather average.

## CONCLUSIONS

Even though this is a beautifully finished and built amplifier with the convenience of a good quality remote volume control, it is hard

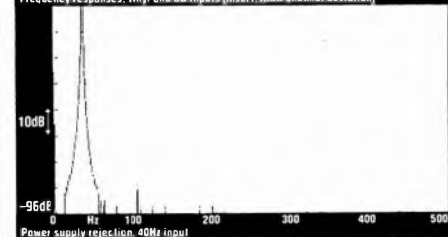
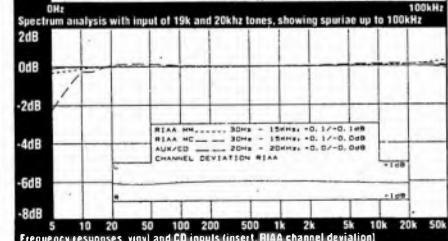
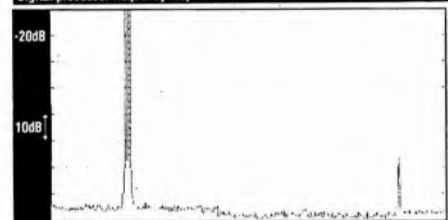
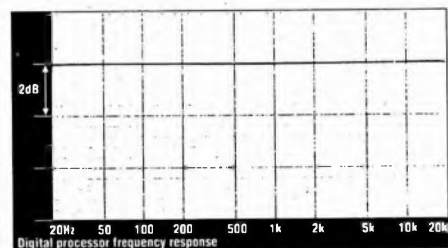
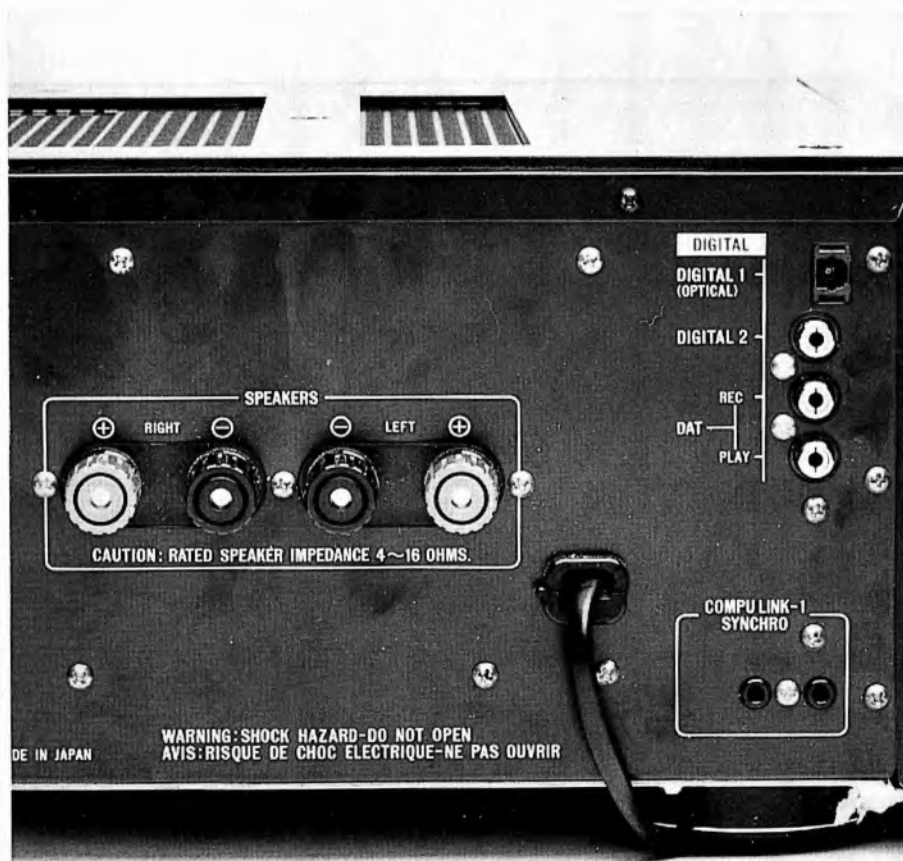
to find justification for the high price and comparatively ordinary sound quality. Had more than one digital source been widely available, the rationale would have been stronger, and there is certainly some sense in laying down plans for the future in this way. Even though this JVC works rather better than earlier models from rival manufacturers, one must still face the fact that important lessons regarding the refinement of the sound of these devices have yet to be learnt.

## TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		100W (=20dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	21.5dBW 21.4dBW 21.3dBW		
Both channels, 4ohm load	19.7dBW 20.0dBW 19.9dBW		
One channel, 2ohms, pulsed		*dBW	
Instantaneous peak current		+12A	-12A
Distortion			
Total harmonic distortion,	20Hz 1kHz 20kHz		
at rated power, aux/CD input	-86dB -83dB -80dB		
Intermodulation, 19/20kHz, rated power, aux input		-100dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)		-91dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MC)		-87dB	
Noise			
Disc (MM) input (IHF, CCIR weighted)		-78dB	
Disc (MC) input (IHF, CCIR weighted)		-68dB	
Aux/CD input (IHF, CCIR weighted)		-78dB	
Residual, unweighted (volume control at min)		-94dB	
DC output offset		left 2mV, right 2mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	29.4dB 28.8dB 28.2dB		
Disc (MC) input (IHF)*	27.7dB 27.0dB 26.4dB		

Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	77dB	65/75dB	38/48dB
Aux/CD input	94dB	65/75dB	38/48dB
Output impedance (damp)	0.08ohm	0.08ohm	0.11ohm
Channel balance, disc, at 1kHz			0.37dB
Volume/balance tracking			
Aux/CD input	0.01dB	0.28dB	1.22dB
Input data			
	socket type	sensitivity	loading
Disc (MM) input		0.55mV	46kohms 260pF
Disc (MC) input*		0.045mV	460ohms —nF
Aux/CD input		42.5mV	27kohms 220pF
Output, preamp (tape)		10.3V max, 380ohms	
Disc equalisation error, 30Hz-15kHz		+0.1dB,	-0.1dB
Digital Section			
Channel balance	0.03dB	0.03dB	0.05dB
Stereo separation	65dB	64dB	60dB
Total harmonic dist, 0dB	-92dB	-90dB	-87dB
Total harmonic dist, -10dB	—	-81dB	—
Total harmonic dist, -60dB	—	-47dB	—
Total harmonic dist, -80dB	—	-20dB	—
Intermodulation, 19kHz/20kHz, 0dB			-85dB
Intermodulation, 19kHz/20kHz, -10dB			-97dB
Frequency response,			
left channel	-0.02dB	0	-0.09dB
Frequency response,			
right channel	-0.02dB	0	0.09dB
Signal-to-noise, 20Hz-20kHz unweighted			94/95dB
Signal-to-noise, CCIR/ARM, 1kHz ref			95/99dB
Output level, 0dB, left/right			2.08V
Output impedance			560ohms
De-emphasis 1kHz, -0.35dB; 5kHz, -4.4dB; 16kHz, -9.15dB			
Spurious up to 100kHz			-82dB
Resolution at -90dB		L, -88.6dB; R, -86dB	
Headphone socket			variable, 330ohms
Dimensions (w x d x h)			47.5 x 16.7 x 46cm
Estimated typical purchase price			£600

\*current limited protection



# SONY TA-F450D

SONY UK LTD., SONY HOUSE, SOUTH ST., STAINES, MIDDX. TEL: (0704) 67000.



Sony may not match some of the broader based Japanese multinationals for sheer size, but it concentrates almost entirely upon the consumer electronics sector (apart from a highly successful professional audio and video equipment operation) and consequently has a strong presence in virtually all markets – even VHS videorecorders, at last!

The brand is known best for innovation and design skills that few can approach, and new markets rarely develop without either Sony's lead or active participation. As one of the moving forces behind digital audio in all areas – notably co-developing the CD format but also responsible for several complete ranges of PCM audio recording systems – Sony actively promulgates the digital message at every opportunity, so the appearance of a digital amplifier from the stable is no surprise. However, the way the 450D seems to be sneaking on to the market makes one wonder if there is much confidence behind it.

Sony must market about ten separate amplifiers in the UK, two or three incorporated in midi systems, but the £250 TA-F450D hasn't yet made it into the brochures. It's the only digital model in the range, save for the 7700D featured in the Series 1000CD upmarket midi system. Pricewise and by nomenclature it sits between the £200 TA-F400B and the £300 TA-AV480B, the former a conventional 84W model, the latter a 85W+25W surround sound, remote control unit intended for integrating audio and video. The provisional spec. gives the 450D 85W output power, which is pretty close to our measurement findings.

A 'digital' amplifier consists of a conventional enough analogue amplifier that handles all the usual (analogue) signals from pickup cartridges, cassette decks, CD players and the like, but also incorporates the electronics side of a CD player. Digital sources such as CD players fitted with a digital out-

put socket and/or optical connector may transfer the datastream direct to the amplifier, rather than converting into conventional analogue signals beforehand. Note that the single connector is all that is needed to carry both channels of a stereo pair.

Although there is inevitable redundancy in doubling up the CD player electronics, this does avoid cable induced degradation – and any earth interference too if an optical link is used. In fact digital amplifiers incorporate various digital input and output sockets to handle possible future developments – such as DAT (digital audio tape) and satellite radio or TV soundtrack broadcasts. And because these alternative digital sources have different sampling rates – 32kHz for broadcasts, 44.1kHz for CD and 48kHz for DAT – there is also the circuitry for switching between these different standards.

It's a medium weight device, built on Sony's proprietary Gibraltar chassis with metal front and wrap, and sitting on silly cosmetic feet. The ergonomics are a bit messy by Sony standards, with a large, slightly sticky volume control, smaller bass, treble and balance rotaries. There are a number of pushbuttons, providing tone defeat, 'loudness', subsonic filtering, MM/MC cartridge and digital/analogue input selection, plus an illuminated button for 'digital direct'. Rotaries cover 4-way speaker switching (A+B/off/A/B), the separate analogue and digital input selectors, plus a six position 'record out' selector.

On the digital side there's a single optical and a single electrical for (stereo) replay, then a pair of record/replay sockets for a DAT recorder. Note that the amplifier contains DACs but not ADCs (analogue-to-digital), so those wishing to use DAT machines to record from vinyl or FM radio will also have to make normal analogue connections from amplifier to DAT. Analogue inputs consist of three at

line level, one for vinyl disc plus two tape in/out, all on phono sockets. There's provision for headphones on the front, and loudspeakers connect to rather nasty slot binders on the rear.

The relatively low price is presumably responsible for the fairly basic engineering and component value used here, though the encased mains transformer and 2X10,000µF PS capacitors is quite generous. The power amplifier uses large, discrete complementary transistors, bolted to a central aluminium heatsink which acts as internal divide/shield. There is quite a number of interconnected PCBs, while the phono inputs mix discrete bipolars and op-amps. The ultra-simple processor, in its own screened compartment above the phono input stage, is fed from a couple of regulators, and uses the Yamaha data demodulation chip, Sony oversampling digital filter and 2X BB DACs.

## LAB REPORT

The measured performance is generally pretty good, though the power output is not all that generous, judging by the ±12A peak current – the lower impedance figure was fooled by the protection relay. However, potentially the most serious weakness lies in the +2dB 50Hz 'bump' on the MC vinyl disc input. Quite whether Sony is trying to discredit vinyl or make some sort of clever compensation is unclear, but it bodes ill for the sound whatever.

Elsewhere the measurement set is all perfectly respectable, if showing occasional limitations due presumably to component tolerancing – stereo separation is mildly asymmetric, volume/balance tracking deteriorates at low levels – but measured distortions are all good.

The digital input is also fair enough, the response tailing off slightly at the bandwidth extremes. De-emphasis might have been



more accurate, and high frequency separation rather greater, but channel balance is excellent and low level dynamic range resolution is pretty good.

## SOUND QUALITY

Sony amplifiers don't seem to be having a particularly good sonic run in *Hi-Fi Choice* recently, and the 450D regrettably proves no exception. Even via the optimum (analogue line) input the sound is rather ordinary – quite lively but also 'chromium plated', with some hangover in the bass. The stereo sound-stage is uninspiring with little depth.

Vinyl discs are well below average, particularly using the extra MC gain stage – not helped by the in-band LF resonance no doubt. The music is somehow 'deadened', 'lippy', 'slow' and just plain dull, with weak stereo focus and negligible depth – perhaps they were using a Sony turntable!

The direct digital input is only a little better, providing the combined impression of a cheap CD player through an indifferent amplifier. Treble is phasy and defocused, with 'grain' and 'grit', while the bass is soggy and lacking in impact.

## CONCLUSIONS

Although significantly cheaper than any of its

rivals, the 450D falls flat on its face subjectively, sounding more like a refugee from an over-hyped midi system. Perhaps Sony UK's original uncertainty over importing this model was well founded . . .

## TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		85W (=19dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	19.4dBW 19.4dBW 19.2dBW		
Both channels, 4ohm load	16.8dBW 17.6dBW 17.2dBW		
One channel, 2ohms, pulsed		*dBW	
Instantaneous peak current	+12A	-12A	
Distortion			
Total harmonic distortion,	20Hz 1kHz 20kHz		
at rated power, aux/CD input	-82dB -85dB	-78dB	
Intermodulation, 19/20kHz, rated power, aux input		-100dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)		-89dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MC)		-85dB	
Noise			
Disc (MM) input (IHF, CCIR weighted)		-70dB	
Disc (MC) input (IHF, CCIR weighted)		-66dB	
Aux/CD input (IHF, CCIR weighted)		-70dB	
Residual, unweighted (volume control at min)		-75dB	
DC output offset		left 0mV, right 5mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	30.3dB 29.9dB 28.2dB		
Disc (MC) input (IHF)*	31.5dB 27.2dB 26dB		
Aux/CD input (IHF)	>23dB >23dB >23dB		

### Stereo separation

Disc input (MM)	73/73dB	63/69dB	37/43dB
Aux/CD input	75dB	55/62dB	29/35dB
Output impedance (damp)	0.18ohm	0.17ohm	0.26ohm
Channel balance, disc, at 1kHz			—dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.18dB	0.03dB	1.28dB

### Input data

	socket type	sensitivity	loading
Disc (MM) input		0.33mV	44kohms 240pF
Disc (MC) input*		0.025mV	100ohms —nF
Aux/CD input		20mV	73kohms 190pF
Output, preamp (tape)			8.9V max, 2.2kohms
Disc equalisation error, 30Hz-15kHz			+1.8dB, -0.4dB

### Digital Section

Channel balance	20Hz 1kHz 20kHz		
	0.08dB 0.05dB 0.04dB		
Stereo separation	102dB 78dB 53dB		
Total harmonic dist, 0dB	-96dB -96dB -77dB		
Total harmonic dist, -10dB	-84dB -84dB -		
Total harmonic dist, -60dB	-48/38dB -		
Total harmonic dist, -80dB	-21dB -		
Intermodulation, 19kHz/20kHz, 0dB			-90dB
Intermodulation, 19kHz/20kHz, -10dB			-85dB

### Frequency response,

left channel	-0.08dB	0	-1.17dB
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### Frequency response,

right channel	-0.07dB	0	-1.13dB
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### Signal-to-noise, 20Hz-20kHz unweighted

	101/104dB
--	-----------

### Signal-to-noise, CCIR/ARM, 1kHz ref

	95/101dB
--	----------

### Output level, 0dB, left/right

	2.2V
--	------

### Output impedance

	470ohms
--	---------

### De-emphasis 1kHz, -0.2dB; 5kHz, -5.1dB; 16kHz, -10.7dB

	-103dB
--	--------

### Spurious up to 100kHz

	L, -89.3dB; R, -85.3dB
--	------------------------

### Resolution at -90dB

	variable, 560ohms
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### Headphone socket

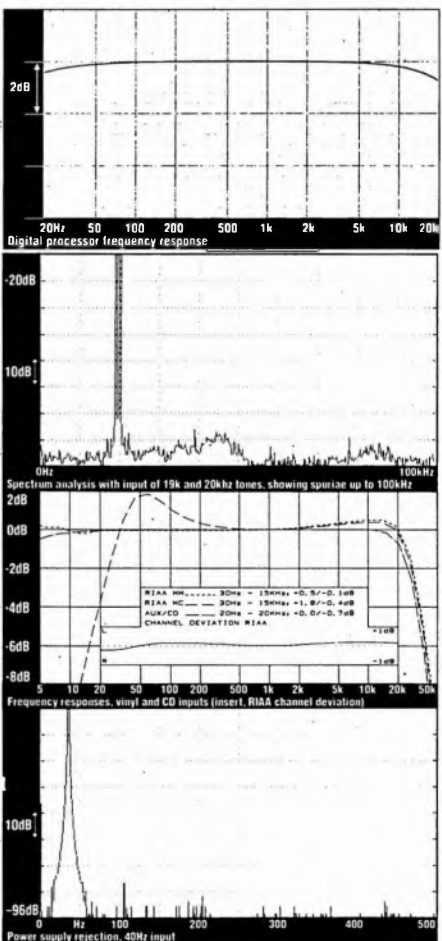
	43 x 12.5 x 36cm
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### Dimensions (w x d x h)

	£250
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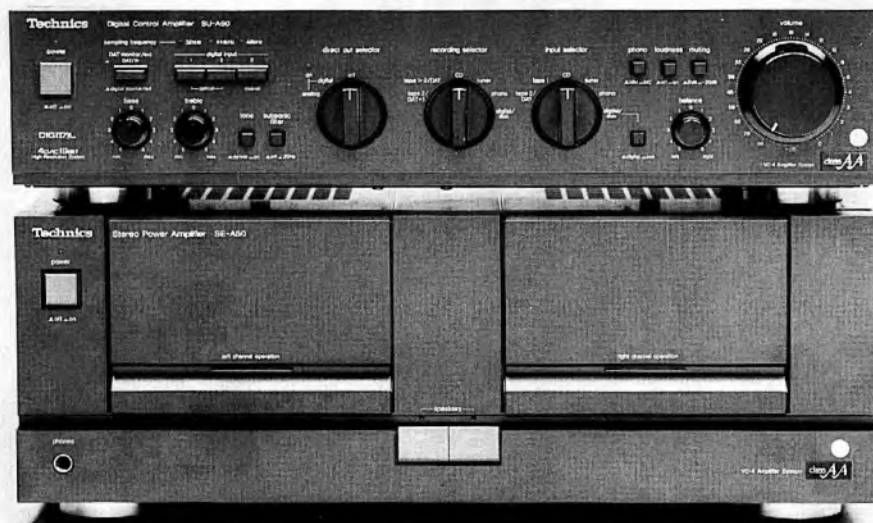
### Estimated typical purchase price

\*current limited protection



# TECHNICS SU-A60/SE-A50

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Technics is the specialist hi-fi arm of the mighty Matsushita organisation, the largest electrical company in the world, and even better known for its mainstream Panasonic consumer electronics brand. Even Technics is a bit of a giant in the much smaller hi-fi market, and is certainly number one in UK separates sales taking all sectors into account. The brand has been carefully fostered to keep a 'clean' image, away from downmarket product and the chain store hurly burly discount wars, and has built a steady image of fine reliability and consistency even through the difficult times before the CD boom got under way.

Technics is rarely a trendsetter, preferring to let others start new technological balls rolling, but its products are often more thoroughly worked out when they do come to market, and that seems to be the case with this impressively flexible and rather effective pre-/power amplifier combination. In fact Technics' 1988 range makes a heavy commitment to 'digital' amplifiers. Two out of the three midi systems with proper separate amplifiers are using the technique, as well as the top two separates models out of a six strong line up.

The £400 SE-A50 power amplifier is effectively much the same as any other stereo power amplifier, operating entirely in the conventional analogue domain (but none the worse for that!). The £400 SU-A60 is described as a 'Digital Control Amplifier', which is as good a term as any, though one could start a philosophical debate over whether it is closer to an outboard digital processor with onboard preamplifier, or a preamplifier with built-in digital processing.

A well designed outboard processor (such as this) is quite capable of improving the sound of many CD players, provided of course that these are equipped with the necessary digital bitstream output. Whether such a pro-

cessor performs as effectively when housed in the same box as a power amplifier, like the integrated digital amps reviewed alongside this combination must remain open to question. The idea of combining the processor with a preamplifier seems somehow much more logical, even if all digital media bar CD are still very much in the future tense.

Ultimately the A60 should allow the flexible interfacing of digital sources and recorders into an analogue system, though it should be pointed out that it works in one direction only – there is no A-to-D convertor to change existing analogue signals into digits (your DAT recorder will have to take care of that). However, Technics' D-to-A converter is equipped with the control chips to self-adjust to the different sampling frequencies being used by current and planned formats. Note also that a single (coaxial or optical) connector is all that is needed to carry both channels of a stereo pair in the digital domain.

The preamplifier has a busy looking fascia covered in small gold legends on dark brown metal. It's dominated by three rotary selectors for inputs and outputs, plus a large, stiff and slippery volume control with strange double scaling. This at first doesn't appear to correspond too much, but the one marked on the fascia is the normal condition, while the other on the knob periphery automatically illuminates and applies when bypassing tone controls (direct out, from one line level analogue or any digital source) – all clever stuff.

Balance, bass and treble are consigned to small rotaries, while small and spasmodically scattered square switches handle –20dB muting, loudness and MM/MC vinyl disc option. The switch selection operations are certainly flexible, though they are also horrendously complex and occasionally idiosyncratic – the digital sources are paralleled to an 'aux' analogue input if used through the

tone controls and suchlike, and only one line level analogue input can bypass this section. The digitals themselves have their own push-button selectors, and comprise switchable optical or coaxial DAT in/out pairs (which permits monitoring) plus three other inputs – one coaxial and two optical. Sampling frequency flags provide confirmation.

Although too busy for easy understanding, at least the legends for 'Digital 4DAC 18-bit' and 'Class AA' are reasonably discreet. The box is metal all round, sitting on silly shiny big plastic feet, but it rattles – almost buzzes – if struck. Gold plated phonos are used throughout, the analogues covering one vinyl, three at line level, plus two tape recorders, equaliser patch links, pre-out and the aforementioned 'in direct'.

The conventional enough stereo amplifier looks big and chunky. A curious but not unattractive fascia styling feature encourages the uninitiated to struggle to open the little 'doors' or 'drawers' which are neither. Switches provide power on/off and main/remote speakers, while other features include a headphones socket plus one status LED per channel. The feet show mild hysteresis, so must be deemed merely 'fairly silly', while legends proclaim 'VC-4 amplifier system', 'class AA'. The metal case is rather rattly and cheap in construction, though the whole unit is very heavy. There are four large binding terminals per channel, plus a bridged mono operation switch.

Inside, the A50 is a nicely built, discrete component, direct coupled complementary transistor power amplifier, with Technics' current-linear output stage circuitry and clean symmetric design. The preamplifier has a separately screened processor, 4Xoversampling Technics digital filter plus a 4XDAC system involving symmetric balanced operation, plus a bit-ranging scheme to give effective 18-bit resolution.



## LAB REPORT

Power output is a respectable 100+ watts, with plenty of current available and no difficulty in low impedance delivery. The power amp response is ruler flat, with sensible, gentle out of band rolloffs, though the various preamplifier inputs all show a very mildly 'rich' characteristic. All distortions and unwanted noise are very low, and the input characteristics look fine.

The digital side has textbook, state-of-the-art distortion figures at low and high levels, very flat response and excellent separation save for some HF deterioration, while channel balance could have been closer. Emphasis is accurate but the DAC record output is at a fixed and high level (3.14V) with very low output impedance – good for driving long cables at any rate. S/N ratios are excellent; low ultrasonic spurious is indicative of fine filtering; fine dynamic linearity is shown by the very accurate – better than 1dB – 90dB recovery.

## SOUND QUALITY

Sound quality is difficult to sum up simply because of the variety of options and the significant differences between them. The power amplifier alone is a thoroughly respectable performer, comparable to similarly priced audiophile separates. It has an open, 'airy' sound with a clear and articulate midrange. Bass is tuneful and dynamic with decent pace, while treble is explicit and detailed, albeit with some loss of harmonic differentiation and a mild 'wispieness' at the very top end. There's some loss of stereo depth, and the presentation is a shade 'forward', though well focused.

The preamplifier was disappointing with vinyl disc, but pretty good elsewhere. Vinyl has muffled definition in the midband, soft treble 'grain' and a general blandness and lack of pace, with flattened stereo images. The line input is much better – on a par with the power amp in fact. Treble is clean and detailed, bass is competent and the midband

has only slight muddle, the overall sound being just a little 'thin' and 'flattened'.

The best bit is the digital processor, which alone is almost worth the price of the pre-amplifier, sounding impressively detailed, articulate and transparent. Resolution is high, stereo depth and focus very good, bass excellent – powerful and driving – and the midband smooth. Dynamics are generally good, but there was the occasional unsettling reservation here – about the only aspect where any criticism was offered.

## CONCLUSIONS

Dauntingly complex though impressively flexible, this combination has much to offer anyone disinterested in vinyl replay. The digital side is best of all, and this preamplifier will upgrade the sound of any D-out-equipped CD player. The power amplifier is a worthy and complementary component, and the ensemble is capable of competing both on price and sound quality with many less well featured, more audiophile oriented components.

## TEST RESULTS

Power output			
Rated power into 8ohms, maker's spec	115W (= 20.6dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	21.1dBW	21.2dBW	21.1dBW
Both channels, 4ohm load	19.6dBW	19.9dBW	19.8dBW
One channel, 2ohms, pulsed		20dBW	
Instantaneous peak current	+25A	-24A	
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-88dB	-88dB	-82dB
Intermodulation, 19/20kHz, rated power, aux input			-105dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-90dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-88dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-80dB
Disc (MC) input (IHF, CCIR weighted)			-66dB
Aux/CD input (IHF, CCIR weighted)			-83dB
Residual, unweighted (volume control at min)			-86dB
DC output offset		left 0mV, right -2mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	33dB	32.6dB	30.3dB
Disc (MC) input (IHF)*	30.2dB	29.4dB	29.4dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB

### Stereo separation

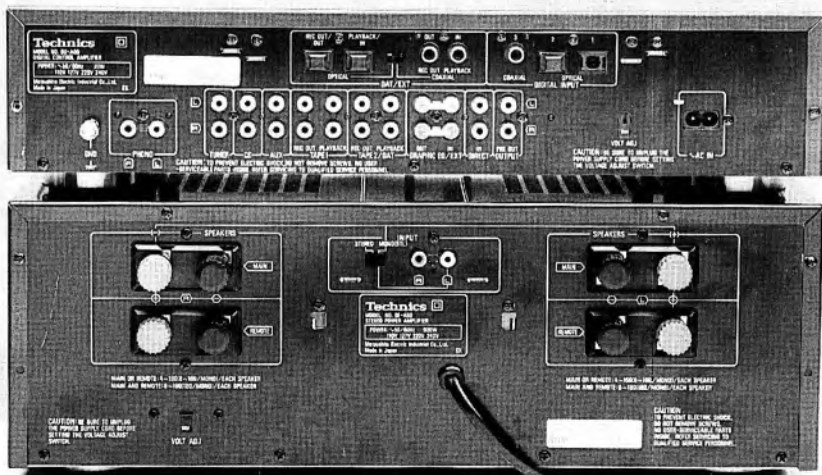
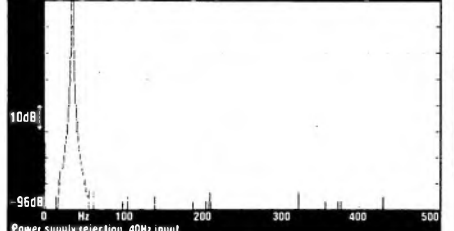
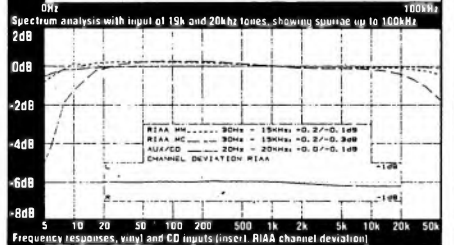
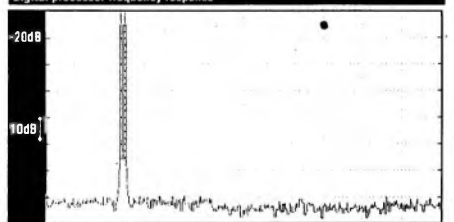
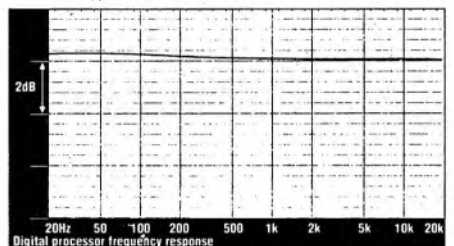
Disc input (MM)	76dB	70dB	47dB
Aux/CD input	76dB	70dB	47dB
Output impedance (damp)	0.11ohm	0.11ohm	0.17ohm
Channel balance, disc, at 1kHz			-0.3dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.10dB	0.17dB	0.0dB
Input data			
	socket type	sensitivity	loading
Disc (MM) input		0.25mV	47kohms
Disc (MC) input*		0.030mV	220ohms
Aux/CD input		16mV	25kohms
Power amp		92mV	50kohms
Output, preamp (tape)		3V (3ohms)	12V max, 550ohms
Disc equalisation error, 30Hz-15kHz			+0.2dB, -0.3dB

### Digital Section

Channel balance	20Hz	1kHz	20kHz
	0.16dB	0.16dB	0.28dB
Stereo separation	117dB	96dB	70dB
Total harmonic dist, 0dB	-100dB	-98dB	-88dB
Total harmonic dist, -10dB		-84dB	
Total harmonic dist, -60dB		-51dB	
Total harmonic dist, -80dB		-28dB	
Intermodulation, 19kHz/20kHz, 0dB			-81dB
Intermodulation, 19kHz/20kHz, -10dB			-105dB
Frequency response,			
left channel	-0.23dB	0	-0.1dB
Frequency response,			
right channel	-0.23dB	0	0dB
Signal-to-noise, 20Hz-20kHz unweighted			113/109dB
Signal-to-noise, CCIR/ARM, 1kHz ref			108/105dB
Output level, 0dB, left/right			3.14V
Output impedance			3ohms
De-emphasis	1kHz, -0.1dB; 5kHz, -4.27dB; 16kHz, -8.81dB		
Spurious up to 100kHz			-104dB
Resolution at -90dB		L, -90.8dB; R, -91dB	
Headphone socket			on power amp
Dimensions (w x d x h)			43 x 10.2 x 32cm + 43 x 16 x 41cm

Estimated typical purchase price

£400 + £400



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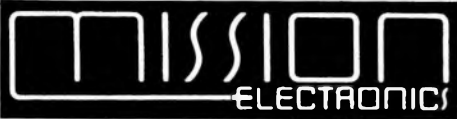
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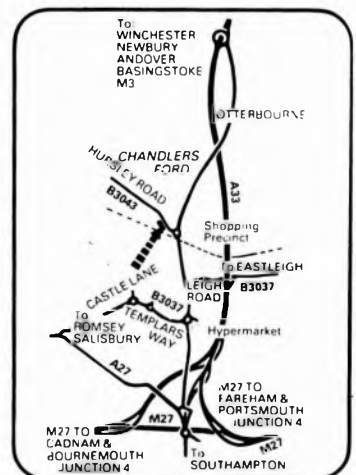
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# CHOOSING AND USING . . . LOUDSPEAKER CABLES

*Paul Miller attempts to unravel the complexities of  
loudspeaker cables.*

Ten years ago, an article discussing the relative merits of various loudspeaker cables would have been viewed as some sort of joke. Over the last decade though, enthusiasts and engineers alike have gradually accepted that individual components exerted an influence on the sound of the system as a whole. What began with turntables, arms and cartridges has ended with equipment supports, loudspeaker stands and both interconnect and loudspeaker cables.

*Choice* carried a major comparative review of interconnect cables in the June '88 issue so this particular exercise is solely concerned with the later link – the speaker cable.

It's important to appreciate the range of tonal and dynamic shadings introduced by different types of loudspeaker cable, but it is just as important to maintain a sense of proportion. A good cable can never retrieve lost musical information just as it cannot miraculously transform a dog-eared system into sounding like the LSO. Nevertheless, the *right* cable may just be sufficient to tip the balance and change a system from being very good to truly great.

Cables as such may either be viewed as subtle tone controls, blending their sonic register with those of the amp and speaker, or as wholly neutral linkages that impart little or no character of their own. Either way the subjective comments included in this 40-strong test should help guide you along the tortuous path of system tuning.

But a word of warning before we enter into a short discussion concerning the effects of cable construction and geometry. Loudspeaker cables are assessed in much the same way as interconnects, however, the electrical termination of speaker leads is rather less predictable and as a consequence the subjective observations are likely to be more system dependent.

Unlike interconnects, virtually all speaker cables adopt a symmetrical construction, the signal and return halves of the cable being identical in both geometry and material. While the thickness and length of the

conductor affects its resistance (R) it is the physical displacement of the signal/return cores that determines the series inductance (L) and parallel capacitance (C).

Braided cables were once popular, however, despite the fact that their outrageously high capacitance had little influence over frequency response, it was sufficient to precipitate an instability in some amplifiers. By contrast the parallel, spaced-conductor cables (Absolute Wire, Naim, Linn, DNM and Exposure) offer a very low parallel capacitance. But series inductance increases proportionally and this also raises the impedance of the cable at high frequencies.

So while a high DC resistance will modify the frequency response of a loudspeaker in accordance with its varying impedance trend, its inductance will contribute to the cable's reactive impedance and so reduce high treble output. A boost in the lower region may also be experienced.

High capacitance may also indicate some sort of dielectric instability, particularly absorption. The choice of insulator is just as critical with speaker cables as interconnects, PTFE (Teflon) possessing superior dielectric properties than either polypropylene, polyethylene or PVC materials. How susceptible a cable is to vibration (microphony) is also partially determined by the insulator as this is the medium through which the charge displacement actually occurs.

For those who are interested a technical article in our June '88 issue included further information on the effects of conductor purity, crystal structure and grain boundaries, skin-effect and non-linear surface conduction, dielectrics, geometry, RF noise and microphony. The short treatise using Molecular Orbital Theory to help explain the theory of conduction is also equally applicable to speaker cables.

## PUTTING THEORY INTO PRACTICE

A new technique was employed to try and sidestep some of the

traditional difficulties that arise when auditioning cables within a specific amplifier/speaker combination. The Deltac DFA-50S power amplifier utilises a novel double-pole/zero phase compensation network that extends out to the loudspeaker terminals, providing extensive correction that also includes the integral speaker leads. Therefore, inserting a length of test cable between the loudspeaker and notional feedback point allowed direct A/B comparisons to be made between the sound of 'no cable' and 'some cable'. Subjective observations could then be drawn against a nominal absolute rather than against some arbitrary 'reference' cable.

Driving the cable and speaker from such a low source impedance tended to highlight the effect of resistance, so comments concerning low bass resolution will be more or less appropriate depending on the output impedance of your amplifier. Variables inevitably creep in whatever the test procedure – but this method does obviate at least one hurdle in a difficult regime.

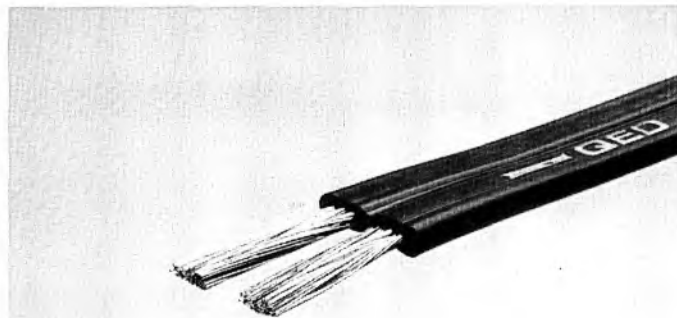
All the basic LCR parameters were assessed in the same way as for interconnects, using a high resolution databridge and 5-digit multimeter. All the numerical results have been normalised for 5metre lengths of cable as this appears to be the most popular size purchased for domestic hi-fi installations. The series loop inductance is quoted in  $\mu\text{H}$  ( $10^{-6}$  Henrys) to a basic accuracy of  $0.05\mu\text{H}$  parallel capacitance in pF ( $10^{-12}\text{F}$ ) to 0.1pF; DC resistance in mohm

( $10^{-3}\text{ohm}$ ) to a 1mohm tolerance. Leakage is a measure of the DC resistance across the signal and return conductors and is expressed in Mohm ( $10^6\text{ohm}$ ).

A series resonance frequency is quoted for each cable which is inversely proportional to the square root of both L and C terms, including an RL correction factor. A high inductance *and* capacitance will tend to lower the primary RF resonance of the cable which may in turn degrade the high treble quality through very high-order difference intermodulation. A high resonant frequency is certainly something to look out for, so long as it is not achieved at the expense of more fundamental considerations. Both power loss and damping factor are straightforward enough, each being assessed in relation to a purely resistive 8ohm load.

Paralleling the work done on interconnects, the mechanical susceptibility (or piezo-effect) of each cable was also determined using a vibration jig. Subsequent to receiving a broadband mechanical impulse the output from each cable was plotted over a 20msec time period (transformations to the frequency domain are not shown, but are commented on where necessary).

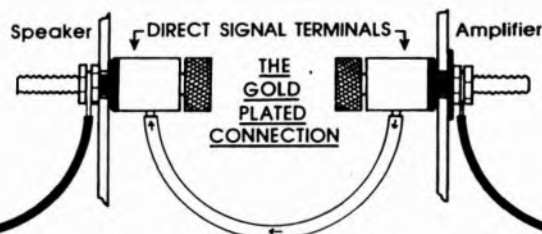
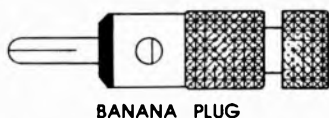
Very high impedance terminations had to be employed for the purposes of experiment so the levels produced by the cable will be some 80-100dB higher than those encountered in practice. The plots still give a relative indication of microphony between cables but do remember to observe the 5 to 500mV/div vertical scalings on the graphs.





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All the cables share important performance features. Specifications for capacitance, resistance and inductance are all on the leading edge of the state of the art. Kimber Kable also rejects outside interference, it has low or no pickup of RF, power line, ignition or other noise. Kimber Kable will also not induce crosstalk into nearby low level cables. In addition, it has little crosstalk or loss to metal. Right and left channels can be run together for hundreds of feet without interaction.

Kimber Kable can be safely used with all amplifiers, valve or transistor, high or low power; in addition, all cables are 100% tested at 1500 volts to ensure the integrity of the insulation. (Note: only 4TC or 8TC are suitable for use with Nam amplifiers - 4VS and 4PR may lead to instability.)

**Directionality** — Like other cable, Kimber Kable is directional and is supplied with a label on the signal output end. The arrow on the label indicates the signal direction - so that on a speaker cable it would be at the speaker end and point to the speaker. On a source component, it would point to the amplifier. Spare labels are provided.

**RF and mains borne interference** — We have observed a very obvious reduction in mains borne noise, clicks, buzzes and hums when a system is wired up with Kimber Kable. We take this as tangible proof of the claims Kimber make for the RF 'dumping' ability of their cables.

**AB comparisons** — When comparing speaker cable types, always change left and right cable together. Do not connect a different type of cable to each channel and then compare them by swinging the balance control from side to side — Kimber Kable deals with RF pickup so effectively that its presence in only one channel will unbalance the amplifier and render the comparison meaningless.

The advantages of Kimber Kable are not confined to top-end hi-fi systems. In fact, the owner of a modest Japanese receiver based system will derive the greatest benefit because his amplifier needs more help and gets it from Kimber Kable. The reasons for this are described in full in the Kimber literature, so I won't reiterate them here. One owner of just such a modest receiver said that the 4TC Kimber Kable speaker leads made about four hundred pounds worth of improvement to the sound of his system. Not a bad return on a fifty pound investment!

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**4VS** is as 4TC but with PVC insulation rather than Teflon. Colours are black and grey.

**4PR** is as 4VS but with untreated copper strands of equal thickness. Colours are black and brown.

**Kimber PSB Interconnect** is the cleanest, most neutral and quietest interconnect cable we have found and partners the TC speaker cables in a system perfectly. The TC speaker cables are very revealing and hitherto acceptable inter-connects may well be revealed as being noisy, 'splashy' or muddy.

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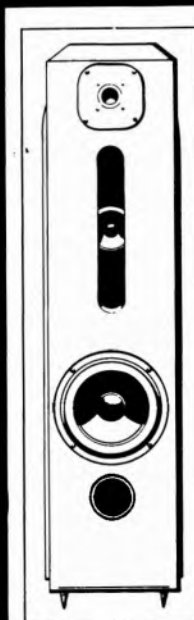
**Kimber Mains Lead** is made of 4TC or 8TC cable with an earth wire down the centre, this cable utterly outperforms standard mains cable, solid core and other 'specials' now available.

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# ABSOLUTE WIRE/FORCE 4

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This Swiss-made cable represents one of the more affordable items currently imported by the high-end moguls at Absolute Sounds. 744 OF copper strands are employed for both signal and return conductors which are held some 12mm apart by a soft, creamy-coloured PVC dielectric.

As expected, the spaced parallel construction of Absolute wire endowed it with a low 119.3pF capacitance. However, inductance was above average at 4.8μH, contributing to the high 6.65MHz resonant frequency (a good thing) as well as lifting the HF impedance trend to 0.61ohm (@ 20kHz). Such a rise is undesirable but the low DC resistance did promote a worthwhile LF damping factor of 139.

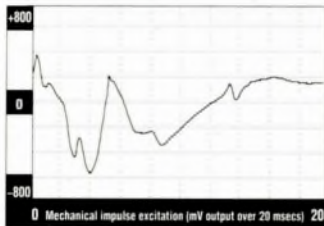
The impulse reaction was irregular, showing peak values of +335mV/-607mV associated with main components at 400Hz (-36.2dB) and 850Hz (-44.7dB). Sonically, Absolute Wire promoted a warm and rich

tonal balance with an attendant muddling throughout the upper bass. This introduced a 'bloom' to the midband which enhanced the big and friendly sound.

Nevertheless by current standards there was a loss of fine, sharp detail at the frequency extremes, the extreme treble being muted and so restricting the appeal of this product.

## TEST RESULTS

Inductance	4.8μH
Capacitance	119.3pF
Resistance	57.5mohm
Leakage	94.9Mohm
Q factor	28.5
Resonant Frequency	6.651MHz
Power Loss	0.062dB
Damping Factor	39.1
Price per metre	£4.50



# AUDIONOTE AN-SP

AUDIO BY DESIGN, UNIT 8 DYKE ROAD MEWS, 74/76 DYKE RD.,

BRIGHTON BN1 3JD. TEL: (0273) 203277.

AN-SP is based around a pair of 15-strand silver conductors, each strand being a nominal 0.2mm in diameter and coated six times over with a polyurethane lacquer. Talc is introduced just before the polyethylene dielectric and PVC jacket are vacuum-formed around the outside.

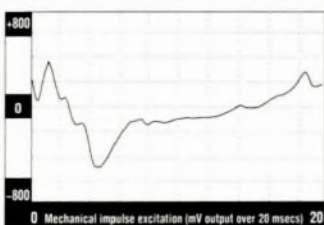
As expected, the isolated signal and return cores offered a very high 7.6μH series inductance when run in parallel, though this value could be reduced by twisting. This, together with the high 358mohm DC resistance accounts for a total impedance of 1.02ohm at 20kHz, a high 0.38dB power loss and a meagre DF of 22.4. Less microphonic than the cheaper Audionote cable, AN-SP produced a +349mV/-480mV peak charge migration with a 720Hz component causing some rippling of the main LF transient.

Strangely quiet throughout the midband, AN-SP proved to be a clean and open-sounding cable

that offered a deep and pleasantly detailed perspective. Bass was slightly restricted near the bottom of the range but seemed tight and coherent nonetheless. Similarly, there was a hint of forwardness in the extreme treble which introduced a glassy coloration on occasions.

## TEST RESULTS

Inductance	7.6μH
Capacitance	57.5pF
Resistance	358mohm
Leakage	>300Mohm
Q factor	80.8
Resonant Frequency	7.613MHz
Power Loss	0.038dB
Damping Factor	22.35
Price per metre	£100



# AUDIONOTE OR-200

AUDIO BY DESIGN, UNIT 8 DYKE ROAD MEWS, 74/76 DYKE RD.,

BRIGHTON BN1 3JD. TEL: (0273) 203277.

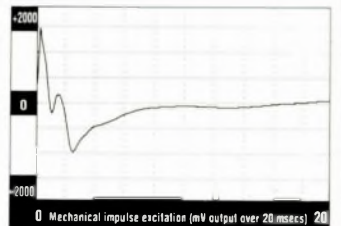
Imported by Audio by Design, OR-200 is actually the baby of a range that includes 400 and 800-strand versions of this cable. As far as OR-200 is concerned the 200 LC copper strands are drawn through a diamond die to achieve a very uniform surface. The strands are apparently coated with six layers of polyurethane before being bound in cotton. The twisted signal and return cores are then clamped in a vacuum-formed transparent PVC jacket.

Clamping resulted in a sharp 900Hz transient at -54dB but the high +1450mV/-961mV output was ameliorated by a quick recovery. Note the 500mV/div scaling on the graph. Electrically, OR-200 offers a mix of high capacitance with low inductance and resistance; the resonant frequency was a little low at 3.44MHz but, more importantly, the inadequate cotton dielectric has resulted in a very poor 740kHz leakage.

Subjectively it offered a weighty but soft sound, though not suffering the blooming effect noted with Absolute Wire. It proved both open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies. OR-200 represents good value and is certainly worth considering.

## TEST RESULTS

Inductance	2.4μH
Capacitance	894.6pF
Resistance	81mohm
Leakage	0.739Mohm
Q factor	4.17
Resonant Frequency	3.435MHz
Power Loss	0.088dB
Damping Factor	98.76
Price per metre	£16



# AUDIOQUEST BC-4

A&R CAMBRIDGE LTD., DENNY IND. EST., WATERBEACH,

CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

BEST BUY

The four BC cables are the cheapest in Audioquest's substantial three-tier range. BC-4 employs four cores of 16awg OFHC strands wound in a helical or star-quad array to reduce inductance. Indeed the series figure of 1.4μH was well below average but this was offset by a huge parallel capacitance of 1379pF which may be sufficient to precipitate instability in some amplifiers.

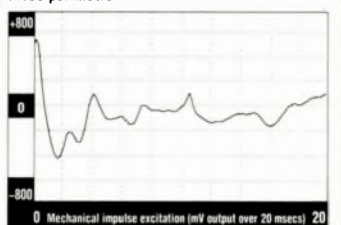
The strand diameter has been chosen to minimise the effects of non-linear surface conduction and the associated problems of RF noise. However, the combination of hard black and clear PVC dielectrics posed a more basic problem, that of an inadequate 1.95Mohm leakage figure. Resistance was low though, contributing a damping factor of 121.

Subject to the impulse test, BC-4 delivered a broad energy distribution from 430Hz (-28dB) to 2.5kHz (-56.9dB), the initial shock amounting to

+533mV/-412mV (200mV/div scale). Overall this was a highly satisfactory cable, its sonic register obviously leaner and more articulate than the likes of Absolute Wire for instance. 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.

## TEST RESULTS

Inductance	1.4μH
Capacitance	1379pF
Resistance	66.5mohm
Leakage	1.95Mohm
Q factor	17.3
Resonant Frequency	3.622MHz
Power Loss	0.071dB
Damping Factor	121.2
Price per metre	£2



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Hi-Fi Review, Nov 86

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# AUDIOQUEST LIVEWIRE BLACK

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

RECOMMENDED

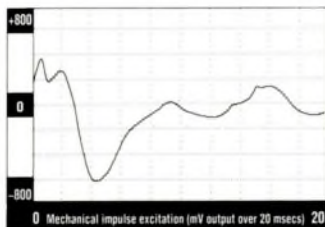
All the Audioquest *Livewire* 'colour' series are distinguished by a series of surface-only high quality copper conductors. *Livewire Black* has six conductors, three signal and three return, each comprising a single layer of OFHC copper strands laid atop a core of polypropylene foam. Each conductor is insulated with a colour-coded dielectric before being twisted side-by-side onto the periphery of a central polypropylene foam core.

A&R Cambridge have made a good job of terminating this awkward topology using heatshrink tubing and nickel-plated banana plugs. A fairly strong +362mV/-607mV impulse reaction was associated with a 200Hz (-23dB) peak together with a noise cluster between 1.5kHz-2.5kHz (-70dB). Electrically, *Black* benefitted from a very low 0.7µH inductance and 80mohm resistance but incurred a high 1073pF capacitance by way of penalty.

During the listening tests *Black* actually surpassed the quality of the dearer *Green* cable, avoiding the thick and laboured sound of the latter. It proved clear and punchy but with some added grain across the treble, nevertheless *Livewire Black* remains an interesting concept and is tentatively recommended.

## TEST RESULTS

Inductance	0.7µH
Capacitance	1073pF
Resistance	80.2mohm
Leakage	115Mohm
Q factor	>100
Resonant Frequency	5.807MHz
Power Loss	0.087dB
Damping Factor	99.75
Price per metre	£15



# AUDIO TECHNICA AT6120

AUDIO TECHNICA LTD., TECHNICA HOUSE, LOCKWOOD CLOSE,  
LEEDS LS11 5UU. TEL: (0532) 771441.

Perfect Crystal by Ohno Continuous Casting describes a new drawing process, the die temperature and drawing speed being adjusted to precipitate crystal growth in one direction only. It is now possible to produce a single crystal wire tens of metres long by this method.

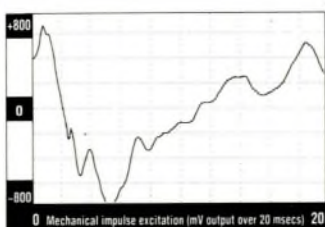
*AT6120* is composed of four polyethylene cores, each pair with 105x0.1mm and 28x0.25mm PC-OCC strands. A mauve PVC jacket encloses each of the signal and return halves of the cable but despite a tight fit this did little to reduce microphony. Electrically *AT6120* enjoys a good blend of moderate inductance and low capacitance, resistance and dielectric loss. The impulse reaction was fairly symmetrical at +754mV/-767mV (500Hz +750Hz, -32dB) but some HF artefacts were observed.

Compared to the earlier LC-OFC cables, this PC-OCC derivative sounded smoother and less aggressive but I must admit to

noticing a deterioration in stereo soundstaging and detail resolution over the last year. Perhaps PC-OCC copper demonstrates some peculiar ageing properties, but either way, my sample of *AT6120* is markedly less coherent than it was when new.

## TEST RESULTS

Inductance	3.3µH
Capacitance	195.8pF
Resistance	87.5mohm
Leakage	290Mohm
Q factor	>100
Resonant Frequency	6.261MHz
Power Loss	0.095dB
Damping Factor	91.43
Price per 10 metre	£95



# AUDIOQUEST LIVEWIRE GREEN

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

One step down from the massive *Livewire Clear* cable is *Livewire Green*, another polypropylene insulated surface-only cable, built in exactly the same way as *Black*. However, the extra cost of *Green* is partially justified by Audioquest's use of FCL or Functionally Crystal less copper instead of OFHC copper.

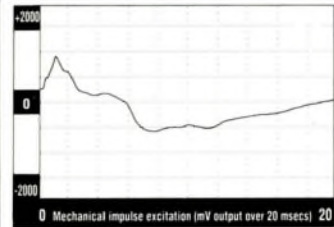
*Livewire Green* does appear to have superior leakage properties though, perhaps a function of A&R's termination more than anything else. More interesting to my mind was the increased microphony of *Livewire Green*, the +915mV (300Hz, -26.6dB) charge migration also containing an element at 450Hz (-35.8dB). From 2kHz to 4kHz the output dropped to -70dB reaching <-80dB thereafter.

Moreover, *Green* did not fare terribly well in the subjective sense. It proved more overtly dynamic and forward than *BC-4* with simple pop tracks for instance, but complex passages

tended towards a mushy and ill-defined perspective. Stereo images that were sharply focused and tactile one moment would waver and blur when the going got tough. Similarly, any low frequency ambient detail was deadened to produce a rather 2D acoustic. Most disappointing given the price.

## TEST RESULTS

Inductance	0.8µH
Capacitance	980.7pF
Resistance	78.1mohm
Leakage	>300Mohm
Q factor	>100
Resonant Frequency	5.682MHz
Power Loss	0.084dB
Damping Factor	102.4
Price per metre	£30



# BELLWIRE

AVAILABLE FROM ELECTRICAL STORES.

Bellwire represents the cheapest solid-core cable on the market. My sample was composed of two parallel 0.5mm copper conductors loosely sheathed in white PVC.

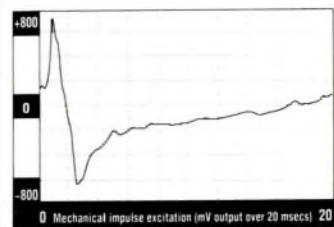
As expected the 5m loop resistance was very high at 0.48ohm and this was responsible for a drop in voltage of 5.7 per cent, this determining an effective power loss of 0.51dB. Fortunately the series inductance was kept down to 3.5µH so the total impedance at 20kHz only amounted to 0.65ohm. Correlating with the vague and loose bass quality demonstrated by this cable, the damping factor was recorded at a meagre 16.6.

Interestingly, a very sharp and well defined impulse trend was observed. The +709mV/-607mV charge migration is reproduced here on a magnified (x2.5) vertical scale and shows that low frequency spurious are well suppressed with components at 400Hz (-47.5dB) and 600Hz (-56.2dB).

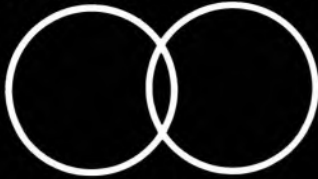
Bellwire will tend to exaggerate the response of some loudspeakers depending on their impedance characteristics, so to a large extent its subjective quality will vary from system to system. Broadly speaking it delivered a bright and tizzy-sounding treble with a fairly open and detailed mid and little or no bass resolution. Best left for the bells.

## TEST RESULTS

Inductance	3.5µH
Capacitance	348.8pF
Resistance	481mohm
Leakage	7.62Mohm
Q factor	16.5
Resonant Frequency	4.555MHz
Power Loss	0.507dB
Damping Factor	16.63
Price per metre	12p



3ADABADABADABADABA



## sound advice

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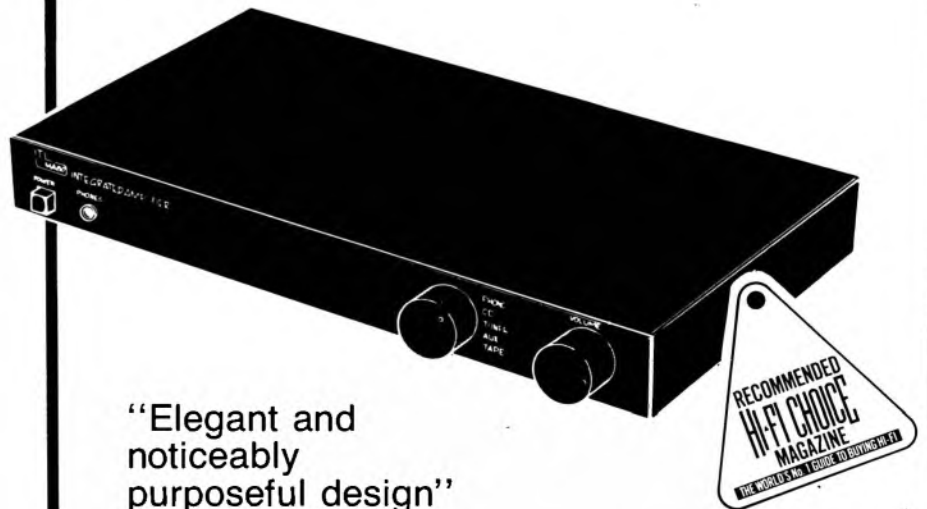
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# DELTEC 8S

DELTEC PRECISION AUDIO LTD., 16 CLAUDE ROAD, ROATH,  
CARDIFF CF2 3PZ. TEL: (0222) 482818.

RECOMMENDED

At present the Deltec range consists of three cables with 8S sitting comfortably between the cheaper 4S and costly Black Sixteen.

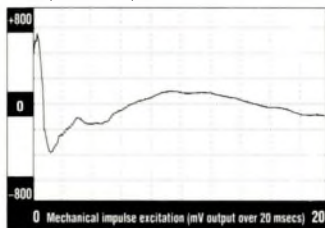
Two pairs of 4x0.6mm silver-plated OF copper strands are employed, each of the 16 cores (8 signal/8 return) being insulated with a colour-coded PTFE dielectric. The cable is wound in a starquad array with a light peripheral braid (plastic) binding the cores together. A moderate resistance of 85mohm gives rise to a damping factor of 94 – an average figure for a modern integrated amplifier. Subject to the impulse test a sharp +555mV/-377mV peak was recorded followed by a broad relaxation curve that also contains an induced 50Hz mains component.

The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at this price. It can sound very

slightly glassy in the far treble at times, perhaps as a further result of the slightly lean bass. Nevertheless 8S would appear to offer the same immunity to skin-depth artefacts as a single-strand solid-core cable but without suffering the penalty of high resistance. At £144 for a 5m set it's too pricey to be termed a Best Buy – so 'Recommended' must suffice.

## TEST RESULTS

Inductance	2.1µH
Capacitance	363 pF
Resistance	85.1mohm
Leakage	>300Mohm
Q factor	>100
Resonant Frequency	5.764MHz
Power Loss	0.092dB
Damping Factor	94.01
Price per 5 metre pair	£144



# DNM SOLID CORE

DNM DESIGN, 15 HIGHLAND AVENUE, BRENTWOOD,  
ESSEX CM15 9DD. TEL: (0277) 225865.

RECOMMENDED

Single 0.54mm conductors are employed for both signal and return paths, the copper being nickel/tin plated and insulated with a thin layer of coloured PVC. These single strands are separated by about 16mm in a very flat grey PVC strip, their parallel displacement giving rise to an inordinately high inductance of 8.3µH.

This, together with the high DC resistance of 640mohm results in a total impedance of 1.22ohm at 20kHz. This is more than sufficient to modify the frequency response of most loudspeakers in addition to losing some 0.668dB of power. Capacitance (34.7pF) is extremely low while the resonant frequency is usefully high at 9.38MHz.

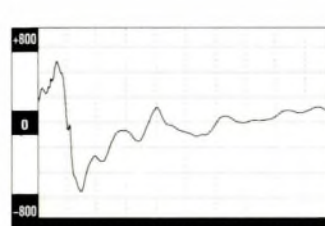
The cable impulse demonstrated an extended noise floor pattern with main peaks at 450Hz, 1kHz and 1.35kHz. Subjectively the resolution of bass instruments and ambient detail seemed extremely poor but

extreme treble managed to avoid those scratchy colorations that plagued bellwire.

Vocals benefitted from a clear and gentle midband, there being no added sibilance or harshness. DNM cable seems too unbalanced for general consumption but excellent results have been obtained in sympathetic systems.

## TEST RESULTS

Inductance	8.3µH
Capacitance	34.67pF
Resistance	640mohm
Leakage	107Mohm
Q factor	21.5
Resonant Frequency	9.382MHz
Power Loss	0.668dB
Damping Factor	12.50
Price per metre	£2.30



# DELTEC BLACK SIXTEEN

DELTEC PRECISION AUDIO LTD., 16 CLAUDE ROAD, ROATH,  
CARDIFF CF2 3PZ. TEL: (0222) 482818.

RECOMMENDED

Black Sixteen's construction is eminently sensible. A total of 16x0.6mm strands are used per conductor, each silver plated and individually insulated with a high-grade PTFE dielectric.

The strands are tightly wound in a symmetrical manner before each of the signal and return cores are clamped by a thick layer of moulded polyethylene and sheathed in a high gloss, black PVC jacket. Chunky gold-plated 4mm banana plugs sourced from WBT are used.

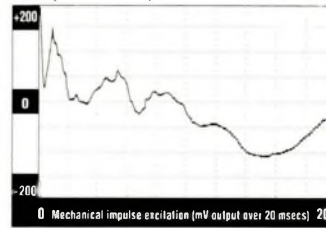
This exceptionally non-resonant construction is reflected in its very low microphony, note the x10 vertical scaling (50mV/div). A double migration was observed, +189mV and +146mV, with frequency components isolated at 1.55kHz and 2.05kHz (-64dB). A low 35.7mohm resistance promoted a decent 224 DF while both leakage and Q-factor were above the limits of measurement. Parallel capacitance was also

suitably low at 164pF, the inductance merely an average 2.9µH.

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. Subjectively, Black Sixteen proved to be a 'non-cable', so minute was its influence on the sound. Highly Recommended.

## TEST RESULTS

Inductance	2.9µH
Capacitance	163 pF
Resistance	35.7mohm
Leakage	>300Mohm
Q factor	>100
Resonant Frequency	7.307MHz
Power Loss	0.039dB
Damping Factor	224.1
Price per 4.5 metre pair	£456



# EXPOSURE CABLE

EXPOSURE ELECTRONICS, THE WORKS, 59 NORTH STREET,  
PORTSLADE, SUSSEX BN4 1DH. TEL: (0273) 423877.

RECOMMENDED

Exposure cable employs some 56 x 0.3mm OF copper strands together with a stiff, high temperature black PVC insulator which offers a good long term dielectric and chemical stability. Simple nickel-plated banana plugs are used to terminate the cable, the signal and return cores being separated by a 10mm PVC web.

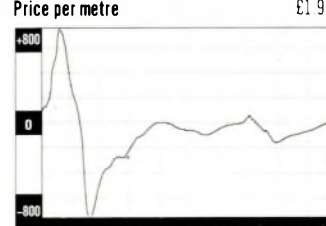
As a result of this parallel separation the capacitance was reduced to 114pF over the 5m length. Conversely the series inductance was increased to 4.8µH which is above average and increases the total impedance to 0.61ohm at 20kHz. At lower frequencies the low DC resistance of 43mohm starts to dominate, yielding an excellent damping factor of 187. The impulse reaction was only just accommodated on a ±800mV scaling due to the peak +780mV/-762mV charge migration.

There was a slight exaggeration of vocal sibilance with Expo-

sure cable and it lacked warmth and richness in the lower mid-band. It could sound a trifle matter-of-fact but this emotive flattening was also somewhat dependent on the music program. Nevertheless, while far from perfect Exposure cable is both inexpensive and highly suited to long runs – it is therefore Recommended.

## TEST RESULTS

Inductance	4.8µH
Capacitance	113.9pF
Resistance	42.8mohm
Leakage	29.5Mohm
Q factor	31.2
Resonant Frequency	6.807MHz
Power Loss	0.046dB
Damping Factor	186.9
Price per metre	£1.99





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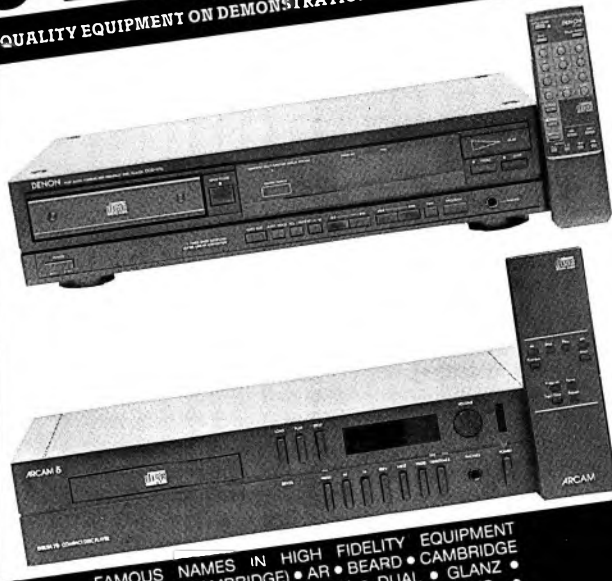
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# KIMBER KABLE 4TC

R.A.T.A., EDGE BANK HOUSE, SKELSMERGH, KENDAL,

CUMBRIA LA8 9AS. TEL: (05398) 3247.

RECOMMENDED

The top two Kimber Kables benefit from a special kind of electrolytic OF copper that has been surface treated to improve conductivity. Similarly, the insulator has been changed to a high grade of PTFE for its superior dielectric properties even though the same open-weave topology is still applied.

4TC is composed of four blue and four black conductors, each comprising a total of seven strands that vary in thickness by a maximum ratio of 1:10. The series inductance and DC resistance of 4TC was much the same as 4PR but the capacitance was appreciably lower, 630pF being rather more sensible for a 5m length in my view. Leakage and Q-factor were also markedly improved by the PTFE dielectric though microphony was more pronounced.

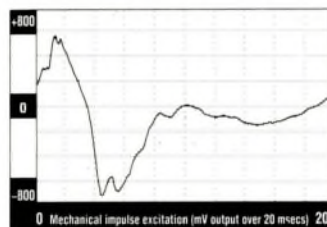
Using the 200mV/div scale the main charge migration covered +544mV/-707mV with spurious products observed between

500Hz-850Hz (-50dB), 1.2kHz (-51dB), 1.45kHz (-53dB) and 3.2kHz (-65.6dB). Sonically 4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble and a slightly rich but suitably weighty bass.

4TC has a beguiling if not totally neutral sound. Highly Recommended.

## TEST RESULTS

Inductance	1.2µH
Capacitance	627.6pF
Resistance	94.7mohm
Leakage	78Mohm
Q factor	>100
Resonant Frequency	5.799MHz
Power Loss	0.102dB
Damping Factor	84.47
Price per metre	£16



# LINN K20

LINN PRODUCTS LTD., FLOORS ROAD, EAGLESHAM,

GLASGOW G76 0EP. TEL: (041) 644 5111.

Sourced directly from BICC, Linn's K20 loudspeaker cable is an unpretentious design offering a mix of low resistance and low parallel capacitance. Fifty-six 0.3mm strands of OF copper are employed for each of the signal and return conductors while a relatively soft grey PVC dielectric serves as an insulator. In much the same way as Naim and Exposure, Linn have opted for a spaced conductor topology using a central web to isolate the two cores.

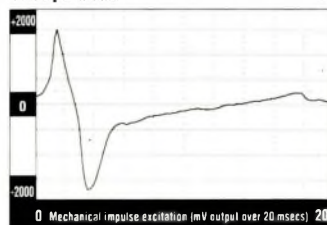
So, not only is the capacitance knocked down to 135pF/5m but leakage is also improved to a fine 123Mohm. A high-ish 4.4µH series inductance adds some 0.55ohm of reactance at 20kHz but the low 50mohm DC resistance (DF = 162) will allow long lengths of cable to be tolerated. Ten plus metres are feasible.

K20 is highly microphonic though, the substantial +1505mV/-1704mV (218Hz) charge migration requiring

500mV/div on our graph's vertical scale. Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery. There was a trace of instrumental muddling in the upper bass and midrange which tended to compromise the ultimate transparency, while vocal sibilance was an intermittent nuisance.

## TEST RESULTS

Inductance	4.4µH
Capacitance	134.7pF
Resistance	49.5mohm
Leakage	123Mohm
Q factor	85.5
Resonant Frequency	6.537MHz
Power Loss	0.054dB
Damping Factor	161.6
Price per metre	£2



# KIMBER KABLE 4PR

R.A.T.A., EDGE BANK HOUSE, SKELSMERGH, KENDAL,

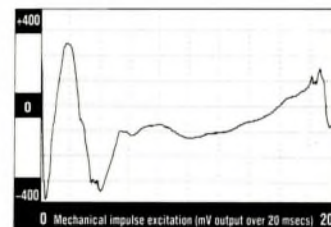
CUMBRIA LA8 9AS. TEL: (05398) 3247.

The least expensive of the four Kimber Kables, 4PR is distinguished by the black and brown colour of its PVC insulation. Four conductors are employed for signal and return, each conductor comprising some seven strands of the same thickness. These conductors are woven in such a way that rejection of hum and RF fields is improved as well as reducing the inductance down to 1.4µH. The high frequency reactance of the cable is carefully controlled, but the DC resistance was just acceptable at 0.1ohm.

RATA claim state-of-the-art LCR characteristics but this was not borne out by the massive 1129pF capacitance. This may be sufficient to precipitate an ultrasonic instability in some amplifiers, so take care in system matching. The impulse reaction was very clean at LF, the noise floor dropping to <-60dB beyond 500Hz. Note the protracted core vibration due to the open weave construction at 18.8msec.

## TEST RESULTS

Inductance	1.4µH
Capacitance	1129pF
Resistance	101mohm
Leakage	7.08Mohm
Q factor	19.9
Resonant Frequency	4.324MHz
Power Loss	0.109dB
Damping Factor	79.21
Price per 5 metre pair	£49



# MARANTZ ML-55S

MARANTZ AUDIO (UK) LTD., 15-16 SAXON WAY IND. EST., MOOR

LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: (01) 897 6633.

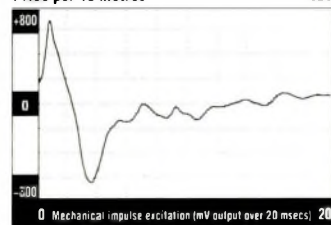
This directional, three-conductor cable has been designed to complement Marantz's range of big-ground loudspeakers. Each of the three conductors is made up of 30 0.18mm OF copper strands, each insulated in hard PVC and clamped in a softer black PVC jacket. The inner PVC cores are colour-coded red, black and grey for signal, LF ground and HF ground respectively.

ML-55S is supplied in 10metre lengths but Marantz also include two pieces of heat-shrink tubing for 5m termination. Unfortunately all the LCR parameters were rather high, leading to a composite impedance of 0.498ohm at 20kHz and a meagre damping factor of 34 below 100Hz. Over 5m there was a voltage drop of 2.8 per cent (into 8ohms) or a power loss of 0.25dB. Leakage was also poor at 2.76Mohm due to the PVC dielectric. However, the tightly defined +671mV/-634mV impulse reaction did offer a quick decay.

Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy. Sharp percussive notes for instance were tinged with coarseness. The bass seemed quite extended though not terribly firm, the overall effect seemingly a trifle imbalanced.

## TEST RESULTS

Inductance	3.5µH
Capacitance	489pF
Resistance	234mohm
Leakage	2.76Mohm
Q factor	16.7
Resonant Frequency	3.847MHz
Power Loss	0.250dB
Damping Factor	34.19
Price per 10 metres	£25





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*Introducing and evaluating equipment keeps most hi-fi magazines fully occupied. There's seldom the opportunity to do a similar introduction for hi-fi retailers, which is why we at Hi-Fi Experience have decided to tell you something about our six specialist hi-fi shops around the country. There are three in London, all wholly owned by Hi-Fi Experience plc, and franchises which we directly control in Birmingham; Bradford, West Yorkshire; and Leamington Spa in Warwickshire. Each store has a highly individual character of its own if not the building, then the manager! Yet each benefits from being part of a multiple retailer.*

*From your, the customer's point-of-view, that means our shops are ready to help each other when it comes to obtaining an item of equipment you especially want to listen to. Each one stocks a range of equipment - much of it British-made-tailored to the requirements of its own customers, but there is a standard of service that's common to all.*

*The three years that Hi-Fi Experience has been operating have shown us that, with increased leisure time, people everywhere are putting a higher value on good hi-fi. In addition, we've all lately come to expect better service regardless of what we're buying, and there was an urgent need for hi-fi retailing to reflect that trend and finally move away from the 'boxes over the counter' approach of a few years ago.*

*At Hi-Fi Experience we decided to offer a new level of service, one that would apply without qualification at all our shops, regardless of where they were or how big they were. That meant stocking only equipment we were satisfied with, in terms of sound quality, construction, reliability and after-sales service. We had to be able to demonstrate that equipment to the best of its capabilities, and that meant implementing an ongoing programme to ensure our listening rooms and setting-up procedures met that requirement.*

*There is a constant effort to improve the comfort and ambience of our demonstration rooms, to make selecting and comparing equipment as relaxed and enjoyable a process as possible.*

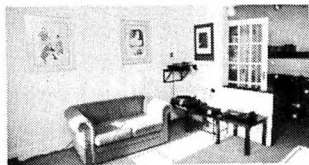
*Of course, the best equipment and the best demonstration facilities would count for nothing if we didn't believe we also had the best staff. Good staff is a product of good training, and we invest heavily to ensure the people you will encounter in our shops know their equipment, and how to get the best from it. We undertake the kind of staff training courses that are far-from-commonplace in hi-fi retailing.*

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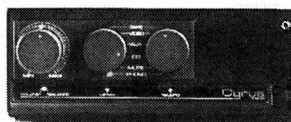
*Each of our shops will do some things slightly differently: we encourage an individual approach to customers' requirements. But the minimum we expect from each one is good demonstration facilities; comfortable, well-furnished places in which to listen; an exchange-if-not-entirely-satisfied procedure; and fair prices. We also hope they'll convince you that good hi-fi can look good, too, and that you don't need the likes of a Gold Visa card to obtain it! All our shops offer sound-value, inexpensive equipment which will form the basis of a reliable system for years to come.*

*It's worth adding that Hi-Fi Experience plc is a member of the British Audio Dealers' Association (BADA) as are some of our shops on an individual basis. All, however, trade within the terms laid down in BADA's charter, and most often exceed them.*

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**Birmingham**  
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Tel: 021-631 2675



# MISSION CYRUS

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

BEST BUY

An interesting one, this. Mission's new Cyrus cable is really a chunkier version of the 'anaemic' DNM cable. Two 0.8mm OF copper conductors are employed, one for signal and one for return, each having a thin colour-coded polyethylene dielectric. The solid cores are held parallel by a flat, stiff PVC insulation.

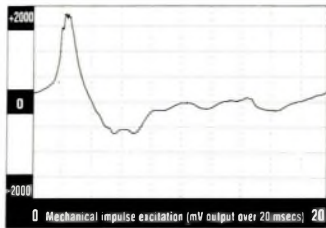
Technically, Cyrus cable is a nightmare. A low-ish 99.3pF capacitance is combined with high 7.5 $\mu$ H inductance and 318mohm resistance giving rise to a total impedance of 1ohm at 20kHz. With an 8ohm speaker there will be a 0.34dB power loss together with an ineffectual DF of 25.2. The cable was also exceedingly microphonic, the irregular charge migration leading to a poorly defined +1740mV peak and broad decay pattern reaching -562mV beneath the horizontal axis.

Because of the impedance characteristic of the cable it will deliver a smooth and unfatiguing

treble balance with loudspeakers offering an easy load. I was happier with short 1 or 2m lengths where the cable afforded a light and transparent midband while reducing the softening effects at low frequencies. In many respects it proved comparable with mains cable though possessing far better resolution of detail.

## TEST RESULTS

Inductance	7.5 $\mu$ H
Capacitance	99.30pF
Resistance	318mohm
Leakage	77.6Mohm
Q factor	47.1
Resonant Frequency	5.832MHz
Power Loss	0.338dB
Damping Factor	25.16
Price per metre	£2.50



# MONSTER SUPERFLEX

PORTFOLIO MARKETING, 2 HILLBOTTOM ROAD, SANDS IND.  
EST., HIGH WYCOMBE BUCKS HP12 4HJ. TEL: (0494) 463345.

Six different Monster Cables are presently available, *Superflex* being one step up from *XP* which is the baby of the range.

*Superflex* incorporates many hundreds of OF copper strands in each conductor, wound in bunches to form a figure of eight. Monster's proprietary Duraflex insulation surrounds the cores while a short web holds the signal and return halves apart. This enables the user to drive small tacks into the cable without puncturing the conductors but it has increased the inductance to 5 $\mu$ H, yielding a reactance of 0.64ohm at 20kHz.

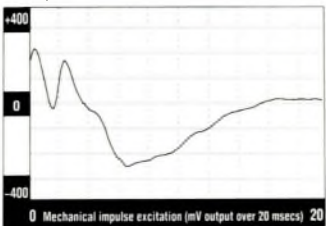
The DC resistance of *Superflex* (101mohm) is actually quite high for a thick multi-strand cable, but the clear insulation does give it the appearance of being bulkier. Subject to a mechanical impulse, the reaction was controlled by a low frequency charge migration, about 154Hz in fact, its double +218mV/+169mV peak caused by the compliant

insulator.

Treble detail was both reserved and confused with this cable though there was little in the way of harshness or grain. Deep bass notes were also to be found lacking while the midrange possessed a strangely sat-on quality. Overall, *Superflex* sounded rather jumbled-up and inarticulate.

## TEST RESULTS

Inductance	5.0 $\mu$ H
Capacitance	146.3pF
Resistance	103mohm
Leakage	106Mohm
Q factor	29.8
Resonant Frequency	5.885MHz
Power Loss	0.112dB
Damping Factor	77.42
Price per metre	£2.50



# MONITOR PC4 SILVERLINE

BANDRIDGE LTD., 1 YORK ROAD, LONDON SW19 8TP.  
TEL: (01) 543 3633.

One of a myriad Monitor PC cables currently distributed by Bandridge Ltd, *PC4S* employs a total of 2072 0.07mm silver-plated copper strands per conductor in a parallel topology reminiscent of many other cables. A clear FullFlex sheathing is used for insulation, giving the impression of a silver Monster cable.

Monitor PC claim to have stabilised the soft polymer jacket but a significant amount of oxidation has taken place on the surface strands of the sample I've had for some five months. Such thin strands will offer a proportionally higher surface area, so the longevity of the cable is in some doubt.

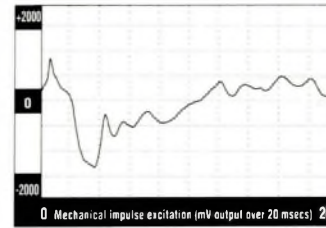
The technical parameters were all fairly respectable, only the 3.7 $\mu$ H series inductance being a little above average. *PC4 Silver* was very microphonic though, requiring a  $\pm$ 500mV vertical scaling to accommodate the +653mV/-1323mV charge

migration. Sonically it laboured under a heavy and claustrophobic balance, lacking the 'see-through' transparency and lucidity of the better solid-core speaker cables.

Complex rhythm lines were mangled by a distinct lack of dynamic and tonal contrast, the midband overwhelmed by an upper bass bloom.

## TEST RESULTS

Inductance	3.7 $\mu$ H
Capacitance	173.6pF
Resistance	41.4mohm
Leakage	225Mohm
Q factor	>100
Resonant Frequency	6.280MHz
Power Loss	0.045dB
Damping Factor	193.2
Price per metre	£5.75



# MONSTER ORIGINAL

PORTFOLIO MARKETING, 2 HILLBOTTOM ROAD, SANDS IND.  
EST., HIGH WYCOMBE BUCKS HP12 4HJ. TEL: (0494) 463345.

Based on the very first Monster product this cable benefits from improvements to both the stability of the dielectric and purity of the many copper strands. Older Monster Cables tended to show signs of surface oxidation over relatively short periods but my *Original* had not aged appreciably over the last 18 months.

Monster *Original* is thicker than *Superflex* but the clear insulation makes the copper core look bigger still. The classic figure-of-eight construction is employed once more but the conductors are not spaced apart this time, reducing the inductance to a more sensible 3.3 $\mu$ H while lifting the parallel capacitance to just 334pF.

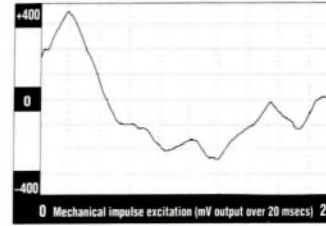
Another peculiar low frequency impulse trend was observed, the 300Hz fundamental peaking at +344mV prior to a broad negative aftershock. Subjectively too, Monster *Original* bears a close similarity to *Superflex* except at low frequencies

where it seems to possess much more weight and conviction.

It still sounded relatively congested and murky at higher frequencies though, this cable lacking the transparency and poise demonstrated by the solid-core types. Still, Monster *Original* may still find an application with a bright-sounding system.

## TEST RESULTS

Inductance	3.3 $\mu$ H
Capacitance	333.7pF
Resistance	69.9mohm
Leakage	31.6Mohm
Q factor	22.7
Resonant Frequency	4.796MHz
Power Loss	0.076dB
Damping Factor	114.3
Price per metre	£4



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# MONSTER POWERLINE 2

PORTFOLIO MARKETING, 2 HILLBOTTOM ROAD, SANDS IND.

EST., HIGH WYCOMBE BUCKS HP12 4HJ. TEL: (0494) 463345.

The three *Powerline* cables represent a break with tradition for Monster. Dubbed a 'Time Coherent' speaker cable, the many individual strands are wound in a helical fashion around a central insulating core. The pitch of this helix is apparently chosen to correct for 'magnetically induced group-delay over the full 10 octave audio bandwidth'. This is the basis of Monster's much vaunted 'Balanced Bandwidth' technology.

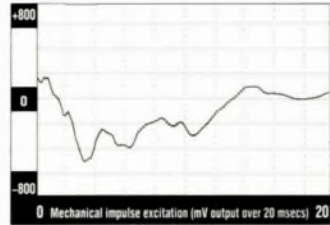
Both signal and return conductors are separately insulated before being packed with polypropylene foam and a layer of tissue inside a soft, buff-coloured PVC jacket. *Powerline 2* has a higher 96.7mohm resistance than *Monster Original* but both inductance and capacitance are better balanced. Leakage and Q-factor were beyond the limits of measurement.

It did prove to be slightly more sensitive to vibration than the other Monsters, requiring a

200mV/div scale to accommodate the +167mV/-499mV output. Subjectively too, *Powerline* stamped its own hallmark on the sound with a strong and taut bass and an essentially clear midband giving tactile stereo images. At progressively higher frequencies, however, the sound took on a softer, vague aspect that restricted any sense of sparkle.

## TEST RESULTS

Inductance	3.3µH
Capacitance	271.1pF
Resistance	96.7mohm
Leakage	>300Mohm
Q factor	>100
Resonant Frequency	5.32MHz
Power Loss	0.104dB
Damping Factor	82.76
Price per metre	£12



# NAIM NAC-A4

NAIM AUDIO, SOUTHAMPTON ROAD, SALISBURY,

WILTS SP1 2LN. TEL: (0722) 332266.

This spaced-conductor cable is actually sourced from BICC and in this respect it closely mirrors the cheaper Linn *K20*.

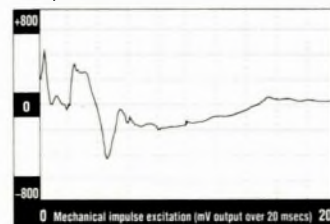
A harder, higher temperature grade PVC insulation appears to have been chosen, though whether this influenced the peculiar charge migration is open to question. Subject to the mechanical impulse, *NAC-A4* produced a rippled noise floor containing 530Hz harmonics out to 9kHz (-81dB). The fundamental and second harmonic dominated the spectrum, accounting for the double +252mV/-496mV impulse product. Inductance was above average at 3.8µH due to the cable geometry but the low 40.5mohm DC resistance - and subsequent 198 damping factor - is commendable.

Subjectively *NAC-A4* was tinged with brightness while the deep bass response seemed both over-heavy and poorly integrated compared to the immediate competition. By contrast vocal repro-

duction appeared quite natural, articulate and unforced; it was only higher frequency brass instruments that suffered from an intermittent coarseness. *NAC-A4* should work consistently in long lengths but it remains a little too unbalanced for a general recommendation.

## TEST RESULTS

Inductance	3.8µH
Capacitance	152.8pF
Resistance	40.5mohm
Leakage	85.1Mohm
Q factor	25.6
Resonant Frequency	6.605MHz
Power Loss	0.044dB
Damping Factor	197.5
Price per metre	£2.24



# MUSICAL FIDELITY LIFELINE

MUSICAL FIDELITY LTD., UNIT 16, OLYMPIC TRADING EST.,

FULTON ROAD, WEMBLEY HA9 0ND. TEL: (01) 900 2866.

RECOMMENDED

Judging by the number of new amplifiers and speakers emerging from the Musical Fidelity stable, it was only a matter of time before they developed a partnering cable. *Lifeline* is very flexible as it uses a total of four independently insulated 0.8mm PC-OCC strands. A colour-coded PTFE dielectric allows the strands to be configured for use either in bi-wire mode or twisted to form a conventional signal and return pair. It can also be employed as an interconnect.

The conductors are clamped in a bright blue rubberised insulator which is applied in two layers to improve damping. Certainly the impulse test produced very little LF spurious, a good sign, the +231mV/-340mV charge migration being composed of 400Hz (-42dB) and 900Hz (-53dB) components.

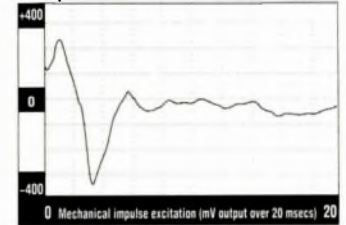
Inductance and DC resistance were a little high at 4µH and 172mohm respectively and this tended to encourage a very

smooth treble quality, quite free of any fatiguing grain or harshness. *Lifeline* did demonstrate a strong directional inclination however. Bass was surprisingly weighty, the sense of rhythm and ambience being faithfully retrieved when correctly oriented.

Best used in short lengths and with slightly bright sounding systems, *Lifeline* is Recommended.

## TEST RESULTS

Inductance	4.0µH
Capacitance	197.7pF
Resistance	172mohm
Leakage	31.3Mohm
Q factor	40.5
Resonant Frequency	5.660MHz
Power Loss	0.185dB
Damping Factor	46.51
Price per metre	£11.50



# NVA CABLE

NENE VALLEY AUDIO, 1 CHURCH FARM, HATLEY ST. GEORGE,

NR. SANDY, BEDS SG19 2EA. TEL: (0767) 50532.

RECOMMENDED

NVA cable is based around 7 0.25mm silver alloy strands, each individually insulated with translucent PTFE and bound up inside a loose-fitting woven grey plastic sleeve.

The strands are extremely delicate and have a tendency to kink, at least one strand had detached itself from a nickel-plated banana plug during transit. NVA cable is akin to a thin version of Deltec cable, the high 7.5µH series inductance together with 518mohm's of DC resistance combining to produce a 20kHz composite impedance of 1.08ohm.

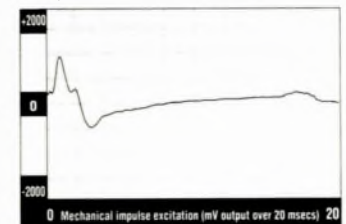
Both the effect of resistance at low frequencies and series reactance at high frequencies will be sufficient to modify the balance of some loudspeakers. This said, the RF resonant frequency was very high at 8.1MHz while the impulse reaction of +887mV/-527mV was clean and settled rapidly.

A light and breezy-sounding

cable best suited to short lengths, NVA benefitted from a clear and transparent outlook. With little false emphasis at any point the cable revealed tonal colours most faithfully. Ambient detail was accurately preserved too, despite it erring on the lean side of neutral. Recommended.

## TEST RESULTS

Inductance	7.5µH
Capacitance	51.75pF
Resistance	518mohm
Leakage	25.6Mohm
Q factor	7.57
Resonant Frequency	8.079MHz
Power Loss	0.545dB
Damping Factor	15.44
Price per metre	£6



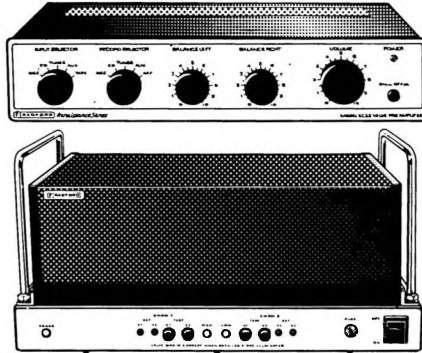


# The Radford Renaissance range of Valve Amplifiers

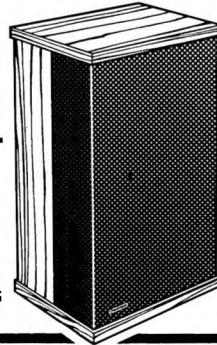
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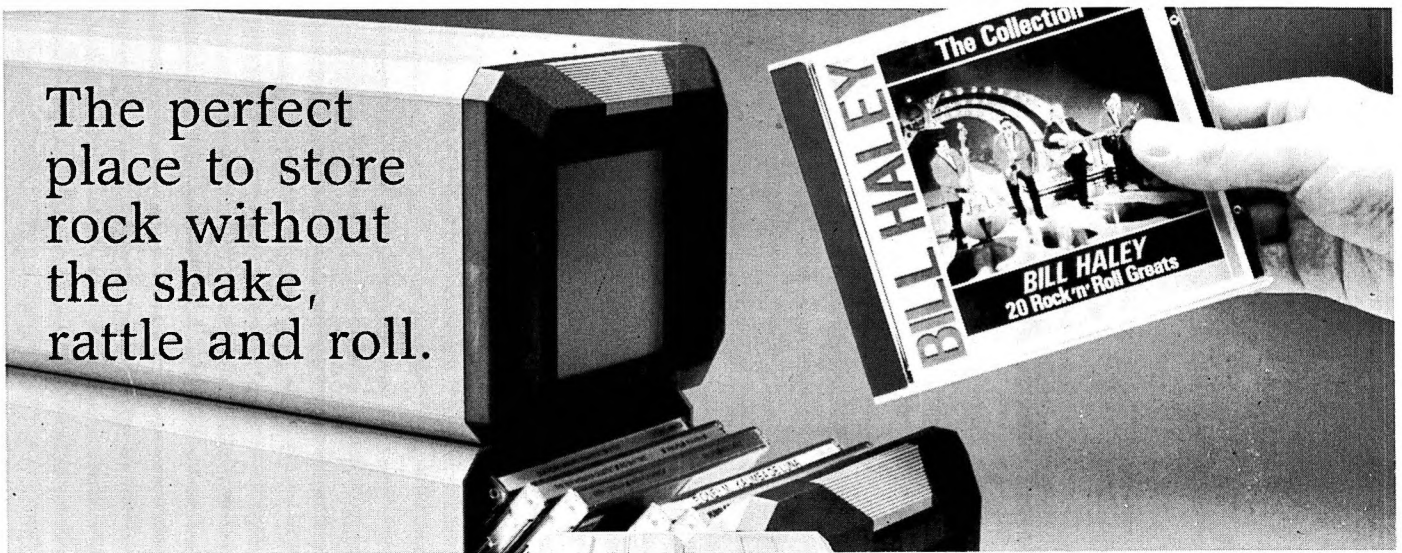
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# ORIGIN LIVE SOLI-CORE ORDINARY

ORIGIN LIVE, 87 CHESEL CRESCENT, BITTERNE,  
SOUTHAMPTON SO2 4BJ. TEL: (0703) 442183.

RECOMMENDED

Soli-Core *Ordinary* uses two thick (1.8mm) copper conductors which are individually insulated with a heavy PVC and tightly wound to provide a modicum of shielding at the same time as reducing series inductance. A fairly high figure of  $3.4\mu\text{H}$  was recorded though, possibly as a consequence of the six enamel-coated 0.5mm strands that are woven inbetween the main cores.

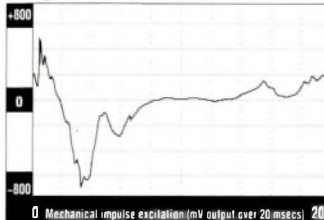
These thin strands are soldered onto the ends of the main signal and return cores, the crude litz-type construction bumping up the capacitance to 499pF. With above average figures for both L and C, Soli-Core *Ordinary* has a proportionally lower series resonant frequency of 3.87MHz. It's a long shot, but this low RF figure may be the underlying reason behind the forward and occasionally coarse treble quality demonstrated by this cable.

Matching Naim's *NAC-A4*, Soli-

Core also provided a succession of harmonics (@ 165Hz) when subject to the impulse test. Subjectively it bettered the performance of the costlier *Super* version, affording a pleasantly detailed and spacious soundstage with a firm bass devoid of any unnecessary bloom. I would say that it's well worth investigating.

## TEST RESULTS

Inductance	3.4 $\mu\text{H}$
Capacitance	498.7pF
Resistance	71.3mohm
Leakage	6.46Mohm
Q factor	20.2
Resonant Frequency	3.865MHz
Power Loss	0.077dB
Damping Factor	112.2
Price per metre	£1.80



# QED INCON GRAPHITE

QED AUDIO PRODUCTS LTD., UNIT 12, ASHFORD IND. EST.,  
SHIELD ROAD, ASHFORD, MIDDX TW15 1AU. TEL: (07842) 46236.

Available as either an interconnect or loudspeaker cable, the *Graphite* version of QED's *Incon* includes a conductive polymeric screen that surrounds the symmetrical signal and return conductors. A naked drain wire completes the screen and this should be terminated at the power amplifier if possible. If not, then take care to avoid introducing a short.

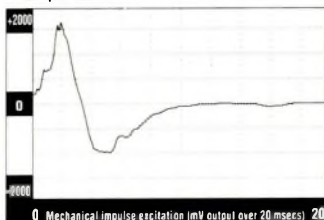
The main OFHC strands are insulated with a colour-coded PVC, twisted together and bound by the conductive screen. DC resistance is markedly greater than *79-Strand*, leading to a power loss of 0.2dB and a meagre damping factor of 42. More worrying, however, is the combination of the high  $3.1\mu\text{H}$  inductance and massive 995pF parallel capacitance which leads to a series resonance at just 2.865MHz – a very low figure. Leakage was also weak at 4.15Mohm.

Strongly microphonic the

+1631mV/–961mV impulse was based around a centre frequency of 120Hz. Oddly enough this graphite version of *Incon* sounded cruder and generally more heavy-handed than the cheaper unshielded type. The overall presentation was mildly restricted and cloaked in a faint aural fog, dynamics appearing slightly compressed.

## TEST RESULTS

Inductance	3.1 $\mu\text{H}$
Capacitance	995.4pF
Resistance	190mohm
Leakage	4.15Mohm
Q factor	20.8
Resonant Frequency	2.865MHz
Power Loss	0.204dB
Damping Factor	42.11
Price per metre	£1.75



# QED 79-STRAND

QED AUDIO PRODUCTS LTD., UNIT 12, ASHFORD IND. EST.,  
SHIELD ROAD, ASHFORD, MIDDX TW15 1AU.  
TEL: (07842) 46236.

RECOMMENDED

Less pretentious than *Monster*, QED did a fine job in the early days weaning the British enthusiast off scrawny bellwire. Launched in the late 70's, QED's famous *79-Strand* loudspeaker cable remains unchanged to this day. As the name suggests this cable is composed of 79 high purity copper strands, woven into the classic figure-of-eight configuration.

*79-Strand* is available in any colour so long as it's black or white and a ridge moulded down one side of the PVC jacket identifies the signal core to prevent accidental out-of-phase wiring. The low DC resistance of *79-Strand* makes it useful for long runs though both L and C are above average for this sort of topology.

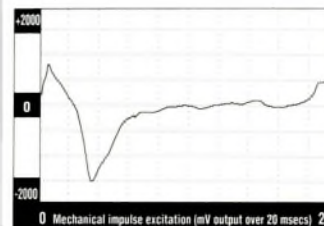
QED's stalwart cable is also rather microphonic, the +798mV/–1505mV impulse reaction centred around a low 100Hz. This cable is not the most revealing or neutral ever built,

but it does avoid the thin and scratchy colorations that plague some thin hook-up wires. There is a loss of treble air and freedom and bass seems faintly stodgy, but it's a good allrounder.

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.

## TEST RESULTS

Inductance	3.2 $\mu\text{H}$
Capacitance	486.2pF
Resistance	71.6mohm
Leakage	6.43Mohm
Q factor	19.6
Resonant Frequency	4.035MHz
Power Loss	0.077dB
Damping Factor	111.7
Price per metre	90p



# QED FLAT 200 STRAND

QED AUDIO PRODUCTS LTD., UNIT 12, ASHFORD IND. EST.,  
SHIELD ROAD, ASHFORD, MIDDX TW15 1AU.  
TEL: (07842) 46236.

RECOMMENDED

Just released as a successor to the long defunct *C38*, QED has a new top-of-the-range cable in the form of *F* (Flat) *200* cable. *F200* is constructed with the same high grade of copper as *79-Strand* but the strands themselves are some 25 per cent thinner. Two hundred are deployed in four bunches of 50 per side in order to minimise the bulk of the product which is finished off with a slender black PVC insulator.

QED has managed to reduce the capacitance to 192pF/5m (as claimed) while the inductance has risen to a moderate  $3.9\mu\text{H}$ . Fortunately the DC resistance is low-ish at 78.5mohm so the reactive impedance will be determined almost solely by the inductance at high frequencies.

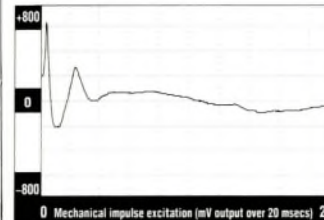
*F200* proved less microphonic than other QED cables, most noise occurring between 1-2kHz (–58dB), reflecting the fast +634mV/–209mV impulse characteristic. Comparing *F200* with *79-Strand*, the former is both

lighter and more intimately detailed with a quicker, freer delivery of delicate transients for example.

I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive. Recommended.

## TEST RESULTS

Inductance	3.9 $\mu\text{H}$
Capacitance	191.6pF
Resistance	78.5mohm
Leakage	57.5Mohm
Q factor	67.4
Resonant Frequency	5.822MHz
Power Loss	0.085dB
Damping Factor	101.9
Price per metre	£1.96

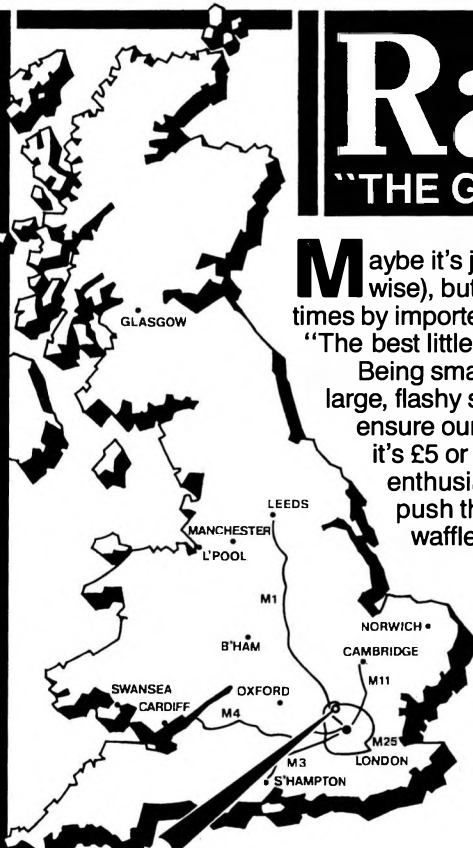




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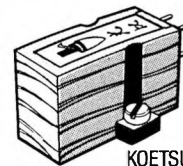
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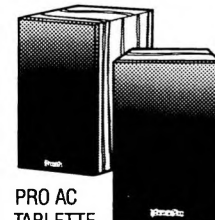
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## ROTEL SUPRA 4mm

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

RECOMMENDED

Manufactured in Sweden, *Supra 4mm* includes a total of 1,036 fine OFC strands for both signal and return, the two conductors adopting the classic figure-of-eight construction. A light grey PVC insulator covers the 4mm<sup>2</sup> section of conductor, one half of the cable being printed with the *Supra* logo to ensure the wiring is kept in-phase.

The series inductance of *Supra 4* was about average, the capacitance slightly high and the DC resistance usefully low at just 42.5mohm for the 5m loop. The combination of high capacitance and a weak leakage figure of 4.85Mohm indicates a dielectric stress of some sort, but then PVC is not the best choice for cable duty.

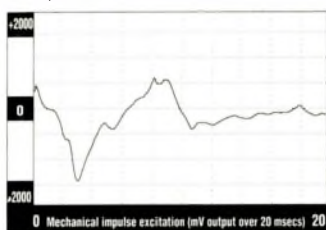
Rotel *Supra 4* is also rather microphonic, the protracted -1420mV/+568mV impulse being derived from strong 160Hz (-10dB), 950Hz (-31dB) and 1.4kHz components. Subjectively it provides a warm and approach-

able balance though with a faint plummy coloration throughout the lower midrange.

Ideal for both long and short runs, *Supra 4* furnishes a delightfully open and 'big' sound that benefits further from a smooth, unfatiguing treble. Good value and recommended.

### TEST RESULTS

Inductance	3.1μH
Capacitance	436.5pF
Resistance	42.5mohm
Leakage	4.85Mohm
Q factor	27.5
Resonant Frequency	4.327MHz
Power Loss	0.046dB
Damping Factor	188.2
Price per metre	£2.49



## SONY RK-S5ES

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

Beautifully packaged, Sony's *RK-S5ES* cable has been designed to match the successful non-resonant interconnects. A similar theme is followed here as the 350 x 0.08mm OFC strands are bunched with a 0.04mm heat-shrink tape before being firmly clamped by a hard external polyethylene insulator. One of these symmetrical conductors is colour-coded for polarity.

Sony's claims of low microphony were borne out by the impulse test which only required a ±50mV/div vertical scaling to accommodate the +70mV/-97mV LF (+850Hz) transient. Electrically there were no problems either, *RK-S5ES* offering an average inductance and capacitance with a slightly high 5m/loop DC resistance of 105mohm - the damping factor of 76.2 is a little too low.

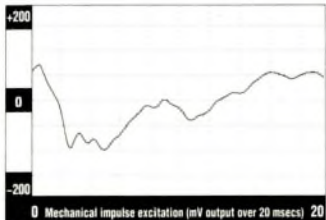
Strangely, the sound of this cable was also somewhat controlled and over-damped. The treble was relatively free and 'airy' but

lower octaves, including the mid-band, were constrained and relatively undynamic. With strong percussive sequences the treble also began to crack up, a splashy coloration leading to a glassy sheen in the extreme treble.

While Sony's *RK-S5ES* is an interesting cable its performance did not come up to the standard of their matching interconnect.

### TEST RESULTS

Inductance	2.1μH
Capacitance	326.4pF
Resistance	105mohm
Leakage	40.6Mohm
Q factor	99.5
Resonant Frequency	6.079MHz
Power Loss	0.113dB
Damping Factor	76.19
Price per 5 metre	£60



## ROTEL SUPRA 10mm

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

RECOMMENDED

*Supra 10*, as the name suggests, offers a conductor area of 10mm<sup>2</sup> and this is composed of an incredible 2,562 strands for both signal and return halves. A similar light grey, soft PVC dielectric is employed but a very small web has been incorporated to hold the conductors slightly apart. This has benefitted the leakage figure which now moves up to 23.3Mohm while the parallel capacitance has been shifted down to a respectable 258pF.

This heavyweight multistrand cable offers an extremely low DC resistance of just 15.2mohm/5m loop, resulting in a nominal damping factor of 526! *Supra 10* was just as microphonic as *Supra 4* though, the modulated +798mV/-1215mV impulse being attributed to a broad output between 360Hz-480Hz (-16dB).

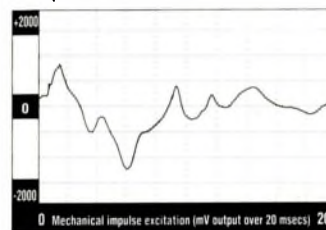
Remarkably for such a thick design, *Supra 10* actually provided a very free and open sound that was unhindered by any

excess at low frequencies. There was a trace of softening in the bass just as further up the range vocals tended to become a little 'shouty' at times. By contrast, very high frequency transients were smoothed over.

Worth its weight in scrap copper alone, *Supra 10* is ideal for very long runs (>10m) and so is recommended.

### TEST RESULTS

Inductance	3.2μH
Capacitance	258.2pF
Resistance	15.2mohm
Leakage	23.3Mohm
Q factor	36.9
Resonant Frequency	5.534MHz
Power Loss	0.016dB
Damping Factor	526.3
Price per metre	£6.49



## SOLID-CORE 1.5mm TWIN-AND-EARTH

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Perhaps the cheapest and most sensible entry into the solid-core arena, the cable used for lighting circuits (rated at around 15 amps) usually gives the best results - and cooker cable is just too damn stiff! The conductors, are sheathed in a colour-coded PVC dielectric and surrounded by a stiffer PVC jacket.

Housing wiring cable such as this also has a third, naked earth wire but this is likely to be redundant unless you wish to terminate it as a shield on the power amps.

The series resonant frequency of solid-core mains cable is fairly low at 3.78MHz because both the series inductance (4.3μH) and parallel capacitance (412pF) are both higher than average. Leakage and Q-factor (15.7) were not very impressive either.

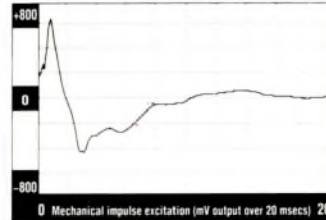
The impulse response was nicely defined with a +634mV/-426mV peak output centred on 375Hz (-38dB), 750Hz (-54dB) and 1.6kHz (-67dB).

Sonically, mains cable enjoys much of the smooth treble and articulate midrange usually associated with the better solid-core derivatives. It is slightly lean and lacking in deep bass slam but what remains is taut and rhythmically coherent.

Using mains cable for speaker duty may sound daft, but it works well and costs next to nothing.

### TEST RESULTS

Inductance	4.3μH
Capacitance	412.3pF
Resistance	76.7mohm
Leakage	10.1Mohm
Q factor	15.7
Resonant Frequency	3.780MHz
Power Loss	0.083dB
Damping Factor	104.4
Price per metre	36p



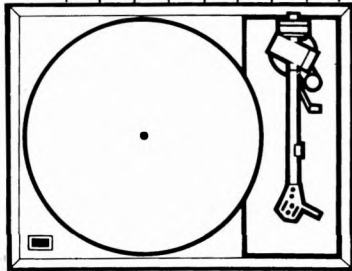


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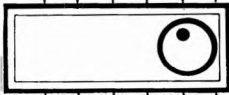
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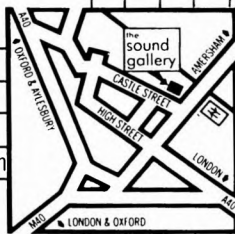
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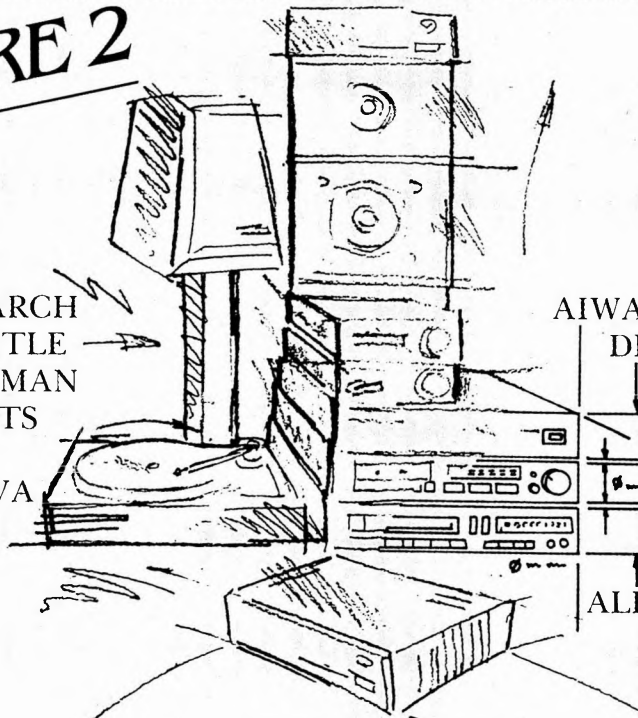
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# STERLING

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

Distributed by Presence Audio this thin, two-conductor speaker cable uses 99.99 per cent pure silver throughout. Each of the signal and return conductors is insulated with a colour-coded PTFE material, twisted to reduce inductance and provide an element of shielding before being jacketed with a thin grey PVC sleeve.

Electrically, only the high 349mohm DC resistance need give cause for concern while the impulse test indicated a very low level of microphony. The noise floor followed a gentle trend down from the +174mV peak at 350Hz but it took some 45msecs to fully equilibrate.

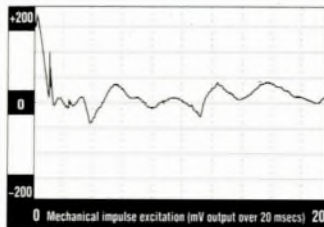
This pre-production sample was marked for directionality but connected either way the cable possessed a strangely muddled and reserved sound quality. Quite the reverse of what I might have predicted, *Sterling* suffered from a progressive instrument modulation that confused more

complex orchestral passages.

Vocals were not totally clean or fully articulate, and the cable seemed to introduce added sibilance. The background was somehow 'noisy', making it difficult to interpret real dynamic contrasts.

## TEST RESULTS

Inductance	3.3µH
Capacitance	178.8pF
Resistance	349mohm
Leakage	261Mohm
Q factor	>100
Resonant Frequency	6.552MHz
Power Loss	0.371dB
Damping Factor	22.92
Price per 5 metre pair	£499



# VAN DEN HUL MC CS-122

VIPER LTD., UNIT 7, SHARFLEET IND. EST., SHARFLEET RD.,  
CANVEY ISLAND, ESSEX. TEL: (0268) 511166.

RECOMMENDED

Residing at the budget end of the prodigious van den Hul range the price of *CS-122* does not seem totally extravagant when you realise that all the 19 x 0.45mm strands are silver plated. The signal and return conductors are sheathed in a soft, rubberised mustard insulator which also incorporates a short web to hold the cores apart.

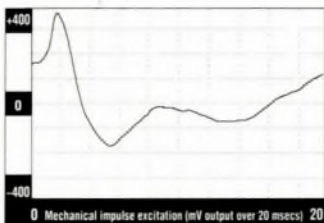
One slightly worrying trend is the premature ageing of *CS-122*; the silver coating on an earlier sample did deteriorate quite markedly over a few months. The rubber insulator appeared to be more stable on our new sample, so perhaps this problem has been dealt with. Inductance is high as a result of the cable geometry but I was more surprised at the high 150mohm/5m DC resistance, yielding a total impedance of 0.65ohm at 20kHz. Microphony was fairly well controlled.

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 that could begin to verge on the claustrophobic at times. Anyway, midband resolution was pretty good so a recommendation seems appropriate for this attractive design.

## TEST RESULTS

Inductance	5.0µH
Capacitance	167.9fF
Resistance	150mohm
Leakage	78.6Mohm
Q factor	20.7
Resonant Frequency	5.493MHz
Power Loss	0.161dB
Damping Factor	53.33
Price per metre	£5.50



# TOWNSHEND ISOLDA (LARGE)

TOWNSHEND INTERNATIONAL LTD., UNIT 2, NORTH WEYLANDS  
IND. EST., MOLESEY ROAD, WALTON-ON-THAMES,  
SURREY KT12 3PL. TEL: (0932) 246850.

RECOMMENDED

This vast cable may have all the domestic charm of an anaconda but its bulk conceals a purpose. A total of eight coaxial cables are bound together in a fashion that mimics the characteristic impedance of an 8ohm loudspeaker. Of course, it is impossible to achieve a true broadband impedance match but the *Isolda* cable does get closer than most in preventing unwanted signal reflection through mis-termination.

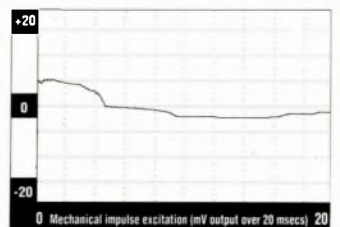
Hand-in-hand with this unsymmetrical construction is a huge parallel capacitance of over 4nF, sufficient in some circumstances to precipitate instability in a few amplifiers. Conversely, the inductance is a minute 0.9µH but the series resonant frequency is still rather low because of the overwhelming capacitance. DC resistance was vanishingly low, 10.1mohm/5m loop representing an effective damping factor of 792!

Microphony was virtually immeasurable, amounting to

+14mV/-10mV based around a 210Hz (-69.2dB) component. Sonically, *Isolda* cable possessed a truly 'dark' background out of which rose a very solid and extended bass together with an excellent sense of transparency throughout the upper octaves. Some vocals were faintly 'echoey' and a hint of fast 'icyness' was detected in the extreme treble.

## TEST RESULTS

Inductance	0.9µH
Capacitance	4098pF
Resistance	10.1mohm
Leakage	77.5Mohm
Q factor	>100
Resonant Frequency	2.621MHz
Power Loss	0.011dB
Damping Factor	792.1
Price per 5 metre pair	£400



# VAN DEN HUL MCD 352

VIPER LTD., UNIT 7, SHARFLEET IND. EST., SHARFLEET RD.,  
CANVEY ISLAND, ESSEX. TEL: (0268) 511166.

Thick but very flexible, *MCD-352* uses a mix of 7 x 0.76mm high grade copper strands together with 168 0.125mm strands. The finer wires are wound in a figure-of-eight configuration around the thicker central cores and all the strands benefit from a substantial coating of silver. The overall geometry of *MCD-352* is very similar to *CS-122*, simply larger.

DC resistance was suitably low, only the high-ish 5.3µH series inductance giving any possible cause for concern. This is attributable to the parallel spaced conductors which also reduce the equivalent capacitance to a manageable 131pF. Leakage was kept under control but the Q-factor seemed a trifle low at 16.8.

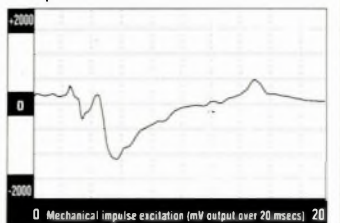
The impulse trend was peculiar but repeatable, showing a delayed -1106mV charge migration that was responsible for a complex noise floor. Several anomalous peaks were identified throughout low and midrange

frequencies. Subjectively, it sounded like *CS-122* only more so, the deep rumbling bass tending to overwhelm subtle details.

*MCD-352* also appeared a trifle peaky in the treble, not bright but slightly compressed and awkward sounding. This cable is much more expensive than *CS-122* and so would appear to lack a competitive edge.

## TEST RESULTS

Inductance	5.3µH
Capacitance	130.9fF
Resistance	73.3mohm
Leakage	73.6Mohm
Q factor	16.8
Resonant Frequency	6.042MHz
Power Loss	0.079dB
Damping Factor	109.1
Price per metre	£12.95





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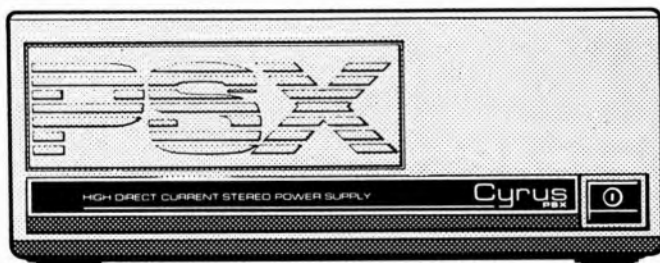
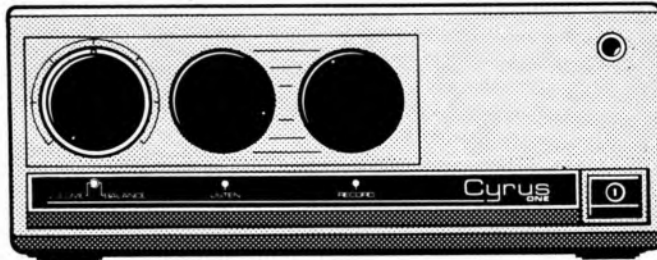
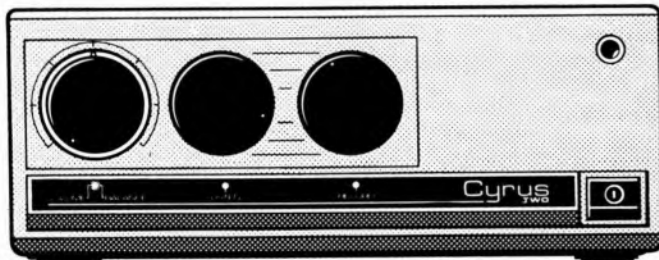
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## VAN DEN HUL SCS-12

VIPER LTD., UNIT 7, SHARFLEET IND. EST., SHARFLEET RD.,  
CANVEY ISLAND, ESSEX. TEL: (0268) 511166.

RECOMMENDED

A range of prestige, PTFE insulated loudspeaker cables are available from van den Hul covering every thickness from two-gauge to a single 22 micron strand! *SCS-12* is sold in single conductor lengths which need to be twisted up and terminated with nickel-plated 4mm plugs to form the desired speaker cable. Each 12-gauge conductor employs 19 tightly wound silver-plated copper strands, rigidly clamped in pearl white Teflon.

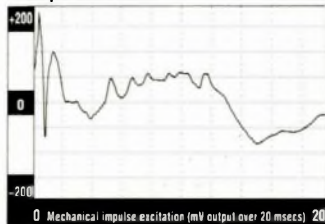
The electrical characteristics of *SCS-12* will depend on how tightly the conductors are twisted together, a light twist offering a good balance between inductance (3.7 $\mu$ H) and capacitance (163pF). The quality of the PTFE insulation is reflected in the >300Mohm leakage which showed negligible dielectric loss. Only the DC resistance of *SCS-12* is a little high, 113mohm/5m loop giving rise to a DF of just 71.

Microphony was very low; note the 50mV/div vertical scaling

which easily accommodated the +179mV/-67mV impulse output. Subjectively too, *SCS-12* set a high standard with a tight and well focused soundstage populated with tactile stereo images. The bass end was not quite as extended nor as resolved as with some other cables but it was rhythmically secure and pleasantly 'boppy'.

### TEST RESULTS

Inductance	3.7 $\mu$ H
Capacitance	162.9F
Resistance	113mohm
Leakage	>300Mohm
Q factor	98
Resonant Frequency	6.483MHz
Power Loss	0.122dB
Damping Factor	70.79
Price per linear metre	£30



## VAN DEN HUL SCS-2

VIPER LTD., UNIT 7, SHARFLEET IND. EST., SHARFLEET RD.,  
CANVEY ISLAND, ESSEX. TEL: (0268) 511166.

RECOMMENDED

The thickest and most expensive cable in the vdH range, *SCS-2* is quite simply outrageous. A total of 665 silver-clad matched crystal copper strands are used for each conductor, the cross-sectional area of both the signal and return cores being some 34mm<sup>2</sup>! I was not surprised to find the 2-gauge *SCS-2* cable weighing in with the lowest DC resistance in this test, 9.99mohm/5m loop giving a nominal damping factor of 800.

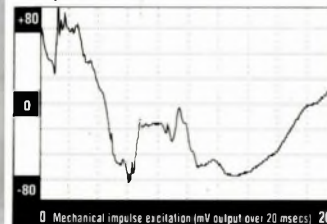
A creamy coloured PTFE insulation covers the external surface of each conductor but this showed a higher leakage (73.6Mohm) than the thicker insulation used on *SCS-12*. The sheer unwieldy nature of these cores made twisting very difficult indeed, hence the high 5.7 $\mu$ H inductance and low 117pF capacitance. *SCS-2* is terminated with chunky WBT lockable banana plugs.

The impulse reaction was similar to *SCS-12* but was lower in amplitude and higher in fre-

quency. 35msecs was required for full equilibration. *SCS-2* was notably more coherent and solid in the depths of the bass than was *SCS-12* but this was traded for a slight hint of grain in the treble registers. Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair.

### TEST RESULTS

Inductance	5.7 $\mu$ H
Capacitance	116.7F
Resistance	9.99mohm
Leakage	73.6Mohm
Q factor	27.5
Resonant Frequency	6.171MHz
Power Loss	0.011dB
Damping Factor	800.0
Price per linear metre	£100



## VECTEUR R-CV30

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*R-CV30* is a fairly chunky and attractive-looking cable that employs four individually PTFE insulated 0.8mm LC-OFC strands. These are wound in a classic star-quad array to provide a modicum of shielding and reduce the series inductance.

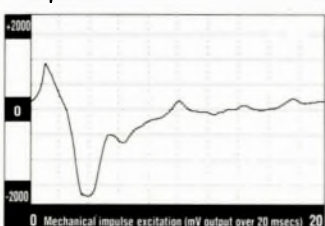
The two red and two clear insulated strands are only joined at the point of termination so as to reduce interference from non-linear surface conduction. These cores are dusted with talc and clamped in a relatively stiff, transparent PVC jacket but this did little to reduce the microphonous nature of the cable. A high 500mV/div vertical scaling was used to observe the +895mV/-1751mV charge migration.

The DC resistance (171mohm) and parallel capacitance (793pF) of *R-CV30* were both quite high so lengths under 5m will be most suitable. Subjectively this cable was the better balanced of Vecteur's three-

strong line-up, offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes. This was particularly true of the treble which tended to smooth over some delicate timbral details. The mid was clear and articulate though - a good point and one that clinches the Best Buy status for this cable.

### TEST RESULTS

Inductance	1.8 $\mu$ H
Capacitance	792.9F
Resistance	171mohm
Leakage	58.7Mohm
Q factor	>100
Resonant Frequency	4.213MHz
Power Loss	0.184dB
Damping Factor	46.78
Price per metre	£4.99



## VECTEUR S-CV90

PRESENCE AUDIO, THE OLD POSTHOUSE, PLUMMERS PLAIN,  
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At first sight this cable looks very much like a flexible version of VdH's *SCS-2*, but appearances can be deceptive. In fact *S-CV90* uses six 0.7mm LC-OFC strands per conductor, the signal and return halves having a separate polyethylene sleeve. The internal geometry of the cable is very much like a coarse Litz and this is reflected in the very high 1.3nF parallel capacitance. This will not affect the frequency response of a speaker but some amplifiers might not appreciate the load.

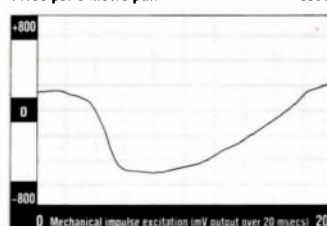
Vecteur's use of multiple strands has lowered the DC resistance of this S-version compared to the cheaper R-cable. As such the damping factor has been elevated to 91 with a minimal 0.095dB signal loss when attached to a standard 8ohm load. Subject to the broadband mechanical impulse, *S-CV90* produced a very low frequency charge migration centred on 30Hz, the -501mV movement being matched by a +550mV

peak after 26msecs.

Subjectively *S-CV90* proved slightly disappointing, especially when compared to the fine all round performance offered by *R-CV30*. In particular it seemed both less transparent and integrated throughout the midband, though both frequency extremes were spruced up with a tighter, sharper delivery.

### TEST RESULTS

Inductance	1.5 $\mu$ H
Capacitance	1309pF
Resistance	87.5mohm
Leakage	82.1Mohm
Q factor	>100
Resonant Frequency	3.592MHz
Power Loss	0.095dB
Damping Factor	91.43
Price per 5 metre pair	£199





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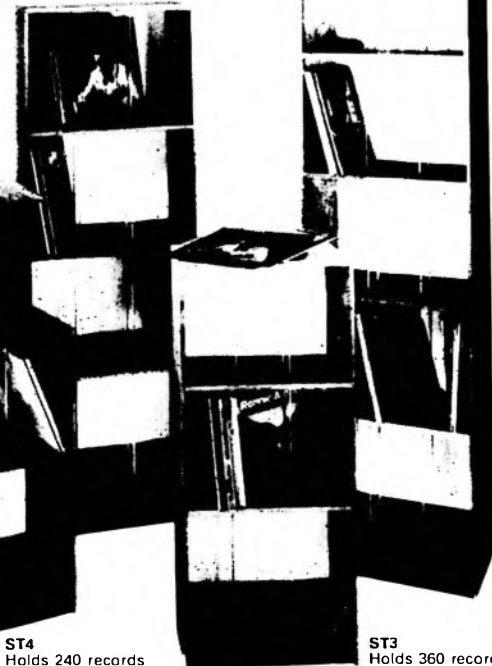
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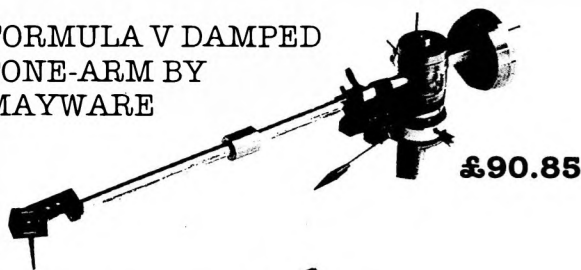
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Introducing and evaluating equipment keeps most hi-fi magazines fully occupied. There's seldom the opportunity to do a similar introduction for hi-fi retailers, which is why we at Hi-Fi Experience have decided to tell you something about our six specialist hi-fi shops around the country. There are three in London, all wholly owned by Hi-Fi Experience plc, and franchises which we directly control in Birmingham, Bradford, West Yorkshire, and Leamington Spa in Warwickshire. Each has a highly individual character of its own - if not the building, then the manager! - yet each benefits from being part of a multiple retailer.

From your, the customer's point of view that means our shops are ready to help each other when it comes to obtaining an item of equipment you especially want to listen to. Each one stocks a range of equipment - much of it British-made - tailored to the requirements of its own customers, but there is a standard of service that's common to all.

The three years that Hi-Fi Experience has been operating have shown us that, with increased leisure time, people everywhere are putting a higher value on good hi-fi. In addition, we've all lately come to expect better service regardless of what we're buying, and there was an urgent need for hi-fi retailing to reflect that trend and finally move away from the 'boxes over the counter' approach of a few years ago.

The best equipment and the best demonstration facilities would count for nothing if we didn't believe we also had the best staff. Good staff is a product of good training, and we invest heavily to ensure the people you will encounter in our shops know their equipment, and how to get the best from it. We undertake the kind of staff training courses that are far from commonplace in hi-fi retailing and we encourage our manufacturers to run product training courses as well.

It's all part of an effort to offer you a level of service that's way above the rest.

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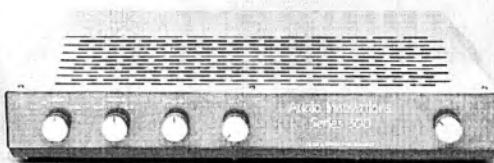
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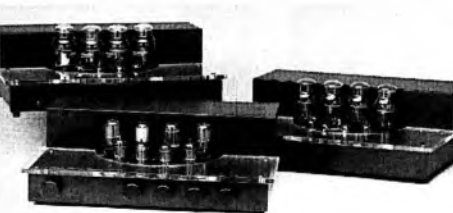
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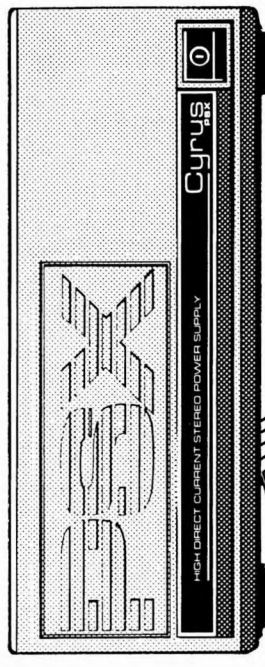
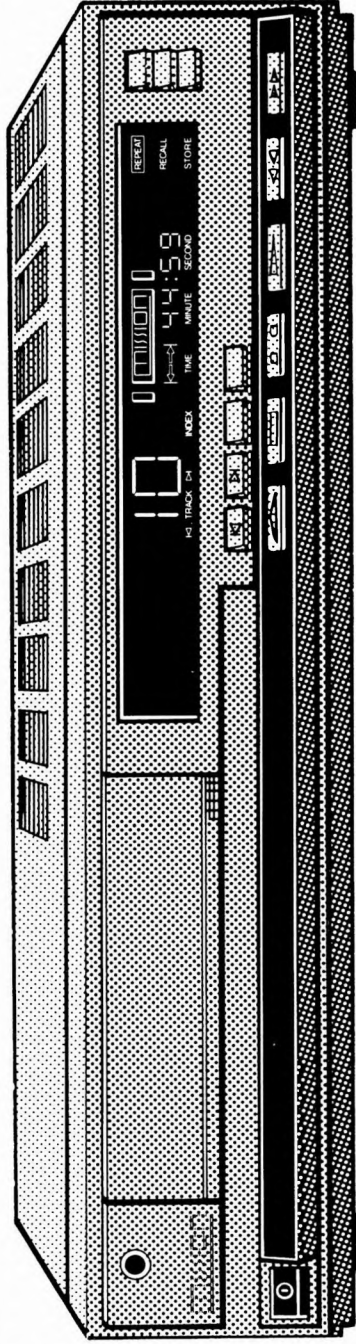
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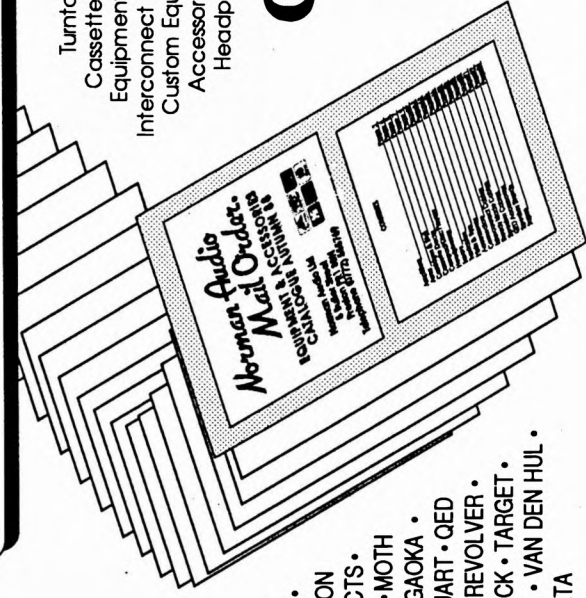
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## NEWSLETTER

Vol. 4, No. 4 NOVEMBER 1988

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

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

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

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

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

### AFFORDABLE EXCELLENCE

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

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

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

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

### AMPLIFIERS

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

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

### COMPACT DISC PLAYERS

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

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

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

### LOUDSPEAKERS

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

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

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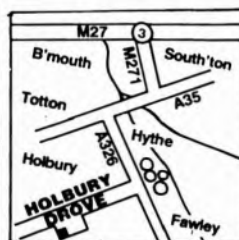
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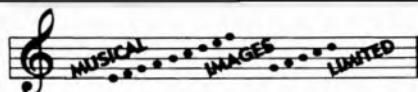
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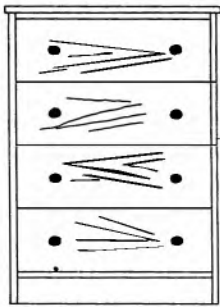
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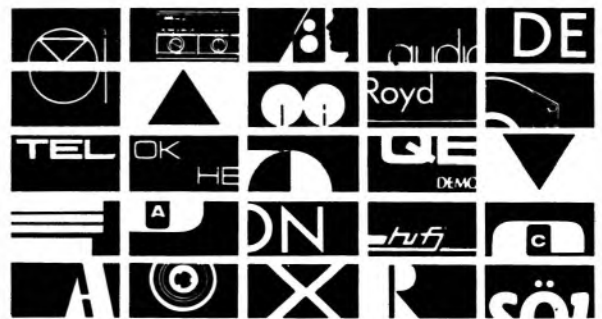
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# THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *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.

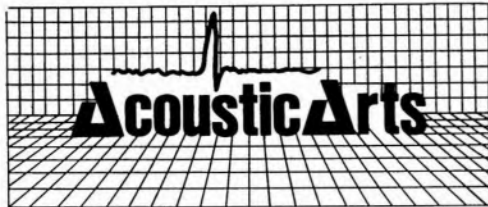
Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

**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).

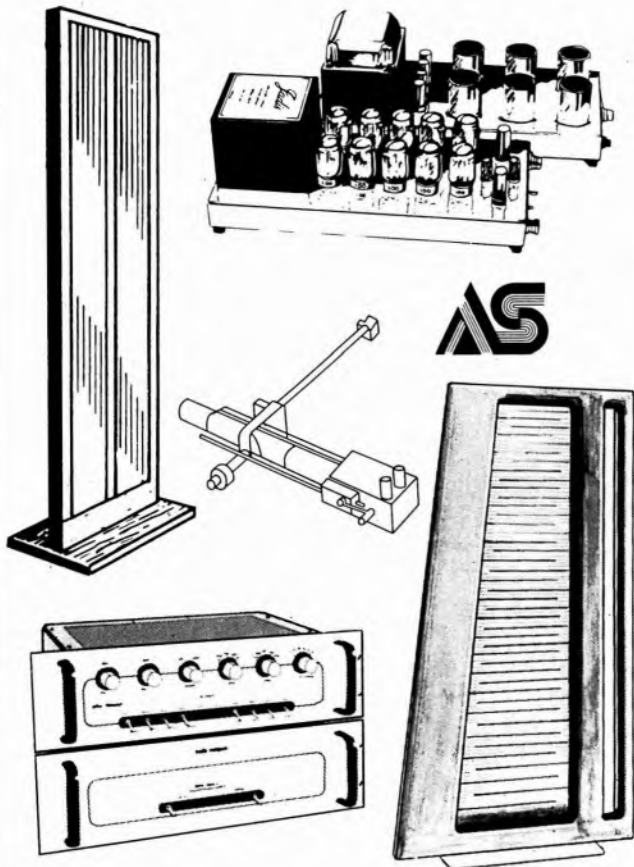
### INTEGRATED TURNTABLES

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 £140	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average + Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average + Average +	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 6g (B&O carts. only)		48 (Summary)
Dual CS503-1 £125	Poor Average	Slated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,000	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £279/£249	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Kuzma Stabi/Stogi £575/£349	Average + Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis 12.5g	Stogi: R	60
Linn Axis £345	Good + Good +	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	60
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 DM10 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 £759	Average – Average –	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Rotel RP-830 £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK; mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	55
Source/Odyssey RP1 From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
Systemdek II £199	Good + Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good + Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average – Average –	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 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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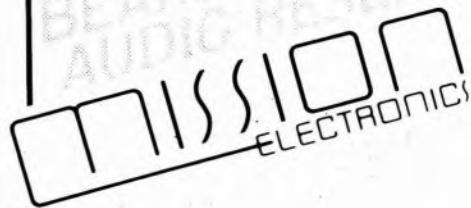
We plan to have the equipment on static display at 1 pm to afford the opportunity to examine and discuss the design, build quality and suitable applications. Later in the day we will be demonstrating the equipment in various system configurations and producing the quality of sound that can only come from the best.

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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 £235	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	55
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Turntable £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set up, the price (necessarily) includes stand	Manual, belt drive subchassis, stand, 33/45rpm		60
Oracle Delphi III £1500	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service – but very expensive	Manual, belt drive, subchassis	R	60
Oxford Acoustics Crystal Reference £1955	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R	60
Pink Triangle PT 100 £539	Very Good Very Good	A substantial improvement on its predecessor, the TD0's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting up is critical, and for experts only	Manual, belt drive, solid/decoupled	R	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
Systemdek IV £448	Good + Good +	Clarity and definition in the midrange and treble were outstanding. It was better for firm support, less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average +	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average +	Nice product. Exciting, rather undynamic and insubstantial sound quality, but facilities such as ability to accommodate 12 inch arm compensate	Manual, belt, suspended motor unit, 78rpm, pitch control		55
Townshend Rock £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55

## TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £395	Good + + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average +	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48/Summary
Eminent Technology £960	Good + Good + +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good +	This venerable is still capable, if not competitive with modern alternatives	7g		48
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 £156	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1138	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good + + Good + +	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6-8g	R	48/Coll



## THE DIRECTORY

## CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries)

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>A&amp;R C77</b> £20	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
<b>A&amp;R E77Mg</b> £47	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
<b>A&amp;R P77Mg</b> £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
<b>ADC TRX1</b> £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
<b>ADC TRX II</b> £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)
<b>Audionote IQ2VDH</b> £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
<b>Audiquest MC5</b> £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
<b>Audio Technica AT 105</b> £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
<b>Audio Technica AT95E</b> £14.95	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
<b>Audio Technica AT 115E</b> £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
<b>Audio Technica AT3200XEI</b> £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
<b>Audio Technica ATF30CC</b> £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
<b>Audio Technica AT 140ML</b> £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
<b>Audio Technica ATF50CC</b> £100	Average + Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low, MC	BB	54
<b>Audio Technica AT33ML</b> £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
<b>Audio Technica ATOC7</b> £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
<b>Audio Technica ATOC9</b> £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
<b>Azden YM10VE</b> £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
<b>Azden GMTE</b> £30	Average - Average -	Of academic interest only, this high o/p MC is seriously flawed in sonic terms	8-18g Low/normal, MC		54
<b>Azden GMP5L</b> £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>B&amp;O MMC5</b> £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>B&amp;O MMC4</b> £33	Good Average +	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
<b>B&amp;O MMC3</b> £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>B&amp;O MMC2</b> £75	Good Average +	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
<b>B&amp;O MMC1</b> £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
<b>Cello Chorale</b> £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 output, MC	R	48/Coll
<b>Clear Audio Gamma</b> £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
<b>Clear Audio Delta</b> £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
<b>Clear Audio Pradikat</b> £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		Coll
<b>Clear Audio Accurate</b> £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
<b>Denon DL110</b> £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
<b>Denon DL160</b> £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
<b>Denon DL 103</b> £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
<b>Dynavector DV-50X</b> £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



# THE DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>Dynavector DV10X IV</b> £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
<b>Dynavector DV23RS</b> £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
<b>Dynavector DV XX-1</b> £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
<b>Glanz MFG 110EX</b> £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
<b>Glanz GMC20E</b> £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
<b>Goldmund Clearaudio</b> £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
<b>Goldring Epic</b> £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal, MM	R	48
<b>Goldring G1010</b> £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
<b>Goldring G1020</b> £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal, MM		43
<b>Goldring G1040</b> £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
<b>Goldring Eroica L</b> £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
<b>Goldring Electro II</b> £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal, MC		43
<b>Goldring Electro 11LZ Boron</b> £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low, MC		38 (Summary)
<b>Grace FSE II</b> £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery - consider this model	5-10g Normal, MM		48
<b>Grado XTE + 1</b> £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
<b>Grado XF3E +</b> £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
<b>Highphonic MCA3</b> £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
<b>Kiseki Blue Silver Spot</b> £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
<b>Kiseki Purpleheart Sapphire</b> £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
<b>Kiseki Blackheart</b> £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
<b>Kiseki Lapis Lazuli</b> £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
<b>Koetsu Black K</b> £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/Coil
<b>Koetsu Red</b> £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/Coil
<b>Koetsu Red Signature</b> £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
<b>Linn Basik</b> £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
<b>Linn K9</b> £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/Coil
<b>Linn Asaka</b> £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/Coil
<b>Linn Karma</b> £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/Coil
<b>Linn Troika</b> £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after firing a Troika	8-18g Low, MC		Coil
<b>London Maroon</b> £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
<b>London Super Gold</b> £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/Coil
<b>Madrigal Carnegie One</b> £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low, MC		54
<b>Milltek Aurora</b> £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coil
<b>Milltek Olympia</b> £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
<b>Mission 773HC</b> £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low, MC	R	38
<b>Monster Alpha 2</b> £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
<b>NAD 9100</b> £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
<b>NAD 9200</b> £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal, MM		28
<b>Nagaoka MM4</b> £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
<b>Nagaoka MP10</b> £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, 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 'unruly'	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
Albarr 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
Albarr M1008 II £899	Very Good Good	A larger version of the similarly styled M408II, fairly good all round but only of average quality for the price	80W, monoblok		62
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



# 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
Hatler DH120 kit form £295	Fair	We didn't build one, see below	60W		44
Hatler 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/IA30 £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

# THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



# THE DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
Linx Stratos £999	Good+ Good	Facing strong competition in the UK this New Zealand pre/power combination gives good sound quality... but not exceptional at the price.	120W MM/MC straight line		50
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional.	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register.	85W MM/MC		44
Luxman LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here.	9 inputs 80W, MM/MC tone controls		57
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 BB line		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 R line		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 MFs, the B200 delivered fine musical and dynamic sounds with plenty of power.	80W MM/MC 4 line inputs straight line	BB	62
Musical Fidelity 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 amplifiers 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/PAT7 £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
Nikko NA700 £189	Good+ + Poor	Disappointing sound quality at an above budget price. Inescapably old fashioned.	60W MM/MC 4 line inputs tone filters		56
Nuance £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer.	4 inputs MC		50
Oakley Image £425	Poor Very Good	An interesting valve preamp from Yugoslavia, the Image on first impression needs a bit of tweaking to warrant <i>Choice</i> 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
Perreaux SA3 £690	Very Good Fair	This exotic New Zealand-built preamp did not really offer the sort of sound quality expected at the price.	4 inputs MM/MC		44

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# THE DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Perreux 1850 £990	Very Good Fair	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/MC, 4 inputs, battery supply	R	62
Pioneer A333 £149	Very Good Fair	A rather average but nonetheless competent performer that is pleasant enough	55W, MM, 5 inputs, hdp, tone controls		62
Philips FA860 £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
Philips FA960 £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
QED A240 CD II £169	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £219	Good+ + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	62
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 RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdp, 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, hdp, 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 hdp 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 hdp		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 hdp 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 hdp 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
<b>Acoustic Energy AE1</b> £700	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/W 60Hz	R	59
<b>Acoustic Research 8BX</b> £100	Average Average—	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
<b>Acoustic Research 22BX</b> £170	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	59
<b>Acoustic Research 35BX</b> £200	Average Average—	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
<b>Apogee Caliper</b> £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
<b>Apogee Scintilla</b> £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/Coil
<b>A&amp;R Arcam Three</b> £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
<b>A&amp;R Arcam Two</b> £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "ballys" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		59
<b>A&amp;R Arcam One Plus</b> £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
<b>Ariston QLN1</b> £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
<b>Audiostatic ES200</b> £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
<b>Audiostatic ES300</b> £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
<b>Avance 120</b> £279	Average+ Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
<b>Avance Concrete 2000</b> £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>B&amp;W DM100i</b> £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 90Hz	R	59
<b>B&amp;W DM110i</b> £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		59
<b>B&amp;W LMI Mk II</b> £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>B&amp;W DM1600</b> £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	59
<b>B&amp;W Matrix 1E</b> £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
<b>BBC LS3/5A</b> £265	Good+ Average+	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not yet checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coil
<b>BLQ Q2</b> £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
<b>Bose 6.2</b> £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
<b>Boston A4011</b> £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
<b>Castle Clyde</b> £139	Average+ Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
<b>Castle Durham</b> £189	Average+ Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/W 67Hz	R	46
<b>Castle Pembroke</b> £289	Good Average+	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31
<b>Celestion DL6 Series Two</b> £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		59
<b>Celestion DL8 Series Two</b> £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/W 60Hz	R	59
<b>Celestion SL6S</b> £350	Good Good+	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
<b>Celestion SL600</b> £700	Good Good+ +	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
<b>Celestion SL700</b> £1220 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/W 45Hz		60
<b>Celestion 6000</b> £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
<b>Chameleon 500</b> £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		59

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## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
dbx 1000 £450	Average - Average -	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor.	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
Gale 301 £279	Average Average +	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth.	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £699	Average + Average +	Clean but rich and powerful bass, stereo focus was not a strong point, but it is worth considering. (Recent revisions not 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 HL Compact From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive though well differentiated stereo. Can be bi-wired to advantage.	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/W 65Hz		59
Harbeth HL Mk 4 £525	Good + Good +	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'.	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
Heybrook Point Five £139	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better.	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		59
Heybrook HB1 £189	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation.	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
Infinity RS2000 £130	Good Good +	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly.	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	59
JBL TLX-3 CI £130	Average Average -	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed.	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46
JBL L 60T £399	Good + Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms.	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL L80T £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety.	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
JBL 18Ti £599	Good + Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. 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 C10 £94	Good Average -	Listening panelists gave this a poor reception.	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
KEF C40 £209	Average + Average -	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well.	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
KEF R102 £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect; what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
KEF 103/3 £630	Good + Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room.	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £806 (£905)	Very Good Good + +	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels.	90 x 28 x 41.5cm floor standing in free space	92dB/W 50Hz	R	60
KEF 107 £1890	Very Good Good +	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension.	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	60
Linn Nexus £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing.	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		59
Linn Sara £729	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before.	43 x 34.4 x 26.5cm stand mounting, near wall	88dB/W 50Hz	R	60
Linn Isobarik £1695	Good Good + +	Exceptional capabilities in the dynamic range and bass performance, demands serious consideration as a state of the art contender, but odd stereo.	76 x 33 x 41.5cm low stands against rear wall		R*	Coll II
Magneplanar SMGa £697	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience.	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MG2.5R £1897		Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension.	183 x 56 x 4.5cm Open space	83-85dB/W 35Hz		60
Magneplanar MG111a £2650	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music.	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz		46
Marantz LD20 DMS £150	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought.	36 x 23 x 24cm free space on 45cm stands	86.5dB/W 55Hz		53
MB Quart 390 £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail.	52 x 31 x 30.5cm open space, on stands	89.5dB/W 60Hz		59
Meridian M30 £725	Average + Average	Pricey but easy on the ears and worth considering especially where space is at a premium.	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70 II £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance.	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 700LE £140	Good Average	Mission re-submitted this popular model and again got a positive review - which proclaims their (and our) consistency.	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	59
Mission R737 Renaissance £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition - wonderful piano, bloated orchestras etc.	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		59
Mission Argonaut £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and good looks.	95 x 23 x 31cm floor- standing near wall	91dB/W 40Hz	R	60
Monitor Audio R100 £139	Average + Average -	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange.	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Monitor Audio R252</b> £159	Average + Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
<b>Monitor Audio R352</b> £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
<b>Monitor Audio R700 MD</b> £269	Average + Average +	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R	46
<b>Monitor Audio R352 MD</b> £299	Good Average +	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB	53
<b>Monitor Audio R452/MD</b> £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz		59
<b>Monitor Audio R652 MD</b> £369	Average Average +	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz		53
<b>Monitor Audio R852/MD</b> £380	Good + Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good – an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	59
<b>Mordaunt Short MS10 II</b> £90	Average Average -	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
<b>Mordaunt Short MS100</b> £189	Average + Average +	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
<b>Mordaunt Short 45Ti</b> £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be subtle	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
<b>Mordaunt Short MS300</b> £319	Average + Average +	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46
<b>Mordaunt Short 442</b> £1150	Good + Good + +	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/W 40Hz	R	60
<b>Musical Fidelity MC-2</b> £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear, the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	59
<b>Musical Fidelity MC-4</b> £499	Very Good + Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	59
<b>Quad ESL-63</b> £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
<b>Rogers LS2</b> £170	Good Average +	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R	46
<b>Rogers LS6</b> £240	Good + Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition – well balanced with an open and informative nature	51 x 27 x 28cm open stands, free space	87.5dB/W 48Hz	BB	46
<b>Rogers LS7t</b> £360	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	59
<b>Roksan Darius</b> £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
<b>Rotel RL850 II</b> £120	Average + Average +	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	59
<b>Royd A7 Series 11</b> £99	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/W 75Hz	R	53
<b>Royd A25</b> £100	Average + Average -	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
<b>SD Acoustics SD1</b> £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
<b>Sony APM 10ES</b> £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	59
<b>Sony APM 22ES</b> £249	Good + Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
<b>Sony APM 66ES</b> £700	Average + Average +	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		59
<b>Spendor Prelude II</b> £350	Good + Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strong. Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
<b>Spendor SP2</b> £450	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	59
<b>Spendor SP1</b> £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	60
<b>Spendor SA3 Passive</b> £1400	— Good +	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
<b>Spendor SA3 Active</b> £2708	Good + Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
<b>Spica TC-50</b> £595	Average + Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R	59
<b>Spica Angelus</b> £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
<b>Tannoy Eclipse</b> £120	Average + Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	59

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Tannoy Mercury II £160	Good Average +	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as yet unchecked	50 x 25 x 23.5cm open space 45cm stands	88dB/W 55Hz	BB*	53
Tannoy Westminster £3500	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
Technics SBC 250 £130	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB	59
Wharfedale Delta 50 £99	Average + Average -	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
Wharfedale Diamond 111 £100	Below Average Average -	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz		59
Wharfedale 504 £139	Average + Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R	46
Wharfedale Super Diamond £140	Average Average -	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/W 57Hz		53
Wharfedale 510.2 £299	Average Average -	Even in its latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz		59
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R	46

\* rating refers to original, tested model.

## CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal - at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		This
Aiwa AD-WX707 £180	Poor Average	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		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, 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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<b>Kenwood KX-440HX</b> £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
<b>Kenwood KX-660HX</b> £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
<b>Luxman K-105</b> £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
<b>Luxman K-112</b> £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lossy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
<b>Marantz SD-35</b> £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
<b>Marantz SD-45II</b> £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
<b>Marantz CP230</b> £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
<b>Marantz SD-55</b> £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
<b>NAD 6300</b> £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
<b>Nakamichi CR-1E</b> £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
<b>Nakamichi CR-2E</b> £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
<b>Nakamichi RX-202E</b> £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
<b>Nakamichi CR-3E</b> £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
<b>Nakamichi CR-4E</b> £745	Very Good + Very Good +	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
<b>Nakamichi CR-7E</b> £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
<b>Nakamichi Dragon</b> £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for music cassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
<b>Nikko D-80II</b> £309	Average Average	Easy and rewarding to use (apart from the mannered aesthetics), but sound quality is below par for the price, especially with dbx	Real-time counter, auto reverse, track search, Dolby B, C and dbx, bias adjust		57
<b>Onkyo TA-2120</b> £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
<b>Onkyo TA 2130</b> £140	Average + Average +	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust		52
<b>Philips FC566</b> £179	Average + Average +	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
<b>Philips FC567</b> £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
<b>Pioneer CT-443</b> £180	Average Good	Structurally sound and subtly musical recorder. Sophisticated, mildly damped sound quality	Dolby B & C, fine bias adjust, track search	R	63
<b>Pioneer CT-737</b> £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
<b>Proton AD-200</b> £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
<b>Proton AD-300</b> £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
<b>Revox B215</b> £1461	Good Average +	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
<b>SAE C102</b> £549	Average + Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
<b>Sony TC-FX 150</b> £90	Average + Average +	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C		52
<b>Sony TC-W300</b> £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
<b>Sony TC-RX50</b> £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
<b>Sony (WMD6C) ProWalkman</b> £249	Good + Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
<b>Sony TC-RX60ES</b> £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
<b>Sony TC-RX80ES</b> £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
<b>Sony TC-K700ES</b> £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	60
<b>Tandberg 3014A</b> £1650	Good Very Good	Very excitingly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
<b>Teac V-250</b> £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
<b>Teac V-270C</b> £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
<b>Teac R-515</b> £299	Average + Average +	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
<b>Teac V-870</b> £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

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# THE DIRECTORY

## CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Teac V-970X £499	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
Technics RS-T230 £160	Average— Average	Satisfactory with prerecorded material but otherwise unexceptional, the main features of this deck are its excellent user interface and value for money	Dual deck, Dolby B/C		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 widget under the sun. Happily it sounds good too.	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-1200 £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time 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 – frequent – 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
Acoustic Research CD-06 £350	Good+ Fair+	An attractive design that could sound better and needs more development to be fully competitive at the price.	Remote, power volume		
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 CD 2000E £330	Good+ Fair+	One of the slimmest players in the business but nothing special inside. Nice ergonomics but overpriced	Remote, timeshared 16 bit		This
Aiwa DX-M45 £149	Fair Fair	Cutdown Philips technology, but results are quite good for this British made machine	Manual	R	This
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		This
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	This
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62

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## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Akai CD93</b> £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.	R	58
<b>Arcam Delta Black Box</b> £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
<b>Arcam Delta 70</b> £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
<b>Cambridge Audio CD2</b> £600	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
<b>Cambridge Audio CDI</b> £1500	Good + Excellent	Advanced design and circuitry give this top class two-box machine exceptional performance, so the intrinsic qualities of CD, (eg. silent surfaces), make themselves felt	No headphone socket, seven audio filters, skip and scan	R	Coll II
<b>dbx DX5</b> £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.	R	58
<b>Denon DCD 610</b> £200	Good + Fair +	Lots of Denon player for the money, well equipped with good all round performance	Remote, versatile programming 2x 0/S	BB	This
<b>Denon DCD-600</b> £250	Below Average Average	Slightly raw sound which lacks resolution. Bass and dynamics are good however and the player sounds pleasant on audition, even if it isn't quite the obvious first choice at the price	Remote track entry, calendar display, headphone output (fixed)	R	61
<b>Denon DCD 810</b> £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	This
<b>Denon DCD-800</b> £300	Good Good	A generally good subjective and objective performance, a comprehensive range of remote controllable facilities, plus Denon's good reputation for build quality and field reliability.	Track entry remote, menu display etc.	R	58
<b>Denon DCD 910</b> £300	Very Good Fair +	A well equipped deck of impressive appearance and solid sonic and lab performance	Remote volume, programming, 8x 0/S	BB	This
<b>Denon DCD-1500II</b> £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
<b>Denon DCD 1700</b> £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
<b>Denon DCD-3300</b> £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	R	51
<b>Dual CD 1030 RC</b> £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, timeshare 16 bit	R	This
<b>Ferguson CD007</b> £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	This
<b>Ferguson CD008</b> £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	R	This
<b>Goodmans GCD550</b> £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	R	This
<b>Hitachi DA-7000</b> £180	Good Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities – a good budget starter	Memory and repeat, plus the basics	R	58
<b>Hitachi DA7200</b> £200	Good Fair	Distinctly more competitive than the '009, the '7200 remains undistinguished in the current state of compact disc technology and sound quality.	Simple remote etc.	R	58
<b>Hitachi DA007</b> £230	Average Fair	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming	R	51
<b>Hitachi 009</b> £300	Good Fair	Despite a pretty clean bill of technical health and an extensive range of facilities, the 009 failed to inspire the subjective enthusiasm needed for recommendation at its £300 price level.	Random, 'roulette' play, menu display, complex remote	R	58
<b>JVC XL-Z444</b> £255	Good Fair +	An average performer, unremarkable though well equipped and fair value for money	Full feature remote, digital output, headphone socket	R	This
<b>Kenwood DP-660SG</b> £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	R	62
<b>Kenwood DP-880SG</b> £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	This
<b>Kenwood DP-990SG</b> £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.	R	58
<b>Kenwood DP-1100SG</b> £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	R	This
<b>Kinergetics KCD-30</b> £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)	R	60
<b>Luxman D-90</b> £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
<b>Luxman D-100</b> £399	Average Poor	Sparsely equipped with a slightly old fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphone socket (variable)	R	51
<b>Marantz CD273</b> £170	Good Good	An ambitious machine at the price, offering pretty good sound quality but a slightly below average build standard	Skip, scan, programmable	BB	51
<b>Marantz CD873</b> £200	Good Very Good	Putting many 'audiophile CDs' to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
<b>Marantz CD-273SE</b> £200	Good + Very Good	The euro-tweaked version of the standard 273, this model fulfils pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
<b>Marantz CD873LE</b> £250	Good Excellent	This was the outstanding sound quality bargain in its review group, with discreet if plasticky presentation and rather lightweight build.	Manual repeat, skip, scan, programming	BB	58
<b>Marantz CD651IIE</b> £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	This
<b>Marantz CD-75DX</b> £300	Good Very Good	Attractively sharp, clear and articulate sounding player with tidy treble and powerful bass. Good tracking ability, ordinary build quality but pleasant to use.	Remote volume, comprehensive display, headphone socket, FTS, optical output	R	62
<b>Marantz CD94</b> £800	Good + + Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphone socket, favourite track selection, remote	R	58

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## CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Marantz CD94/COA94</b> £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
<b>Meridian 207</b> £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile – on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	On-board preamp, remote (inc volume)	R	60
<b>Mission PCM7000</b> £400	Good Very Good	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
<b>Mission PCM2</b> £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	This
<b>NAD 5220</b> £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
<b>Nakamichi OMS-1E</b> £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
<b>Nakamichi OMS-3E</b> £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphone socket		51
<b>Nakamichi OMS-4E</b> £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
<b>Nakamichi OMS-5EII</b> £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price ..."	Skip and scan, simple track programming, manual control		51
<b>Nakamichi OMS-7EII</b> £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
<b>NEC CD610</b> £250	Good Very Good	Although NEC's CD players may take a bit of hunting down, the sound/price/build equation comes down firmly in favour of the '610 despite unspectacular lab performance.	Track entry remote, menu display etc.	BB	58
<b>NEC CD810</b> £400	Very Good Very Good	While the lab performance might have been better still, sound quality, ergonomics and build quality all point towards Recommendation for this rare but attractive example of the CD player maker's art.	Track entry remote, menu display etc.	R	58
<b>Nikko CD200R</b> £250	Fair Fair	This player delivers fair overall performance at what is presumably a fair price, but is insufficiently distinguished to warrant Recommendation.	Simple remote, skip, scan, programming etc.		58
<b>Onkyo DX-1500</b> £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		This
<b>Onkyo DX-2500</b> £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
<b>Philips CD371</b> £150	Fair Good	Though the build and presentation may not be to every taste, this is a fundamentally honest basic player that delivers more than enough of the sonic goods to merit a Best Buy rating.	Skip, scan, programming	BB	58
<b>Philips CD472</b> £200	Fair Good	Once again one cannot argue with the fine sound quality Philips make available at a modest price – with remote control and extensive facilities besides.	Simple remote, programming etc.	BB	58
<b>Philips CD373</b> £250	Average Good	Good, but slightly less so than CD371, which is better value for money. Musical architecture and dynamics are excellent, but some coarseness and 'smear' remain	Track entry/volume remote, headphone output, FTS	R	62
<b>Philips CD473</b> £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet, we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
<b>Philips CD880</b> £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc.	R	60
<b>Pioneer PD-6100</b> £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	This
<b>Pioneer PD-M500</b> £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	This
<b>Pioneer PD-M700</b> £400	Very Good Fair +	Top class autochanger, surprisingly fast, high specification and a good allrounder	Remote, optical digital output, headphone socket		This
<b>Pioneer PD-91</b> £800	Excellent Excellent	Close to state of the art in nearly all areas – soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	61
<b>Revox B226</b> £756	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	Infra-red remote control, full search, scan, programming		51/Coll
<b>Rotel RCD820B</b> £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	This
<b>Rotel RCD820BX2</b> £300	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and comfortably deserves Recommendation.	Direct track entry remote etc.	R	58
<b>SAE D102</b> £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
<b>Sansui CD-X501i</b> £300	Fair Fair	Weak dynamic range for an upmarket player which shows in both lab and listening tests	Remote, programmable, digital output, headphones		This
<b>Sanyo CP17</b> £200	Average – Poor	A no-frills mid-sized package, this was not up to the usual Sanyo sonic or technical standards but it was well built	Skip, search, repeat, 16-track memory programmable		53
<b>Sanyo CP27</b> £220	Fair Fair	System remote apart, the CP27 offers no improvement over the cheaper CP17, and neither of these systems-oriented players really are the subjective musical	LCD display, skip, scan, programming		58
<b>Sharp DX-620</b> £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	This
<b>Sharp DX-R700H</b> £225	Average – Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
<b>Shure Ultra D6000</b> £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
<b>Sonographe SD1 (by CJ)</b> £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
<b>Sony CDP-M35</b> £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
<b>Sony CDP-M55</b> £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
<b>Sony CDP-550</b> £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	This
<b>Sony CDP-M75</b> £230	Good Good	This mid version of the '750 saves £20 on the price (see CDP-750 review).	Track entry remote, menu display ect.	BB	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
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.		58
Sony CDP-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 hdpb output	R	This
Sony CDP-222ES £449	Good Fair	Exceptional build quality and presentation plus respectably good sound quality but some of its kin were preferred	Remote control, 20 digit keypad, track access, programming		51
Sony CDP-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 O/S, 18 bit		This
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 hdpb output	BB	This
Technics SL-XP5 £250	Average - Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality	Headphones, "high cut" filter, skip, search		51
Technics SL-P770 £350	Excellent Good	Sophisticated, high resolution player, but inconsistent with level with some coarseness and compression during loud passages	Remote, 18 bit, rotary cue wheel, comprehensive display	R	61
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good + + Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good	Headphones, remote control, search dial cueing, etc		51
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	This
Toshiba XR-9128 £200	Very Good Good	A well equipped Philips clone with a very good performance for the price	Remote, programmable, digital output, hdpb	BB	This

## TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK. Something of a hi-fi afterthought, tuners are

often selected merely to match a chosen amplifier cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is usually well spent

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average + +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets, FM/MW, LW display manual tune	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only	FM only	BB	50
Denon TU 450L £130	Average + Average +	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation	FM/AM Digital	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/FM, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Hitachi FT-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
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, Scholts enhanced sensitivity, auto time digital		55
Nikko NT-540 £154	Good Average	Lab report was promising but the sound was rather dated	8 presets, AM/FM, digital auto scan		55
Onix B.W.D.1 £520	Good + + Good	Unexceptional sound despite the costly power supply option	FM only, manual digital, variable bandwidth		55
Pioneer F551L £100	Good + Good +	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	55
Pioneer F91 £350	Excellent Good + +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Quad FM4 £289	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets, Digital	R	50
Revox B260 £918	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £110	Good + Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55

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# THE DIRECTORY

## TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Rotel RT-850AL £160	Good + Good +	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
Sansui TU-D99XL £249	Very Good Good +	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST 500ES £200	Good + Average -	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 presets, digital scan	BB	60
Yamaha TX-L400 £130	Good + Good +	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average + Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

## CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on sound quality, but there's no denying the attractiveness or popularity of this approach - the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa V1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54
Binatone Laser CD System 2000 £270	Bad Bad	A bit of a disaster even at the price. Built to extremely low standard with an appalling turntable. CD and loudspeakers OK, but let down by amp	Twin cassette		Systems
Ferguson HF03 £400	Average + Good	An all round success with British built speakers and all sources achieving a reasonable standard. Compact disc was weak compared to other units	Twin cassette	BB	Systems
Fidelity MS202 £340	Bad Bad -	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
Fisher Midi System M46CD £500	Average Average	Somewhat overpriced, the M46 is let down by a poor amplifier and worse speakers. Other elements perform reasonably, CD being its strongest point	Twin transport		Systems
Fisher Midi System M56CD £580	Average Average	Fitted with a pretty good amp, but dire loudspeakers; otherwise a competent combination including a pretty fair cassette deck	Twin cassette, 5-band graphic equaliser		Systems
Goodmans 5200 £459	Average + Average +	Offering possibly the best speakers around in this midi system market, the Goodmans wins on a fair standard for the price, though the turntable was not too hot	12 Band Graphic Eq, Twin deck	BB	Systems
Goodmans Maxim-Midi System £520	Average Average +	De-luxe version of 5200 system - very good value for money and readily upgradeable. Sonics rough but OK and speakers good. CD crude	All separates with twin cassette	R	54
Marantz MX673CD System £900	Average + Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional	R	54
Sanyo 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
Sharp SA-CD800H £700	Average Average -	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 510 £599	Average + Average +	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system	Remote, twin cassette	R	54
Sony Compact 610 £700	Average Average -	Inconsistent. Same turntable used in much cheaper Sonys gave 'fifty' record reproduction. Cassette likewise	Remote, 'shuffle' play CD, twin cassette		54
Sony FH1215CD £800	Average Average +	Probably the ultimate miniature system. The CD player is particularly good. Best to chuck the speakers away though	Miniature, transportable (AC only). Single auto-reverse cassette	R	54
Sony Compact 710 £999	Good Good	Typically well built and presented but complicated to use except via remote. Record deck poor but remainder good, including speakers	Full remote, auto T/T, twin auto reverse cassette	R	54
Sony Compact Series 90 £1500	Good Good +	The best of a not too wonderful bunch, the excellent compact disc player and pretty good speakers make for reasonable sound quality, though the tuner wasn't of quite the same standard	Twin deck, auto reverse, timer, extra tape socket	BB	Systems
Toshiba V17CD £399	Average Average +	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54

## HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jeklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via

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



## THE DIRECTORY

## HEADPHONES

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
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 high 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
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic	R	55
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

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# THE DIRECTORY

## PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony Walkman in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals; some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape type compatibility on many machines and

some even record, but usually only from a microphone or built in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub £50) players.

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £30	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable 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 6000 £50	Average+ Average—	With styling aimed at the fairer sex the 6000 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 unsubtle music	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful	Dolby, autoreverse, graphic EQ, types I, & II, AM/FM	R	56

## CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, 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-0473F £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 unthrilling performance, and will work with external speakers	Spare input		53
Panasonic RX-FD80L £300	Average—	Shiny in a glitzy way, this Panasonic features a reasonable cassette deck but a below par CD player with tiny transport controls	Autoreverse, spare input		53
Sharp WQ-CD15 £250	Good	A reasonably compact machine with a quite impressive CD player and a novel twin cassette mechanism	Twin cassette, graphic equaliser, spare input	R	53
Sony CFD-66L £350	Good	A very attractive player in the true yuppie mould of white plastic with silver details, it even sounds OK	Spare input, shuffle play, AMS (tape search system)	R	53
Toshiba RT-7096 £250	Poor	Quite a large box for the money, the Toshiba isn't too special when it comes to sound quality but does have partly wooden detachable speakers	Twin cassette, graphic equaliser, spare input		53

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# THE DIRECTORY

## STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or 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
<b>Appolo A820</b> £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
<b>Appolo A10</b> £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
<b>Foundation Fred</b> £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
<b>Foundation Maggi</b> £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
<b>Foundation Pi</b> £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
<b>Heybrook Point 5</b> £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
<b>Heybrook HBS1</b> £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
<b>Linn Kan II</b> £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
<b>Linn Sara</b> £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
<b>Monotrak Engineering M1</b> £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
<b>Monotrak Engineering M4</b> £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
<b>Monotrak Engineering M4S</b> £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
<b>Mordaunt-Short IS1 II</b> £45	3 leg Good	Suited to low mass speakers, preferably using spikes to effect coupling, they sounded slightly 'razed up' but the overall sound was quite un-muddled.	18 x 15cm 56cm	R	58
<b>Origin Live</b> £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
<b>Partington PP4</b> £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
<b>Partington Dreadnought II</b> £120 (filled)	1 leg Very Good	Ideal for systems on the light/bright side of neutral, the Dreadnought IIs nevertheless still need some careful re-examination by Partington.	17.5 x 16.5cm 63cm		58
<b>QED TS22 Tristand</b> £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
<b>RATA Torlyte</b> £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
<b>Target HS20</b> £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
<b>Target HI15/3</b> £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
<b>Audioquest Sorbothane Feet</b> £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
<b>Cornflake TC55</b> £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
<b>Cornflake TC56</b> £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
<b>Deltac Isolation Base</b> £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
<b>RATA Model A</b> £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
<b>RATA Amplat</b> £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
<b>Sound Organisation Table</b> £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
<b>Sound Organisation Wall Stand</b> £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
<b>Target TT1</b> £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
<b>Target TT2</b> £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
<b>Townshend Suspension Base</b> £145	Platform Fair	Designed to complement the Rock turntable, this platform will bring subjective improvement to a wider range of electronics.	43 x 36cm	R	57

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



## THE DIRECTORY

## CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence 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.

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Apature LSD</b> 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
<b>Audioquest Reference 2</b> £29	Good Fair	Ultimately Reference 2 simply damped much of the atmosphere and emotional charge of a musical performance.	OF copper		59
<b>Audioquest Livewire Topaz</b> £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
<b>Audioquest Livewire Ruby</b> £45	Fair Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
<b>Audioquest Livewire Quartz</b> £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
<b>Audio Technica AT6115</b> £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
<b>Audionote Copper ANC</b> £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
<b>Audionote Flexible Silver ANS</b> £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
<b>Audionote Silver ANV</b> £140	Poor Fair	Fair weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
<b>Aural Symphonics</b> 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
<b>Budget Patch Cords</b> 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
<b>Budget OFC</b> circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
<b>Deltec Slink</b> £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
<b>Deltec Black Slink</b> £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
<b>Denon LC-OFC</b> 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
<b>DNM Solid-core</b> £15-£25	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (underminated price £4.60 per m.)	Single strand nickel-plated copper. Unshielded	R	59
<b>Kimber Kable PSB</b> £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
<b>Kimber Kable KC-1</b> £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
<b>Kimber Kable KC-AG</b> £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
<b>MDM Interconnect</b> £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
<b>MIT PC-Squared</b> £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
<b>MIT Spectral M1330</b> £193	Poor Fair	M1330 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
<b>Monitor PC 0100381</b> £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
<b>Monster Interlink 400</b> £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
<b>Monster Interlink CD</b> £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
<b>Monster Interlink Reference</b> £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
<b>Myst Tm</b> £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
<b>Origin Live Soli-Core Super</b> £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
<b>QED Incon P1-Gold</b> £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
<b>QED Incon Graphite GP1 Gold</b> £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
<b>Sony RK-C310ES</b> £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
<b>Sterling</b> £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
<b>Thorens SAC 100</b> £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
<b>Van den Hul MC-D300II</b> £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
<b>Van den Hul MC-1021II</b> £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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# 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.	Twin axial silver plated copper, teflon dielectric		59
Van den Hul Thunderline £147	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' '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-0FC 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		This
Audionote OR-200 £16 per metre	Fair + Fair +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		This
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		This
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	This
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	OFCC, surface only - foam core construction	R	This
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		This
Audio Technica AT6120 £95 - 10m	Fair + Fair	Compared to earlier LC-0FC cables this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		This
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		This
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	This
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	This
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	This
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	This
Kimber Kable APR £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		This
Kimber Kable 4TC £16 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	This
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		This
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 PVC dielectric		This
Mission Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	This
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		This
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	OFCC, multistrand, Duraflex dielectric		This
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		This
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		This
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	This
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		This
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	This
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	This
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	This
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 lug	OFCC, polymeric screen		This
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	This
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, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R	This
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	This
Sony RK-SSES £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		This
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	This
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		This
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	This



# 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	This
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		This
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	This
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	This
Vecteur R-CV30 £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-0FC individually PTFE insulated strands	BB	This
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 spruced up with a tighter sharper delivery	6 x 0.7mm LC-0FC strands		This

## 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-direction 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



# SELECTED DEALER DIRECTORY

Choosing a good hi-fi dealer is the most vital step in acquiring the system that is right for you. This unique directory gives full information on dealers in your area.

## AVON

ABSOLUTE SOUND AND VIDEO, 65 Park St, Clifton, Bristol. (0272) 264975. A&R, Denon, Dual, Linn, Mission, NAD, Quad, Roksan, Rotel, Yamaha, etc. (closed Weds). BADA MEMBER **320A**

PAUL GREEN HI-FI LTD, Kensington Showrooms, London Rd, Bath (0225) 316197. A&R, Creek, Dual, Heybrook, Linn, Musical Fidelity, Rotel, Systemdek, Wharfedale. BADA MEMBER. **320A**

RICHER SOUNDS, 20 Cotham Hill, Bristol BS6 6LF. (0276) 734397. City-centre budget hi-fi discounts; most popular 'majors' from A to Z and all points in between; monthly 'specials'. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sats 10-5. Access, Visa, Richer ChargeCard.

## BEDFORDSHIRE

ASHTON AUDIO, 6 High Street, Dunstable. (0582) 608003. AR, Cambridge Audio, Denon, JVC, Monster, NAD, Nakamichi, Quad, Rotel, Sony, etc. Credit to £1,000. Access, Amex, Diners, Visa. Service dept. Open 9-5.30, 6p.m. Friday.

## BERKSHIRE

READING HI-FI CENTRE, 4-6 Harris Arcade, Friar St, Reading. (0734) 585463. 'The best equipment, advice and service from Berkshire's premier Hi-Fi emporium'. BADA MEMBER **320A**

## BUCKINGHAMSHIRE

AUDIO INSIGHT LTD, 53 Wolverton Rd, Stony Stratford, Milton Keynes. (0908) 561551. A&R, Audiolab, Heybrook, KEF, Linn, Mission, Cyrus, Musical Fidelity, Nakamichi, Nytech, Rotel. BADA MEMBER **320A**

AYLESBURY HI FIDELITY, 98 Cambridge St, Aylesbury. (0296) 28790. Dual, Heybrook, Linn arms, Musical Fidelity, Mission, NAD, Nakamichi, Quad, Rotel, I.T.L. 2 Dem rooms, appointment reqd. Mon-Fri 10-6, Sat 9.30-5.30. Home trial, free installation, credit to £1,000. Access, Amex, Diner, Visa. Service dept.

## CAMBRIDGESHIRE

CAMBRIDGE HI FI, 1 Hawthorn Way, Cambridge. (0223) 67773. AR, Mission, Cyrus, Monitor Audio, Panasonic, Pioneer, Sony ES, Technics, Thorens, Kenwood. BADA MEMBER **320A**

STEVE BOXSHALL AUDIO, 41 Victoria Rd, Cambridge. (0223) 68305. Quad, Rotel, Dual, Denon, Krell, Nakamichi, Marantz, Monitor Audio, Tannoy. Dem facilities. No appointment reqd. Mon-Sat 10-6. Home trial, free installation. Credit to £3,000. Access, Visa, Service dept.

## CHESHIRE

ASTON AUDIO, 4 West St., Alderley Edge. (0625) 582704. Wide selection of equipment in N.W. 2-year guarantee. 3 dem rooms. Tues-Sat 10-6. BADA MEMBER **320A**

DOUG BRADY HI-FI, Kingsway Studios, Kingsway North, Warrington. (Padgate 0925) 828009. 'Largest choice of specialist Hi-Fi in N.W.'. All credit cards. 3 Dem rooms. BADA MEMBER **320A**

NEW DAWN HI-FI, 1-3 Castle St, Lower Bridge St, Chester. (0244) 24179. Linn, Quad, Technics, National Panasonic, Denon, Rotel, Dual, Meridian, Aiwa, Philips. BADA MEMBER **320A**

SWIFT OF WILMSLOW, 4-8 St Annes Parade, Wilmslow. (0625) 526213. A&R, Aiwa, Denon, Marantz, Mission, Monitor-Audio, Pioneer, Trio, Yamaha, NAD. Dem facilities. BADA MEMBER **320A**

RICHER SOUNDS, 4 Wellington St, Stockport SK1 3RN. (061) 480 1700. Cheerfully small store by BR station with virtually all major 'budget' names; many on special offer. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-6, Sats 10-5. Access, Visa, Richer ChargeCard. Mail Order for all Richer Sounds stores from this branch.

CHRIS BROOKS HI-FI, 29 Gaskell St, Stockton Heath, Warrington. 0925 61212/3. Tues-Sat 10-6. 2 dem rooms. Credit facilities. All credit cards. Total absence of bull\*\*\*\*. BADA MEMBER **320A**

## CORNWALL

N.C.E. HI-FI, The Bridge, Boscastle, N. Cornwall (08405) 248. Ariston, Arcam, Creek, Denon, Dual, Gale, Heybrook, Intecath, Marantz, QED, etc. Dem room. Full credit facilities including interest free. Access, Visa.

TRURO HI-FI & E.T.S. Ltd, 25 King St, Truro (0872) 79809. A&R, Denon, Dual, Heybrook, Linn, Mission, Cyrus, Nad, Quad, Rotel, Thorens. Dem and home trial facilities. Mon-Sat 8.45-5.30. Credit to £1,000. Access, ETS Visa.

Service dept.

## DERBYSHIRE

ACTIVE AUDIO, 12 Osmostat Rd, The Spot, Derby. (0332) 380385. Meridian, Mission, Denon, Yamaha, Rotel, A&R Cambridge, Monitor Audio, Trio, Marantz. Dem and home trial facilities. Open 9.30-6 - early closing Wed. Credit to £1,000. Access, Visa, Diners; American Express. Service dept.

## ESSEX

A.T. LABS, 442/4 Cranbrook Rd, Gants Hill, Ilford. (01) 518 0915. Mon-Sat, 10-6. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER **320A**

RAYLEIGH HI-FI, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St, On-the-Parkway, Chelmsford, Essex. (0245) 265242. A&R, Audiolab, Beyer, BLQ, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access, Visa. 3 years parts and labour guarantee on hi-fi systems.

BRENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood. (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harman Kardon, Marantz, QED, Quad, Yamaha. Dem and home trial facilities. Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Free installation, credit facilities. Access, Visa, Hi-Fi Markets. Service dept.

LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0206) 560259. QED, Rogers, Denon, Nad, Rotel, J.A. Michell, Mission, Roksan, Gale, Quad etc. Dem and home trial facilities. Mon-Sat 9-6. Installation, credit to £1,000. Access, Visa, Hi-Fi Markets, Eurocheque. Service dept.

## GLOUCESTERSHIRE

ABSOLUTE SOUND AND VIDEO, 40/42 Albion St, Cheltenham. (0242) 583960. A-R, Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed). BADA MEMBER. **320A**

AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 30046. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon. BADA MEMBER **320A**

ROBBS OF CHELTENHAM, 3 Clarence St, Cheltenham. (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Mon-Sat 9-5.30. Instant free credit. Visa, Access. Service dept.

## HAMPSHIRE

ABSOLUTE SOUND AND VIDEO, 4 Feathers Lane, Basingstoke, Hants RG21 1AS. (0256) 24311. A&R, Audiolab, Denon, Dual, Linn, Mission, NAD, Rotel, Technics, Yamaha. Dem and home trial facilities. Mon, Tues, Thurs, Fri 9.30-6, Sat 9.30-5.30. Closed Wed. Free installation. Credit facilities. Access, Visa, Connect, Amex, Diners. Service dept.

HAMPSHIRE AUDIO Ltd, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER **320A**

TRUE-FI SOUND AND VISION, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPW, Mission, Mordaunt-Short, Nagaoka, Sony, etc. Dem facilities. Mon-Sat 9.30-6.00. Free installation, credit to £1,200. Access, Visa. Service dept.

## HERTFORDSHIRE

ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts. (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Mon-Sat 9.30-5.30. BADA MEMBER **320A**

THE AUDIO FILE, 4 Hockerill St, Bishops Stortford, Herts. (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Mon-Sat 9.30-5.30. BADA MEMBER **320A**

## ISLE OF MAN

ISLAND COMPACT DISC CENTRE, Parliament Square, Ramsey. (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman. Mon-Sat 9-5.00. Dem and home trial facilities. Free installation. Full credit, no limit. Access, Elite. Service dept.

## KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury. (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem and home trial facilities. Mon-Sat 9-5.30 closed Thurs. Free installation. Credit to £1,000. Access, Visa, Creditcharge.

Service dept.

## LANCASHIRE

MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spendor, Thorens, Nakamichi, Yamaha, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1,000. Access, Visa. Service dept.

## LEICESTERSHIRE

SOUND ADVICE, The Sound Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. A&R, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, appointment reqd. Mon-Sat 9.30-6. Free installation. Credit facilities. Access, Visa, Amex. Service dept.

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester, LE1 5FQ. (0533) 518597 or 530330. Aiwa, Akai, Ariston, Bose, Cambridge, Celestion, Denon, Harman Kardon, Musical Fidelity, Rotel, etc. Mon-Sat 9.30-5.30. Free installation. Credit to £1,000. Dem facilities. Access, Visa.

## LONDON

A.T.LABS, 159 Chase Side, Enfield, Middlesex. (01) 367 3132. Mon-Sat 10-6. Two single speaker dem rooms. Service dept, car park. Amex, Visa, Access.

BADA MEMBER **320A**

AUDIO T, 190 West End Lane, London NW6. (01) 794 7848. Mon-Sat, 10-6. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER **320A**

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (01) 631 0472. Mon-Sat 10-7. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. 2 dem rooms, full delivery and installation. Credit facilities. Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road. (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, A&R Cambridge, Nakamichi, Rotel, etc. Dem facilities - no appointment reqd. Mon-Sat 10-7.30. Home trial facilities, free installation. Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 18 Monmouth St, London WC2H 9HB. (01) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 Dem rooms. BADA MEMBER **320A**

GRAHAMS HI-FI, 86-88 Pentonville Rd, London N1. (01) 837 4412. 'FBA Dealer of the year 1985'. Linn, Naim, Rega etc. £300-£3,000-£13,000. BADA MEMBER **320A**

H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE. (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities. Mon-Sat 9-5.30, Thurs 9-1. Credit to £1,000. Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (01) 486 8262. A&R, Audio Lab, B&W, Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Nakamichi, etc. BADA MEMBER **320A**

SUBJECTIVE AUDIO LTD, 12 Park Avenue, Palmers Green, London N13 5PF. (01) 882 4975. Air Tangent, Apogee, Alphason, Audio Research, Koetsu, Krell, Meridian, Nakamichi, Oxford Acoustics, Tandberg, etc. 2 dem rooms, appointment reqd. Tues-Fri 10-6, Sat 9-5. Home trial facilities. Design & installation service. All major credit cards. Service dept.

THE SOUND ORGANISATION Ltd, No. 1, Cathedral St, London Bridge, London SE1 9DE. (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME etc. Dem facilities, appointment reqd. Tues-Sat 10-7. Free installation. Access, Visa. Service dept.

RICHER SOUNDS 2, 6 London Bridge Walk, London SE1. (01) 403 1988. Major names in esoteric hi-fi, unusually matched to discount offers and special end-of-line purchases. Dem facilities, expert advice, free local delivery & installation (£500+), plus 2 Yr G'tee. Hi-fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-7, Sat 10-5. Access, Visa, Richer ChargeCard. Service Department.

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## MIDDLESEX

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 33474/31993. A&R, AR, Ariston, Creek, Cyrus, Denon, Dual, JPW, KEF, Manticore, Meridian,

NAD, Nakamichi, Quad, Rotel, Wharfedale, Yamaha, etc. 2 dem rooms. Mon-Sat 10-6. BADA MEMBER **3124**

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W.A. BRADY & SON, 401 Smithdown Rd, Liverpool. (051) 733 6859. Largest choice of specialist Hi-Fi in N.W. £100-£20K. All credit cards. 3 dem rooms.

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PURE SOUND - Birkenhead 051 645 6690.

Acoustic Energy, ADC, Audio Quest, Beard, Denon, Incatech, Mordaunt-Short, QED, Radford, Meridian, etc. Home dems a pleasure, plus evenings and weekends. (Sundays by appointment).

RICHER SOUNDS, 69B Church St, Liverpool L1 1DN. (051) 708 7484. Virtually every major 'budget' name - small store with big discounts and special offers. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard.

## NORFOLK

SOUND APPROACH, 161 Unitham Road, Norwich. (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Heybrook, Mantra, Musical Fidelity, Revolver, Yamaha. Dem and home trial facilities. Mon-Sat 9-6.30. Free installation. Credit to £1,500. Visa, Access, Diners Club. Service dept.

## NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. ADC, Marantz, Onkyo, Sansui, Teac, Harman Kardon, Pioneer, Proton, Ariston, Thorens, Mantra, Goodmans, Castle, JPL, Mordaunt Short, Seleco TV, Monitor Cable + others.

## WEST MIDLANDS

SOUND ADVICE, 162 Alcester Road, Moseley, Birmingham B13 8HS. (021) 449 3328. A&R, Creek, Linn, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Tues-Sat 9.30-6. BADA MEMBER **3124**

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Tues-Sat 10-6, closed Mon. Home trial facilities, 3 dem rooms, free installation, instant credit. Access, Visa, Amex. Service dept.

FIVEWAYS HI-FIDELITY Ltd, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem and home trial facilities. Tues-Sat 9.30-6. Free installation, credit facilities. Access, Visa. Service dept.

GRIFFIN AUDIO Ltd, 94 Bristol St, Birmingham. (021) 692 1359. Linn, Naim Audio, Rega, Creek, Denon, Nakamichi, Quad, Mission, Monitor Audio, Rotel. BADA MEMBER **3124**

RICHER SOUNDS 2, 12 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 6664. Popular esoteric hi-fi for upgrades, monthly special offers. Dem facilities, expert advice, free local delivery/installation (£500+), 2 Yr G'tee. Hi-fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

RICHER SOUNDS, 10 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 1516. An A-Z of affordable, popular hi-fi; no-frills environment. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

## OXFORDSHIRE

ABSOLUTE SOUND AND VIDEO, 19 Old High St, Headington, Oxford. (0865) 65961. A&R, Denon, Linn, Mission, NAD, Rotel, Yamaha. Also 256, Banbury Rd, Summertown. BADA MEMBER **3124**

WESTWOOD AND MASON, 46 George St, Oxford. (0865) 247783. Linn, Naim, Rega, A&R, Heybrook, Dual, Mordaunt-Short, Spondor, Tannoy, Quad, etc. BADA MEMBER **3124**

WITNEY AUDIO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Dual, KEF, Mordaunt-Short, Pioneer, Philips, Sony, Yamaha. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

## SHROPSHIRE

AVON HI-FI Ltd, 12 Barker St, Shrewsbury. (0743) 55166. A&R, B&W, JBL, Dual, NAD, Nakamichi, Revolver, Trio, Quad, Yamaha. Dem and home trial facilities. Mon-Sat 9-5.30, closed Thur. Free installation, credit to £1,000. Access, Visa. Service dept.

## SOMERSET

WATTS RADIO - THE ENGINEERS, Jim Badman, 1 West Street, Somerton. (0458) 72440. Castle, Dual, Denon, KEF, Mordaunt-Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1, 2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.

## STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-

Trent. (0283) 33655. Pink Triangle, Voyd Valdi, Marantz, Audio File, Systemdek, Audio Innovations, Cambridge, Quad, Rotel, Snell, etc. 2 dem rooms - no appointment reqd. Mon, Tues, Thurs, Fri, Sat. 9-6 Wed 9-1. Free installation. Credit facilities. Visa, Access. Service dept.

## SUFFOLK

EASTERN AUDIO, 41 Bramford Rd, Ipswich. (0473) 217217. Quad, Audio Lab, Denon, Dual, Marantz, Mission, NAD, Nakamichi, Technics, Arcam. Mon-Sat 9.30-6. BADA MEMBER **3124**

## SURREY

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## PERSONAL MESSAGES

*A ramble through the hi-fi menagerie with Paul Messenger. This month: trying to get to grips with a hi-tech hi-fi VCR.*

My intention this month was to try and catch up on nearly a decade of videorecorder developments, partly for my own education and partly because Britain is hovering on the edge of the great audio/video integration revolution, which will shortly influence all consumer electronics activities, whether we like it or not (a bit like CD in fact!).

As is the way with revolutions, this one's been about to happen for years, and there's still no official starting date. But pressures are building up in all manner of areas, so the chances are that many will be tempted to consider A/V-oriented equipment when next going shopping. Amplifiers aimed primarily at the US market, like the current Harman Kardons, already bristle with the appropriate socketry.

What is the programming stimulus behind the trend? Concert broadcasting is one of course, and you can make up your own mind whether you like that from the occasional simulcast. Pop music is already something of an A/V phenomenon (a key *rationale* for CD-Video), but feature movies are probably the most convincing source of all.

I well remember, many years ago, the revelation of watching a movie on a tiny, ageing portable colour TV while feeding the sound through a hi-fi TV tuner and a big, full range active hi-fi. Sit close to the screen, turn the lights down and the sound up and the illusion of being in the cinema is impressive – the thunder of horses' hooves bringing home most strongly the dimension missing from the domestic TV experience.

The main reason why the British haven't started integrating audio and video already is that the broadcast TV soundtrack is still mono. The countries which have started stereo broadcasting (W. Germany, Japan, USA) are well ahead in the changeover, even though their stereo TV systems are reckoned to be technically significantly inferior to the part-digital NICAM system planned for the UK.

In a fit of pique over index-linked license fees, the BBC iced its plans to proceed with stereo TV just as everyone was expecting a start up, but those in range of Crystal Palace can receive test transmissions of sorts. Some of this is real stereo programmes, but most is background 'library music' for test purposes. And some ITV companies have stated that they intend to pick up the baton and help get the ball rolling before too long.

Stereo TV broadcasting is the key that will open the floodgates. But there are other sources of high quality A/V material, notably on videotape – and also imminently on CD-Video. Furthermore, many people seem unaware that most major movies

board NICAM decoder (for when the broadcasts *do* get under way). And it has four channels of audio preamplifier with several surround sound modes, plus a built-in stereo power amplifier which can be used for front or rear channels.

In other words it's got just about everything a future-ready sound buff could desire – and lots of other feature besides.

When I first opened the carton, I was pleasantly surprised by the discreet little box that emerged, though the sight of a large and daunting handset did cause a momentary shudder. Still, I've been dealing with hi-fi systems for twenty or more years now; I've even wired up a round-the-house audio video system without too much angst'



*Akai VS-A77EK features a built-in stereo power amplifier for the extra surround sound channels.*

released on videotape carry not just Hi-Fi Stereo soundtracks, but also Dolby Stereo surround sound information, so you can sit there in front of your little domestic TV completely surrounded by loudspeakers and enjoying an uncannily cinematic experience.

Having made do with a fairly primitive, first generation, pre-Hi-Fi soundtrack VCR for the best part of a decade, I was quite excited about the opportunity to try one of the latest top models with all the bells and whistles. £700 for Akai's VS-A77EK sounds a bit expensive until you see what a formidable feature package is on offer – it's virtually an invitation to go A/V at a stroke. There's not just the stereo hi-fi soundtrack, there's also an on-

one occasion, so it's nothing to be frightened of. At least that's what I thought . . .

After a week or three's battling, I still haven't subjugated the wretched thing to my will. There's an ongoing power struggle going on down here chez PM, and my partner refuses even to touch the thing.

The first encounter was a painless enough attempt to replay prerecorded mono material. Just tune the TV into the VCR and you're away. Pictures look OK – though not significantly better than those from the first generation machine; mild black mark there. Put in a hi-fi prerecorded tape and wow – real bass, real treble, real dynamic range, no tape hiss. Real hi-fi? Not really, but never

mind – just feel the thump. It's all a bit over the top, but that's cinema/showbiz.

Seconds out for round two: tuning in the VCR. Set a weekend aside for this one, or maybe take a week off work. Don't leave it until five minutes before you want to time-stretch a programme. Up until this point I was all set to buy the wretched machine, but just now all bets are off, and the towel well and truly thrown in.

I have never encountered anything as perverse as this particular electronic tuning system – give me thumbwheels any day, independent of electronic gremlins and power cuts alike. Perhaps by next copy date I may have worked out how to assign a particular preset to a particular channel, and might even have forgiven the machine for this particular idiosyncrasy.

On the positive side, the sound features do work as advertised. NICAM does give quality stereo soundtracks, and the full Dolby surround is magic with a good movie. I rented *The Mission* the other night and sat entranced, as much by Ennio Morricone's fine soundtrack as anything on the screen, and was impressed by the fact that it's not 'hot seat' surround sound – several people can enjoy the phenomenon at the same time.

But ultimately I'm astonished at the perversity of the ergonomics – little touches like the on-screen display for both master volume and left/right balance (both of which are arguably self evident anyway), yet no comparable display for front/rear, the setting for which does require subtlety.

There's lots I've no space left to discuss this month, both on the A/V experience (my exasperation with lip sync errors for starters) and the capabilities of the 'A77, which are prodigious though patience taxing in the extreme. This VCR is clearly one for the technofreak – mere mortals should approach with extreme caution.

But without it, rented movies are never going to sound the same again.

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