

HI-FI CHOICE

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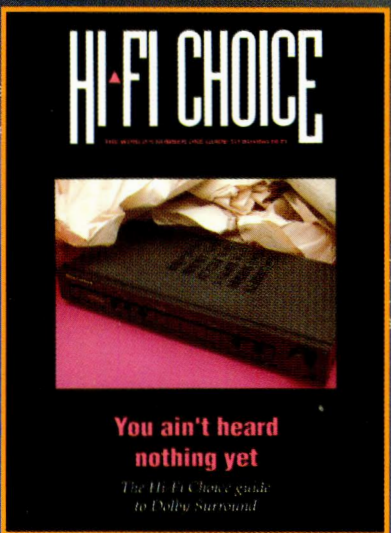


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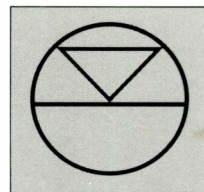
Inside: Free **Surround Sound supplement**

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There are those people who say that to choose a hi-fi you have to understand the jargon and know all about power ratings and performance figures. In our opinion, these people are talking rubbish. Because specifications don't tell you what a hi-fi actually sounds like. The only way to find this out is to listen. Go along to any Linn dealer and you can compare our hi-fi with a selection of other good equipment. You don't have to be an expert. You'll find it very easy to hear the difference. To be honest, the best system will stick out like a banana in a hi-fi ad. For more information write to Linn Products Ltd, Floors Road, Eaglesham, Glasgow G76 0EP. Or telephone (041) 644 5111.



LINN



IT'S AS RELEVANT TO HI-FI AS TECHNICAL SPECIFICATIONS

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Alvin Gold investigates the Dolby S-Type noise reduction system and auditions the first S-Type cassette decks.

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Barry Fox discusses the future of DCC and looks at the BBC's marketing of its own Nicam stereo system.



Paul Miller gets to grips with this lot on page 53.

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Dolby S-Type - how will it fare against DCC and MD? Find out on page 32.

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THE CHOICE DIRECTORY

At a glance information including features, prices and comments on all the current products that we've tested in past issues of *Hi-Fi Choice*.

With well over a thousand entries, it even includes the results from this month's amplifier tests. Beware of cheap imitations, this is the real thing, 30 pages of detailed information including comments on sound quality, compatibility and value for money.

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Your chance to buy cables, interconnects, CD Xtracts and a whole host of other system enhancing goodies from *Hi-Fi Choice's* mail order department. We've also collected together a fantastic selection of audiophile recordings from around the world.

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PERSONAL MESSAGES

Paul Messenger has got hold of the new Naim CD player. Is it enough to convert our resident dyed in the wool analogue addict?



Update

PRODUCTS

Analogue goes digital

It looks as though Meridian has got a busy autumn ahead of it with the launch of a plethora of new products including the 605 power amplifier and a new high end digital preamp. The preamp will be called the 601 and is expected to sell for around £2,700.

The new preamp is quite a departure for the Huntingdon based company, being billed as 'a DSP-based no compromise control unit intended to replace audiophile preamps'. Like the DAC equipped 603 preamp, the 601 comes as a two box unit complete with dot matrix display and remote control unit, and is finished in the now familiar black anodising with a glass front panel.

The preamp comes complete with four electrical digital inputs, two high speed optical inputs and six analogue inputs, including a phono stage which uses digital RIAA processing, the signal being digitised by means of the 601's onboard A to D convertor. The presence of the convertor and the digital RIAA stage owes a lot to Meridian's experience with both the 607 analogue to digital convertor as well as the D6000 digital loudspeaker system.

When it comes to turning the numbers back into music the 601 is no slouch either, employing Philips' latest Bit Stream DAC 7 convertor. Digital outputs are provided in the form of twin electrical and twin TOSLINKs, a fixed digital output, either processed or unprocessed is provided for tape recording. Analogue output is provided in balanced form.

The DSP side of things is covered by the user's choice of DSP modules and can range from Kube-type EQ functions, tailored to the KEF 107 for example, conventional tone controls, tilt and filter



Digital vinyl! Meridian's brand new 601 'high end' preamp includes digital RIAA equalisation.

controls and even a ten octave digital graphic equaliser.

Magic Mushrooms

Japanese cameras-to-photocopiers multinational Canon is taking the bold step of launching a luxury specialist loudspeaker into what many regard as the toughest and most competitive marketplace in the world.

Scheduled to sell at £349 per pair (excluding stands), the S-50 is utterly and startlingly original in all

manner of respects, but the crucial feature which distinguishes it from the herd is the use of an acoustic lens to generate a 'wide imaging stereo' (WIS) effect.

Choice has mentioned Canon's WIS research project several times over the past few years, and the S-50 represents the first fruit (with a subwoofered S-70 expected to follow before the end of the year).

The idea is to control and

Radical chic and a wider sweet spot from Canon hi-fi.

focus the lateral directivity of the loudspeakers so as to create a good stereo image across a much wider area of the room than is usually possible with conventional speakers - a feature that's particularly appropriate to the current spread of stereo sound TV.

The S-50 is actually designed and manufactured here in Britain. Startlingly attractive circular/spherical styling from Alan Boothroyd emphasises the differentness of the design concept, as does the cast metal and plastics construction, the end result bearing little resemblance to a loudspeaker. No less controversially, a single tiny equalised driver is used to cover the whole frequency range. Full report, details and analysis next month.

Monitors hatch

Monitor Audio, the lizard king of metal dome loudspeaker technology, has completed its *Studio* series of near high-end loudspeakers with the birth of the *Studio 20*.

Like the 10 and 15 before it the *Studio 20* uses a 26mm gold metal dome tweeter and Monitor Audio's newly designed magnesium/alloy 120mm cone bass/midrange driver. The latter uses a ceramic coating on both sides of the foil cone to create stiffness and insulation. Thermally coupled to the aluminium voice coil, the



drive unit stays cool, and is said to excel in the areas of midrange clarity, power and smoothness. The 81cm high speaker has a claimed frequency response of 30Hz to 24kHz and an efficiency rating of 88.5dB, with recommended power handling up to 200W. The *Studio 20* is available in a range of real wood veneers over an MDF cabinet. The price is 5p short of two grand.



Metal cones and domes take to the floor in MA's Studio 20.

Quart returns

Denon distributor Hayden Labs has said adieu to Sennheiser and is now representing Quart headphones in the UK. Last distributed over here in 1979, Quart is a large German headphone and loudspeaker company whose cans found favour in *Choice's* reviews of the time.

The range covers all but the electrostatic end of the headphone spectrum and all models incorporate removable ear cushions and unremovable coiled cords. Strange how cable removability was supposed to be such an asset in the Sennheiser days. Hayden is offering a three year guarantee on all Quart 'phones.



Quart's Jecklinesque 85X cans are back courtesy of Hayden.

Metaxas from Reference

Reference Imports has added another high end brand to its prestigious entourage of

serious audio products. MAS or Metaxas Audio Systems is an Australian hi-fi company, run not surprisingly by a Greek. The Metaxas range includes stainless steel



Gorgeous amplification from down under, Metaxas Audio Systems' Iraklis 50W power amp.

encased pre and power amplifiers costing upwards of £1,150 and electrostatic loudspeakers that range in price from £3,375 to a serious £16,500 for the nigh on two and a half metre high *Revelation*.

The amp collection consists of three transistorised pre and power combinations which are lavishly constructed and incorporate such things as balanced interfaces using phono plugs, very short signal paths and high speed power supplies. The relatively low output power amps (50W - 150W) use multiple stage Darlington configuration high speed output transistors and paralleled high speed diodes in their power supplies. For more info contact Reference Imports on (0435) 868004.

A pot in a box

The passive preamp scene is warming up, and a new entrant to the great pot war is Visage Audio of north London. It is producing a single input passive volume control for use with a line level source, which is called the *VA-1* and costs £190. This seems a lot for what is basically a volume knob but the potentiometer in this particular (extruded aluminium) box is none other than a Penny and Giles rotary stereo fader, a very fashionable name in pro audio and high end circles.

Realising that not everyone is dedicated to a single source, Visage is planning a multi input passive, but decided to get the ball rolling with the purist *VA-1* to keep the cost of state of the art attenuation within reasonable bounds. For more details call Visage on (071) 431 2215.

More Aktiv at Linn

Linn Products has launched the *Kaber Aktiv*, a £992 active crossover system for its newly designed £998 *Aktiv Kaber* loudspeaker. The DC

coupled crossover is dedicated to the *Kaber* loudspeakers and is a version of Linn's *Isobarik* active crossover - but with 'more efficient circuitry' and the same power supply used in the *Kairn* preamplifier.

Both active and passive versions of the *Kaber* speaker have new drive units. The tweeter now features a ceramic coated dome and the midrange unit has different magnet and suspension. Damping and sound absorption have also received attention from the Linn engineers.

The passive *Kaber* now costs £1,198; existing owners can have their models upgraded for £220. To convert a passive *Kaber* to the active version would require an operation which Linn is offering free.

Lucky winners times three

In a spate of picking winners from mailbags, we have the winners of the last three *Choice* competitions. Starting somewhere back in the mists of time, Richard Brown of Ripon won the QED *Systemline* kit. Shortly afterwards Rakesh Patel of Mersey won a complete Acoustic Research system, and Frank Carroll of London E13 and N. Kyriazopoulos of Welwyn Garden City both won pairs of AKG head-



Hooray for JPW as it runs off with a Queen's Export award.

phones. And finally, bringing us right up to date, Ron Warrener of London SE18 won a pair of Celestion 7000 be-ribboned loudspeakers, K. Batchelor of Croydon won a pair of Celestion 5000 speakers and stands and T.N. Clarke of Worthing won a pair of Celestion 3000s and stands. Well done lads and better luck next time to the rest of you that entered.

Overseas speaker success

The only Queen's Award for Export Achievement won by a hi-fi manufacturer this year has gone to JPW Loudspeakers, of Plymouth. Exports of JPW Loudspeakers account for 70 per cent of the factory's output; the company has

markets in 30 countries worldwide, and says its markets are continuing to grow. At a time when many manufacturers are gnashing their teeth at the continuing dearth of trade in the British High Streets, JPW says all its staff are on continuous overtime to meet demand. Success in the export markets has enabled JPW to absorb the recent two and half per cent VAT increase in the UK, resulting in an effective price reduction for customers at home.

7 for lucky Celestion

The rash of new loudspeaker systems continues with the launch of the Celestion 7, joining the 3 and 5 in the bookshelf range.

The new £199 speaker measures 47cm high and uses a titanium dome tweeter and (20.3cm) polyolefine bass cone. Both drive units are housed in a 27 litre infinite baffle cabinet made of 15mm high density particle board, which is internally reinforced with a full length figure of eight brace. Internal hard wiring, gold plated speaker cable binding posts and simple crossover filtering promise high performance.

Several aspects of the design are new, from the polycarbonate bass unit chassis, to the grille fixing

with rubber moulded sockets for vibrational isolation.

The *Celestion 7* offers a claimed frequency response of 52Hz to 20kHz (at -3dB) and has a rated sensitivity of 87dB, with power handling of up to 150W. Finish is in simulated oak or black ash veneers.

The new speaker further enhances Celestion's successful range which has resulted in an increase in operating profit of some 170 per cent in the last year. Turnover of the company now stands at £41.5M - 75 per cent of which is generated by overseas trade.



A wolf in black vinyl clothing, the £199 Celestion 7.



UK'd by a Japanese cartridge! Thorens' revised TD280/II UK.

TD280 gets UK'd

Thorens has upgraded its budget *TD280II* deck to UK status. The new *TD280II/UK* retails at £189.90 and is fitted with a Thorens arm and Audio Technica's *AT-95E*, which normally retails for £19 and was once the basis of Linn's *Basik* cartridge.

The *TP28ES* arm has a user friendly, friction free end of side stop and lift device and a removable headshell. The deck is otherwise as before; solid plinth with springy feet, metal platter, belt drive, but the old rubber mat has been replaced with a felt one.

Hi-fi headphones at personal cost

Audio Technica launches an attack on the budget end of the headphone market with the release of the *ATH-L1a* 'stereophone'. Priced £17.95 the *L1a* is an open-backed design which weighs only 103 grammes. Its lightness makes it ideal for use with personal stereos, though it is also made with hi-fi (and even studio) use in mind. *ATH-L1a* is described as highly efficient and able to 'transform the sound quality of a personal stereo's limited output'. It uses a lightweight aluminium diaphragm and copper clad aluminium wire coil. Clarity and excellent transient response are the touted qualities of a design which is nevertheless robust.

Stand to deliver

Marble isolation platforms and a turntable stand are being offered by Rack System Products, of Wembley, Middlesex. The £27 isolation platforms are made of 20mm thick green or black polished marble and can be tailored to fit any size of equipment table, replacing the wooden platform. The weight for a standard example is eight kilograms.

The turntable stand is an



An alternative approach to isolation; marble from Wembley.



Dali's Skyline 2000 ribbon and cone hybrids from Denmark.

ungainly-looking structure of spiked marble base and top platforms supported by tubular steel pipes. Designed, perhaps with appearance as much as performance in mind, the stand weighs a hefty 17 kg and costs £75.

At present both items are available direct from Rack System Products: (081) 904 0163.

Dali delay

At long last Dali is launching its stylish 1.6metre high dipole loudspeaker in the UK. First seen at last year's Penta show the Dali *Skyline 2000* has taken nine months to bring into full production. It costs £1,399.

The speaker uses a 38cm moving coil bass driver, and one metre ribbon tweeter, with two 11.5cm midrange cone units in a sturdy (open) MDF structure. The crossover integrates the three way system at 200Hz and 3kHz. Bi-wiring is possible with the two sets of gold plated terminals and the finish is black with aluminium side cheeks.

The speaker is available from CSE, Suite 4, 1 - 4 Haywra Crescent, Harrogate. Tel: 0423 528537.



Lightweight and robust ATH-L1a cans from Audio Technica.

In Brief

The Cornflake Shop, Windmill Street, London W1, is holding a series of musical evenings in July and August covering Rega, Roksan and Naim. The latest equipment from Rega will be demonstrated on July 31st, Roksan on August 7th and Naim Audio on August 14th. Evenings commence at 7pm and will last around two and half hours. Tickets/details: (071) 631 0472.

Following the success of its recording *Poem*, the American *Stereophile* magazine has released Canadian pianist Robert Silverman's *Intermezzo: Works for Piano by Brahms*. The purist recording, using all valve electronics with no noise reduction is available on double vinyl or single polycarbonate from Stereophile, price £29.95 (including post): PO Box 5529 Santa Fe, New Mexico 87502. USA.

Wilmslow Audio, of Knutsford, Cheshire, is importing and distributing Dynaudio loudspeaker drive units in the UK. The company is also offering three types of loudspeaker system in kit form (prices from £345) and cabinet tuning for customers designing their own speaker systems.

After a lengthy sojourn, the northern cultural town of Harrogate is once again to accommodate an Audio and Video Fair at The Exhibition Centre over the weekend Friday and Saturday November 8th this year.

Our apologies are due to Marpaul hi-fi distributors of Kammerzelt and Mentmore. In our Kammerzelt review (issue 94) we omitted a seven from its telephone number. The correct number is (04747) 3098.



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Eric Wiley 64/85 Beancroft Road Castleford		0977 553066
N O R T H E R N I R E L A N D		
CO-DOWN		
Hi-Fi Experience 47/49 Fountain Street Belfast		0232 238495
LRG Sound & Vision 171 Alberbridge Road Belfast		0232 451381
CO-ANTRIM		
LRG Sound & Vision 120-122 Main Street Larne		0574 72757
Nicholl Bros 13/19 Church Street Ballymena		0266 49616
S C O T L A N D		
GRAMPIAN		
Autosonic 168 Holburn Street Aberdeen		0224 573777
MID LOTHIAN		
Bill Hutchinson Ltd		
43 South Clerk Street Edinburgh		031 667 2877
STRATHCLYDE		
Bill Hutchinson Ltd 43 Hope Street Glasgow		041 248 2857
TAYSIDE		
Robert Ritchie 102/106 Murray Street Montrose		0674 73765
W A L E S		
CLWYD		
Owens Colwyn Centre Colwyn Bay		0492 530982
Lloyds TV, Video & Hi-Fi 30 Lord Street Wrexham		0978 364168
GLAMORGAN		
Tele Electrical Services		
9 The Brackla Street Centre Bridgend		0656 654156
GWENT		
Hi-Fi Western Ltd 52 Cambrian Road Newport		0633 262790
GWYNEDD		
Owens The Mall Wellfield Shopping Centre Bangor		0248 362951





Swim and gym sounds

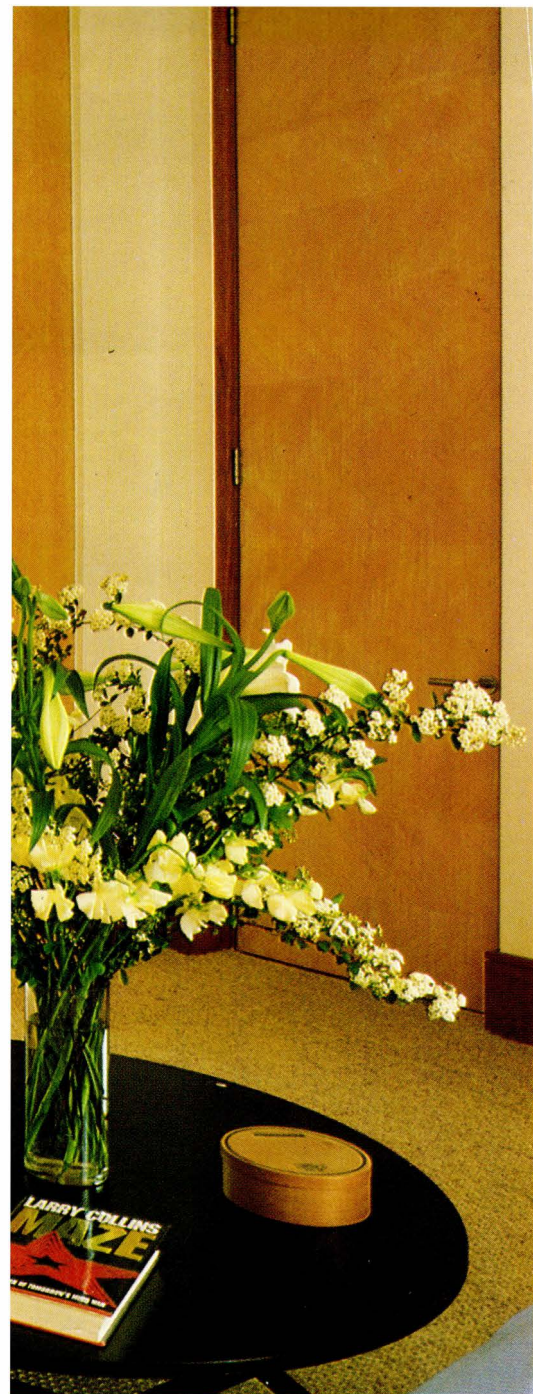
While audiophiles may dream of a purist hi-fi system, multi-room set-ups are rapidly gaining popularity. This month we sent Dan Houston off to check out an Audio Access system designed to provide sound wherever it may be required.

Welcome to a house in central London which has been entirely wired for sound - even the outdoor pool. While not essentially purist, this hi-fi system nevertheless caters admirably for the owner's tastes delivering a combination of audio and video sources to the living rooms and bedrooms. The house is

situated on one of the most famous 'estates' outside Westminster, and has been converted from four to three bedrooms to provide sumptuous accommodation for the owner and guests. It is especially rare in having a large secluded garden - now equipped with a swimming pool and tennis court.

Internally it has been extensively re-decorated by the London interior designers DIN associates, with modern furnishings and materials blending into the original Victorian features.

The redecorating work was begun at the end of 1989 and finished by November last year. By all accounts it was a



mammoth task, with new staircases and flooring throughout, and a new front entrance - not to mention such finishing touches as a raised ceiling in the basement 'gym'.

Coming over

The installation of the sound system is no less impressive and reflects what can be achieved with the marriage of modern zoning equipment and hi-fi components. This type of system has been available in the States, where it was pioneered, for several years, but is less common in recessive Britain. Indeed the installation here uses American Audio Access equipment which is one of the most flexible of its type. The system is fully remote controllable from any of the rooms, a central



The front end of the system is housed in the 'Den'. A Sony 10 disc CD player gives the facility to play over 12 hours of uninterrupted music while tape and vinyl are also catered for in the shape of a Rega turntable and Yamaha cassette deck.

“...the music it makes has an uncluttered and genuinely unpretentious feel that cannot fail to communicate.”

“All this plus good build quality and sensible features at a realistic price make up the necessary ingredients for a Best Buy.”

Hi-Fi Choice August 1991.



**WE WERE GOING TO WRITE AN AD.
THE REVIEWERS BEAT US TO IT.**

The KA-3020 amplifier is part of a range of Kenwood Hi-Fi separates made for the audiophile. For further information and details of your local Kenwood Dealer, contact Trio-Kenwood (UK) Limited, Dept. 302, Kenwood House, Dwight Road, Watford, Hertfordshire WD1 8EB or phone 0923 816444.



KENWOOD

HOME HI-FI ■ CAR HI-FI

moved by music

equipment 'stack' being used to feed sound to wherever it is required in the house.

Heard but not seen

Many of the 'homegrown' multi-room systems, such as those by Meridian, Revox or Bang and Olufsen, require use of that company's equipment throughout the installation. But the main advantage of the Audio Access set up is that individual source components, amplifiers and loudspeakers can be rigged, allowing for differing qualities of sound reproduction according to taste and budget.

DIN Associates hired The Cornflake Shop to equip this installation as it had a proven record as a supplier of both purist hi-fi and through-the-house systems. An important point, according to Steve Moore of TCS, was being able to run cabling while the redecorating work was in progress.

All loudspeaker and control panel cabling is hidden behind the plasterwork with just satin chrome speaker terminal sockets in evidence where conventional speakers on stands are used. The unconventional speakers are all made by Sonance, another American specialist, and are flush fitted to 'disappear' into their settings - heard but not seen. Over two kilometres of cabling for the speakers and relay systems went into the house.

A feature which *will* appeal to audiophiles is that the audio system here is run from its own electrical spur on the fuse box, which reduces the likelihood of any mains related interference.

Open to ideas

The owner, a businessman who runs a successful fashion company, gave The Cornflake Shop a more or less open brief for the installation, after visiting the shop to discuss the options and listen to some of the components. Most of his existing hi-fi equipment had to be discarded on the basis of performance, but Steve Moore was able to incorporate the owner's seven televisions and Loewe video cassette recorder.

On the ground floor, sound is piped to the entrance hall and the two main rooms, both of which look out onto the South facing garden. Upstairs, the main bedroom is equipped with ceiling speakers, as is the Victorian bath and shower room. The basement, kitchen and dining areas have sound from ceiling mounted speakers and music is also available in the gym and pool areas.

With one source playing you can walk around this house and hear it everywhere, be it the sound of a television station, vinyl, Compact Disc, tape or radio station. Audio Access is certainly an apt company name.

The guts of the system are housed on the ground floor in a cosy room known as the 'Den'. The equipment sits on shelves hidden by mirror doors behind a bar. The specification reads like a shopping list, with a Marantz CD94 CD player and

installed for an extension to the system should it be needed at a later date. The power amplifiers for these zones are all sited below the main equipment stacks in the cupboard. The four channel Yamaha MX35s are the tried and tested work-horses for this sort of installation and The Cornflake Shop favours them for rooms where sound quality is not necessarily critical. In this setting they power the ceiling mounted Sonance loudspeakers in the breakfast room and gym, and up-



Even the pool has been provided with its own speakers, in this case Delta Dolphins.

alternative multi-disc Sony machine for non-stop music as the main sources, along with a Rega turntable with a QED phono amp, Rotel tuner and Yamaha cassette deck. Then there are the pre and power amplifiers for each zone, audio and video sockets for each location and the infra red control keypads.

Everything has been labelled by the installers to assist the owner through the learning curve of coping with the initial complexities of the system. All the video and audio sources are connected via the Audio Access components, the three PX6 and PX4 preamplifiers controlling which source signal is fed to each of the three zones. These supply signals to the Den, the drawing room, the dining room, breakfast room, kitchen, outdoor pool, gym, and the master bedroom and bathroom.

Extra cabling and sockets have been

stairs in the bedroom and bathroom. The dining area speakers (again ceiling mounted Sonances) are powered by a Rotel RB 850 while the Den's sound comes through an Onix power amp and Audio Access ceiling loudspeakers.

The main speakers

The best sound from the system can be enjoyed in the drawing room through a pair of Monitor Audio 1200s loudspeakers reinforced with some ceiling mounted Sonance IVs all driven by a Bryston 2B power amplifier. The back-up speakers aren't the best solution to a perfect stereo experience but the spacious surroundings made them necessary, according to Moore. Surprisingly perhaps, listening to the system in here did not belie this. The sound is as clear as the light that streamed through the windows on a sunny afternoon in May.

*"There is hardly anything in the world
that some man cannot make a little worse
and sell a little cheaper;
the people who consider price only
are this man's lawful prey."*

JOHN RUSKIN 1819 - 1900

Meridian Digital Audio Systems



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The ceiling speakers have been set at a relatively low volume level, which keeps them very much in the background; one feels as though one is listening to the Monitor Audio loudspeakers and there is certainly no kind of annoying 'quad' effect. It is in cases like this that the dealer's experience with sound and with music comes into the fore.

I imagine that it is very easy to set up a system like this and end up with a garish sound that would probably be much worse than carrying a ghetto blaster around the house. But then hi-fi has always been a task of mixing and matching componentry to achieve a synergistic result - hence the thriving independent retailer.

All under control

There are two ways to control this system wherever you are in the house. Audio Access supplies a natty eight button wall-mounted keypad, which gives the user full control over the sources and amplification as long as there is software in the relevant front end.

With the keypad you can adjust volume for the zone, switch between the sources - from one CD player to another for example, and switch the programme from one track to another or between station presets on the tuner or television. The limited number of buttons makes it difficult for the novice, but after a few minutes of instruction the logic is easy to comprehend. The 'up' and 'down' arrows, for example, control the volume as well as the programme (which is accessed by a star key).

From the comfort of an armchair the user can also control the system using an Audio Access *Unimote* remote control which uses the Audio Access programme to give the same functions. This can be used in all the rooms which have been fitted with infra red sensors or 'repeaters'. Not only does this save the build up of a plethora of remote control units littering the place, but it also only requires the learning of one keypad's operation - an advantage not to be sniffed at!

A pleasant feature of this installation is that the sound for the televisions, which have the normal four terrestrial channels, along with satellite and video sources, is run through the audio system; one can listen to a TV programme in the drawing room even though there isn't a TV in that room. The higher quality of loudspeakers used also enhances the sound of a video source.

One of the challenging aspects of the installation was to provide underwater sound in the swimming pool - a must, one presumes, for any party animal. The Cornflake Shop used two pairs of British made *Delta Dolphin* loudspeakers which were set into the walls of the swimming pool when it was dug out. The £300 speakers were originally developed for synchronised swimming and are usually suspended in water at the end of their cable. For this more permanent installa-

straightforward way.

Our anonymous host testified to this, saying that in terms of ease of use and sound quality, he was very pleased with the set up. It's not cheap to install something like this - the sheer man-hours taken for running cable around the house and setting the system up mean that labour costs run to several thousands of pounds. Steve Moore's bill, which included everything and some work for wiring telephones, came to the region of £20,000. It's



Even the smallest room is covered, and no, the towel isn't stolen!

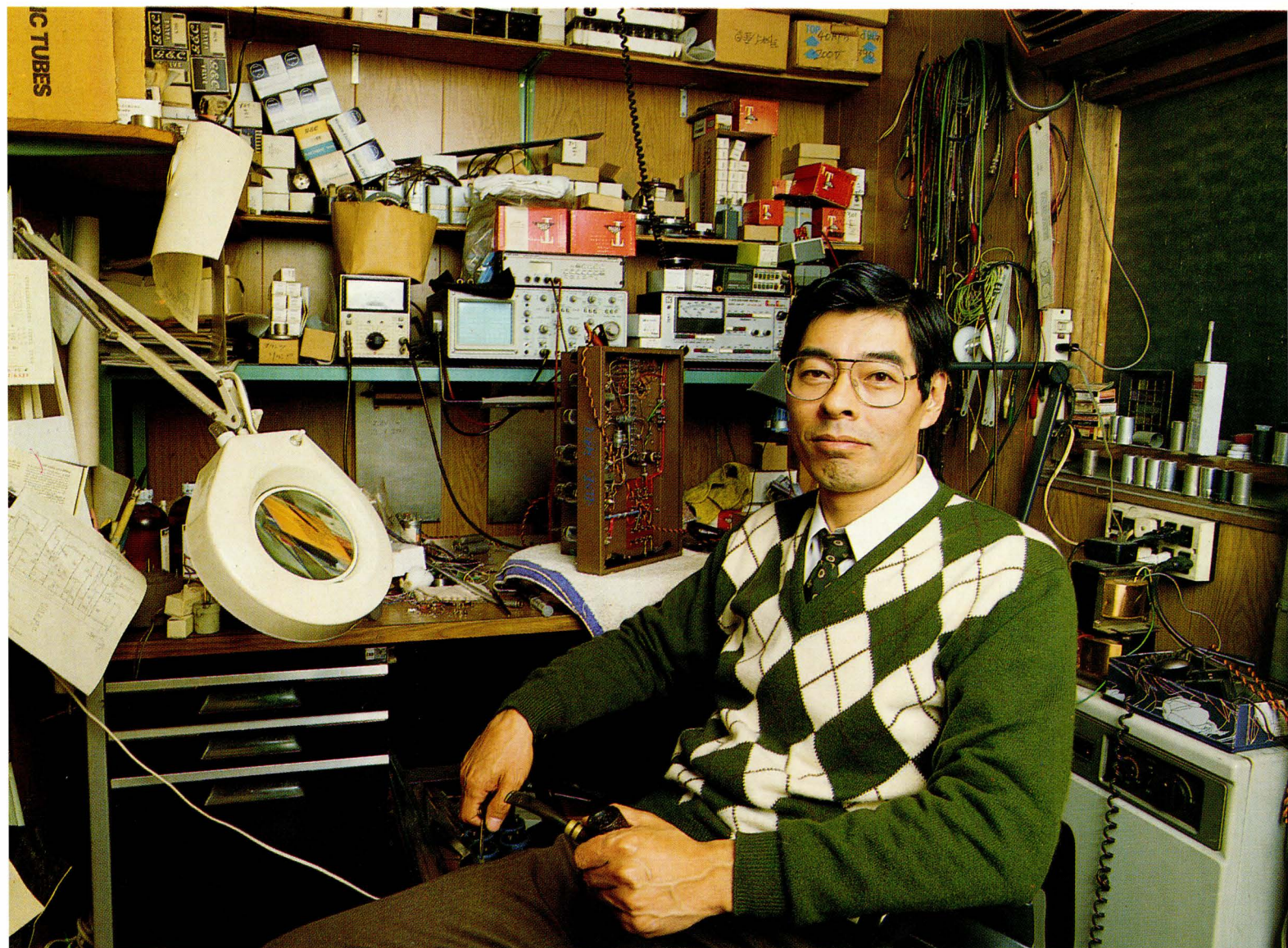
tion The Cornflake Shop made up some waterproof 12inch pipes to create an air-filled chamber for the full range drivers. The watertight pipes give the speakers a better bass characteristic and the finish is the same quality as the Sonance flush mounted speakers in the house. The sound quality of these speakers is surprisingly good according to Steve Moore, though the *Choice* team didn't have time to verify his claim with a synchronous dip!

Tying it all together

The system here is one of the most comprehensive and flexible we have come across; it doesn't tie the installer or user to any equipment other than preamplification and zoning. It caters for both video and audio sources in a logical and

the sort of figure that would make many an audiophile green. It has to be admitted that this is not the sort of system which is capable of extracting the very last piece of subtle detail from a vinyl record's groove. But, of course, sitting and listening to music is an increasingly rarified practice these days. Here, with *Unimote* in pocket, one can switch on the morning's radio news, cross-check with TV or satellite stations, play a hi-energy CD while exercising, switch to something more suitable in the shower and go back to the radio over breakfast - all without touching the hi-fi.

System supplied and installed by: The Cornflake Shop, 37 Windmill Street, London SW1. Tel (071) 631 0472.



Shindo Lab's proprietor Ken Shindo relaxes in his laboratory.

The musical swan

Dan Houston reports from Tokyo, where Ken Shindo runs a small electronics firm producing a limited number of valve amplifiers.

Photography by Chris Richardson. Interpretation by M. Shibazaki.

One of the purposes of the *Choice* visit to Japan was to discover some of the more esoteric aspects of Japanese hi-fi. There is a tendency in Europe, nay the world, to see all Japanese audio activity as an invasion of black boxes, offering a cheap and reliable alternative to the equipment of domestic

manufacturers, whom they so often emulate. While the Japanese majors boast up to the minute research and development facilities, and awesome financial and marketing networks, their presence in the high-end is limited, and are seen collectively to be not so much innovators, as excellent exploiters of technology.

There are, however, several small firms in Japan that produce state of the art equipment which can rival, if not better, the best of 'Western' firms' products. In issue 94 we featured a Goto/Royal Audio system, where horn loudspeakers are literally built into your house in an exercise involving acoustic evaluation, architects



While in the demonstration room a plethora of analogue delights awaits the would be purchaser.

consultation and a team of builders. Issue 85 featured Audio Note which makes extremely expensive amplification and loudspeaker systems using pure silver (for wiring and driver diaphragms). The sound quality of these systems is worthwhile for a no-holds-barred, deep-pocketed audiophile; both companies have survived for well over a decade. This month we're at the offices of Shindo Laboratories, a valve amplifier specialist which refuses to make more than 40 models a month, and which sources all components from Europe.

Amidst the Akihabara

Shindo Labs is based in central Tokyo, a stone's throw from the Akihabara 'Electric Town' district. It's an unassuming venue; three rooms on the first floor above a shop reached by a steep and narrow staircase. Inside, one is greeted by the

faint perfume of tobacco smoke. Ken Shindo, the man at the helm, is a pipe enthusiast, smoking tins of Scottish imported Rattray's Red Rapparee tobacco through a collection of briars. There are quite enough of these littered about to make a small tree.

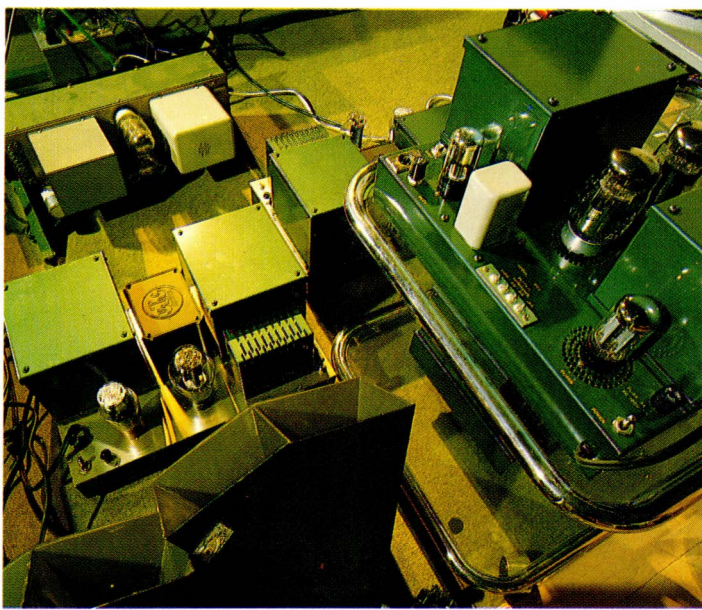
The three rooms serve as a sales area, demonstration lounge and workshop-office. Ken has run Shindo Labs for the last 13 years with the help of his wife who is vice president, and three staff. Manufacture takes place outside Tokyo in Saitama province, to the north of the metropolis, at a small factory employing another four engineers. Shindo now offers ten different models from a range including mono-aural and stereo valve preamplifiers and valve mono blocks priced from £1,000 to £10,000. All are finished in the distinctive bottle green and gold lettering that distinguishes the marque. The logo is a swan

gliding over the words: 'Sound Create Producer' - a great example of the rampant Anglo-Japanese malapropism in this country.

Ken, now 51, used to work as a television engineer for Matsushita but has been building amplifiers in his spare time since childhood, he said. Friends encouraged him, and at the age of 38 he quit the comfort of being a company salaryman to start out on his own.

A glowing reference

He has always designed valve amplifiers, vouching that the simplicity, dynamics and speed of classic valve circuitry resulted in a more realistic sound in a system. The basic circuitry, design-wise, remains the same - it could not be improved he said; refinements have come in the use of certain transformers or the combination of different materials. "I once



Left: Not exactly a single speaker demonstration room: drivers courtesy of Tannoy, Altec-Lansing and Vitavox; boxes courtesy of Ken Shindo.

named because it uses that classic triode valve), designed in 1938 and which he describes as the ultimate power monoblok in terms of musicality. By splitting the stereo signal from the phono stage through to the loudspeakers, he eliminates the chance of crosstalk or interference within the amplifier stages. With such small signal strengths within the preamplifier, this may seem like overkill but we are talking about the quest for perfection.

1992 and all that

Most Shindo customers live in Japan, but the business has built up with customers in Korea and Hong Kong. A new distributor in Sweden recently started dealing with the brand in Europe. Ken recognises that the market for such amplifiers is very small - it's confined to those audiophiles who have large record collections and are willing to spend commensurate amounts of money on a system which will replay them at their best. Consequently, he says he keeps production down - to some 40 models a month and realistically sees that number as the ceiling for his business. But he also told me that by keeping the business small he was able to develop and maintain good relations with many of his customers. He relies on feedback from them to aid further designs and therefore gives the impression of being like a secretary of some salubrious club, where the members have a say in the running of things.

This club then, is not just a manufacturer's outlet or base, but includes the listening room packed with esoteric gear, a workshop and stacks of secondhand

experimented with MOSFETs (a type of transistor), but found that the consistency of quality was not very good," he said. "They were also hard to get hold of and delivery proved difficult."

Rare jewels

This sounds incredible from someone who literally has to scour the world for his supply of valves. He prefers to use European valves in his products and has contacts with military agents where stock is still current. Many of the best valves are no longer made and so it's often a question of buying a 'job lot' when some military quartermaster does a spring clean. Some of these valves date from before the second world war and when seen wrapped in tissue in their cardboard cartons, suggest the rarity of a piece of original art deco jewellery. Ken told me he had a warehouse where his valves were kept, and boasted that he had some 40 million Yen worth (about £160,000) of 300Bs. Shindo most favours the PX25 valve which is no longer in production but he says there is about 20 years worth of supplies left around the globe. What would happen, I asked, if the supply of valves dried up? A look of feigned horror came over his face before he answered: "I'd have to close down".

The design of the power amplifiers has partly been executed to show off the physical beauty of the valve itself. The tubes are placed in open space in front of the shielded transformers, and although this is a necessary measure to keep the valve cool, it is certainly true that listening to music in the dark with a little row of glowing lights in the system can be a pleasant, almost unearthly experience - ask any user of an 'open' valve amplifier.

Only the valves are vintage. Everything else is also sourced from Europe to Ken Shindo's specification. Even though he requires only small numbers, he says he has no trouble in sourcing such com-

ponents. He adds, however, that this is one of the reasons his amplifiers are so expensive. The transformers, for instance are made in Sweden; wiring comes from Belgium.

The amplifiers' names come from France. All the models are named after famous Chateaux wines. The preamps like *Petrus*, *Giscours*, *Montrose*, *Martine* and *Allegro* all reflect Ken's taste for a good vintage, and their bottle green finish enhances this. Even his kit preamplifier is aptly called the *Claret* for those on a starter system. Ken said he'd chosen the names to reflect the quality of his products, and it's easy to imagine Shindo users talking about the full bouquet of sound of the *Haut Brion* power amplifier or the delicate rounded appeal of a *Montrose!*

Ken's favourite amps are the uncompromising *Petrus*, at nearly £7,500 and the new £5,000 *Giscours*, both monaural two box preamplifiers (one box per channel) which represent the culmination of his years as a designer. With these he would partner the *Western Electric 300B* (so



Right: When you spend your life scouring the globe for fast disappearing valves it is only natural that they should become a prominent visual feature of the amplifier designs.

vinyl records for sale. It's an analogue oasis in digitised Japan and is extraordinary in the light of the pile 'em high, flog 'em cheap merchants just down the road in the Akihabara.

The walls of the sales area are lined with around 10,000 secondhand vinyl LPs. The LP has become an enthusiast's quarry in Tokyo and stock is limited to the tastes of discerning audiophiles. Most of the records here are imported from Europe, Ken explained. He said in a rather macabre but matter of fact way that he likes to buy audiophiles' collections when they die and consequently the stock includes many rare classical music recordings from the golden age of the Fifties and early Sixties. The current market value of many of these recordings seems to be rising ahead of inflation in terms of investment. There are several records here selling for around 20,000 Yen, which equates to about £80. The Japanese often buy by the label which reflects the studio engineering, mastering and cutting of musical works; it's as much about quality of sound as quality of musicianship.

Analogue addicts

Most of Ken Shindo's customers are vinyl users, he told me. "About ninety per cent use analogue systems, while the other ten per cent use CD," he said. "Even so most of those who use CD would prefer to buy vinyl if they could get it - the problem is that there are so few outlets in Japan at the moment for vinyl records." It turns out that the analogue/digital debate is alive and well in Japan. There have even been television programmes on the subject.

Ken estimates there are around 100,000 serious users of vinyl in Japan - a serious user being someone with a collection of 1,000 discs or more. And the number is surprisingly large when one considers that buffs are so restricted in buying records. Most have to rely on people like Shindo or collectors' magazines.

While the supply of quality pressings from Europe remains strong, there is little need to source current pressings of music on vinyl, Ken said. However, with less and less releases being available in the analogue medium, he is considering ordering limited pressings from someone like Victor Musical Industries - the largest vinyl producer in Japan. "When the existing stocks run out there will be a demand," he said confidently. "VMI told me that if they had orders for over 2,000 discs then they could press onto a specific label." Such pressings would obviously

only be viable for audiophiles if a similar quality to the vintage Deccas or Kings (a Japanese label) could be guaranteed. But modern recordings using multiple microphones through digital sound desks would probably fail the audiophile test. It would probably be a case of re-pressing from original master tapes (assuming they're still viable) or re-recording from a vinyl copy.

301 not out

As it is, Shindo fuels the analogue market by supplying revamped or overhauled Garrard 301 turntables which are sourced from the Vintage Wireless Company in Bristol.

He makes a new heavy plinth and armbase for the classic deck and either supplies them with an Ortofon 309 tonearm (the longer 30cm version preferred by the Japanese) or makes a similar tonearm using Japanese high precision bearings. He has also developed his own turntable mat for the 301 - a heavy piece of rubber impregnated with lead and covered with canvas to reduce resonance and static, and supplies clamps and feet for the deck.

The Garrard 301 stems from an era when the valve amplifier was in the ascendant among audiophiles, and to complete the picture Shindo also offers several colossal loudspeakers from the same period. These dominate his listening room (it's certainly not a single speaker demonstration room)

with the lustrous wooden veneers of Tannoy, Altec Lansing and Vitavox adding to the vintage charm of the place. Ken reconditions the old loudspeakers by re-wiring them and making new enclosures for the drive units. He is considering making a speaker of his own along similar lines (doped paper cones and simple circuitry) which would necessarily be smaller than these monsters to cater for the size of the average Japanese room.

Without doubt, Shindo Labs has established a degree of respect among Japanese audiophiles and several cognisant Europeans which belies the perfect modern era of digital transistorised sound reproduction. And there is obviously a healthy, although limited, market for these designs which date from three or four decades ago.

By developing and enhancing the performance of this vintage equipment, Ken Shindo and others like him are taking the valve amplifier, and the analogue record deck, into the 21st century. Such designers and their customers are unequivocal about what they want from a hi-fi system. The clarity of a well-designed valve amplifier married to a properly engineered record deck produces a more lifelike sound and higher information retrieval than anything digital.

Ken Shindo's European distributor is: Suwa Trading Harada, Spanga, Stockholm, Sweden. Fax: 46 8 760 9646.

Right: A revamped Garrard 301, complete with heavy weight plinth and Ortofon 309 tonearm, takes pride of place in the demonstration suite.



Unless you've been asleep for the last month you can't have failed to notice that Sony has been talking about a new format. Andy Benham looks at the future of Mini Disc, and on a more conventional note, Jason Kennedy gets in the groove with the Audio Technica AT-OC5.

Choice Sessions

Future formats

Andy Benham looks into his crystal ball to see what we'll all be listening to in the year 2001.

For years and years vinyl coexisted happily alongside the humble compact cassette. Although the record companies would have us believe otherwise, people taped their friend's records and if they liked them they went out and bought the vinyl. Everybody was happy.

Then came CD, 'perfect sound for ever' and all that stuff. It was only a matter of time before some bright spark came up with a recordable digital format and then the problems started.

In the same way that vinyl lived alongside compact cassette the industry is now squaring up for the fight to see which recordable, digital format will sit alongside Compact Disc in the music systems of the next century.

The two leading contenders are Philips' Digital Compact Cassette (DCC) and Sony's recently announced Mini Disc (MD). Into the battle of the acronyms you can also add DAT (Digital Audio Tape) and CD-R (Compact Disc - Recordable).

DAT has been with us for a while now and, quite frankly, has bombed as a mass market medium. Although some of the DAT producing manufacturers will seek to claim otherwise, it has had its 15 minutes of fame and although it will undoubtedly be able to carve a niche for itself at the top of the home recording market, taking the place of ageing Revox B77 reel-to-reel machines, it won't be filling the shelves in Comet and Dixons come Christmas 1992.

CD-R remains something of an enigma. Just as we were going to press, Marantz (which is owned by Philips) announced

that it would be launching a CD-R machine at an astonishingly low £3,000, some £5,000 cheaper than anything else on the market. The problem with CD-R, however, is that the record companies are so scared of people being able to record their own CDs that they are fighting tooth and nail to make sure it never reaches the home of Joe Consumer. The format has been around for quite some time now and it looks highly unlikely that it will ever come down in price far enough to become a major force in the market. Which leaves us with DCC and MD.

Hi-Fi Choice has already covered the technical side of DCC in some depth (Issue 93) but Mini Disc could do with a bit of explanation. The basic concept is for a two and a half inch, magneto optical system where the disc is read by a laser. The Mini Disc comes encased in its own cartridge, which protects the disc surface from damage and does away with the need for a protective case.

A choice of discs

The MD system actually comes in two different flavoured varieties. The first is the recordable disc which closely resembles a computer diskette. The heart of the recording system is a newly developed Terbium Ferrite Cobalt magnetic layer, the polarity of which can be reversed using just a third of the magnetic power used in conventional magneto-optical discs. During the recording process the magnetic layer is heated by the laser and when the temperature reaches a certain point, known as the Curie point, the layer "forgets" its previous magnetic orientation. As the layer then cools to below its Curie point (around 400°F) it will take on a new magnetic orientation according to its surroundings. In the case of MD the

magnetic orientation is determined by an externally applied magnetic field. Polarities of North and South can thus be recorded, corresponding to the digital ones and zeros. If this seems a bit confusing it is much the same sort of thing that happens to a tape when it is left in a very hot environment such as in a car or on top



of a radiator, the resulting degradation in sound quality being due to the tape having heated up and some of the magnetic particles losing their orientation.

Twinned with this layer is a new magnetic head specifically designed for low power consumption operation. This combination does away with the necessity of consecutive erasure and rewriting and results in a smaller, less complex record/playback system. This technology owes more to the computer industry, where discs are nearly always overwritten, than to tape technology where a tape is first erased and then re-recorded.

The other side of the MD system is the pre-recorded software, the availability of which will ultimately decide which of the new digital formats will succeed. These prerecorded two and a half inch CDs will behave like completely conventional Compact Discs apart from the fact that they will hold 74 minutes of ATRAC en-

Sony's prototype MD 'Discorder' complete with both types of disc.

coded data, and will come in a diskette case.

Sony has developed a special MD pickup mechanism which will be able to read both the magneto optical Mini Disc and the more conventional prerecorded material so you should only need one machine to play both types of Mini Disc.

The new pickup will be crucial to the success of the system because it means that prerecorded discs for the MD system can be manufactured using current CD optical technology and production facilities. Prerecorded MDs are effectively two and a half inch 'CD singles' pressed in the conventional manner but containing a whole 74 minutes of music.

When the pickup is reading a magneto optical disc a 0.5mW laser is focused onto the magnetic layer. The orientation of the magnetic field on the disc effects the polarization of the light leaving the disc, depending on the direction of polarization one of the two receiving photodiodes will detect more light. The electrical signals from the photo diodes are subtracted

and depending on whether the difference is positive or negative a one or zero is generated. When a conventional prerecorded disc is played the same 0.5mW laser is used but this time the amount of light reflected will depend on whether or not a pit exists on the surface of the disc. If no pit exists, a high proportion of the light is reflected back through the beam splitter and analyzer into the photodiode. If a pit does exist, some of the light is diffracted, and less light reaches the photodiodes. In this case the electrical signals from the photodiodes are then summed, and depending on the outcome, a one or a zero is generated.

First generation machines will probably be unable to play full size conventional discs and will be aimed at the Walkman end of the market. Having said that, it will only be a matter of time until Sony comes up with a mechanism capable of playing both five inch CDs and MD. The new, multi-format mechanism will probably be the least of Sony's problems as it already has a machine, the *DD1 Data Discman*, that will play both conventional CDs and caddy enclosed CD-ROMs.

The high price of space

Obviously nothing is for free, and the reason that Sony can cram 74 minutes of sound onto its two and a half inch disc is that it uses data compression algorithms to achieve the required saving in space, exactly as Philips has chosen to do with the PASC system it employs with DCC. The Sony system, known as ATRAC (adaptive transform acoustic coding) is reported to compress the data (not the sound) by a factor of five, as opposed to PASC's four.

As with the PASC system, the ATRAC system is a two stage process. The first stage of both systems is to decrease the amount of data passing through to the second stage of the process, where it is then further reduced before being encoded onto the disc. Sony's system uses a fast Fourier transform (FFT) analysis which is applied to individual 20ms chunks of the incoming signal converting them from the time domain into the frequency domain. Each chunk, made up of around 1,000 samples, is analysed to see how the music is changing over the duration of the chunk and then those frequencies which are actually changing are assigned bits according to the change in amplitude. This has the effect of decreasing the amount of data that is fed to the second stage, which is a psycho acoustic based



process. It relies on both the threshold of hearing and effects such as masking to discard that part of the information which is theoretically undetectable by the human ear, thus resulting in another saving in the amount of data which has to be stored on the disc.

The resulting data stream is then encoded using eight to fourteen modulation (EFM) and finally error correction is applied in form of the cross-interleave Reed Solomon code, the same process that is used for error correction with conventional discs.

When it comes to unpicking all this little lot, the digital signal is first fed to an ATRAC decoder which reassembles the 20ms segments into a conventional 16-bit 44.1kHz data stream. This data stream can then be fed to a conventional digital to analogue convertor.

Sony sees the new format as appealing, at least initially, to the vast personal stereo market, and with this in mind has come up with a novel feature known as "ShockProofMemory". The system works by feeding the data disc into a memory chip prior to digital to analogue decoding. The chip will store around three seconds of music, so if you jog the player and the lens is moved out of position, it can play from the memory while the lens is moved back to the correct position. Once the lens is back in position it can begin filling up the memory again ready for the next jog. Apparently, one of the demonstrations being carried out in Japan involves a fleet fingered engineer flipping the disc out of a player and managing to get it back in and playing before the buffer memory runs out, although one would suspect that this demonstration requires slightly more than the single megabyte memory being touted for the first machines.

So there you have it for Mini Disc, but what of the other alternative, DCC? Mini Disc was announced on May 15th and it is probably no coincidence that just two days later Matsushita, the parent company of both Technics and Panasonic, chose a press conference in the South of France to unveil the fact that it was the 'co-developer'

of Digital Compact Cassette and would be supporting Philips in the battle of the formats.

The rightful successor

To quote the manager of Matsushita's engineering department, Mr Abe: "Philip's DCC holds the greatest promise



"Philip's DCC holds the greatest promise of success in tomorrow's consumer tape market and is the rightful successor to the consumer tape medium."

of success in tomorrow's audio consumer tape market and is the rightful successor to the consumer tape medium."

There then followed a demonstration of a prototype Technics DCC machine at the end of which Mr Abe continued: "Ten years ago I carried the prototype CD player. In the last decade CD has become an amazing success. Today I carried another prototype as the successor to the analogue tape. DCC will create another great era as the digital successor to the analogue compact cassette."

The assembled top brass refused to comment on Sony's launch of MD merely stating that the announcement had taken place while they were all in the South of France and that they hadn't had the time to take a good look at it. It was billed however as "an interesting concept and one which we shall study further when

we return to Japan".

Looking more closely at the statements made on the day though, Technics fell a little short of announcing that it would definitely have a player in the shops on a certain date. The company only went so far as to comment that it had completed the R&D phase of the project, and wanted

more time for research before announcing when a player would be available and how much it would sell for. The press conference was billed as an introduction to the technology, rather than a definite decision to introduce that technology to the market.

Technics' announcement cannot be seen as anything other than a major decision to back the DCC format and one which could well turn out to be vital when it comes down to deciding which format will triumph in the shops.

The one thing that hangs over DCC is that it is still a tape based format, with all the associated problems of tape head wear, and it is being introduced into a market in which no one can really doubt that the long term future lies with optical discs, at least until we are at the stage where we can

store our favourite albums on a solid state chip.

Psycho acoustic phenomena

That both the systems on offer use data compression techniques opens up some very interesting possibilities for the future, after all if you can cram 74 minutes onto a two and a half inch disc, then using the same compression algorithms you could cram 370 minutes onto a five inch disc. We are really just at the start of data compression, psycho acoustic phenomena such as masking could be deployed alongside new laser technologies and other projects to bring about further massive increases in the amount of data stored onto a five inch, or indeed a two and a half inch disc. Extrapolating from what has happened in the last couple of months, it is only a matter of time before we see a

disc capable of carrying a whole feature film, complete with HDTV, wide screen format, digital sound and just about anything else you care to mention all crammed onto a single CD. Add in the capabilities emerging from the fledgling CD-I (CD-Interactive) sphere and you begin to get a glimpse of where home entertainment could be heading.

However, the combined format discs are a long way in the future and next year you will be asked to choose between DCC and Mini Disc, the ultimate choice of formats probably coming down to which company manages to persuade the record companies that it has the winning format. It should be stressed at this point that neither DCC nor MD is in anyway intended as a replacement for the conventional CD, both Philips and Sony being keen to stress the fact that CD will be around for the foreseeable future.

We'll be keeping on top of the situation over the coming months and will of course bring you more information as the battle develops.

The taming of the five

Audio Technica has been revamping its moving coil cartridges, JK has tried out one of the more affordable offerings.

As those of you who keep an eagle eye on the newspapers will know, Audio Technica has been making some changes to some of the more popular moving coil cartridges

in its range. The two OCs, 7 and 9, that slayed a few giants in their time, have been replaced with the OC10 and OC30 respectively. At the same time the old F3 and F5 have gained OC status and can be found inhabiting the familiar aluminium body that identifies the species.

The first of these to find itself securely bolted to the headshell of my SME IV was the AT-OC5. It doesn't have some of the esoteric mod cons of the more expensive models like the micro linear nude stylus or the tapered beryllium cantilever, but it's no less dramatically different to its predecessor, and at £122.95 (a real post VAT rise price that one) it's not beyond the grasp of all but the lucky few. It does, of course, boast a handful of technical innovations, not least neodymium iron magnets and 6N (99.99996 per cent) PCOCC coils and terminal pins.

Basically it doesn't look like an F5 and it doesn't sound like one either, which, to be frank, is a good thing. The F5 was alternatively exciting and fast or aggressive and bright depending on your taste, either way it was never boring. In the context of the aforementioned arm and a Voyd turntable, the AT-OC5 is an altogether more civilised performer, in fact it's positively neutral compared to its forerunner.

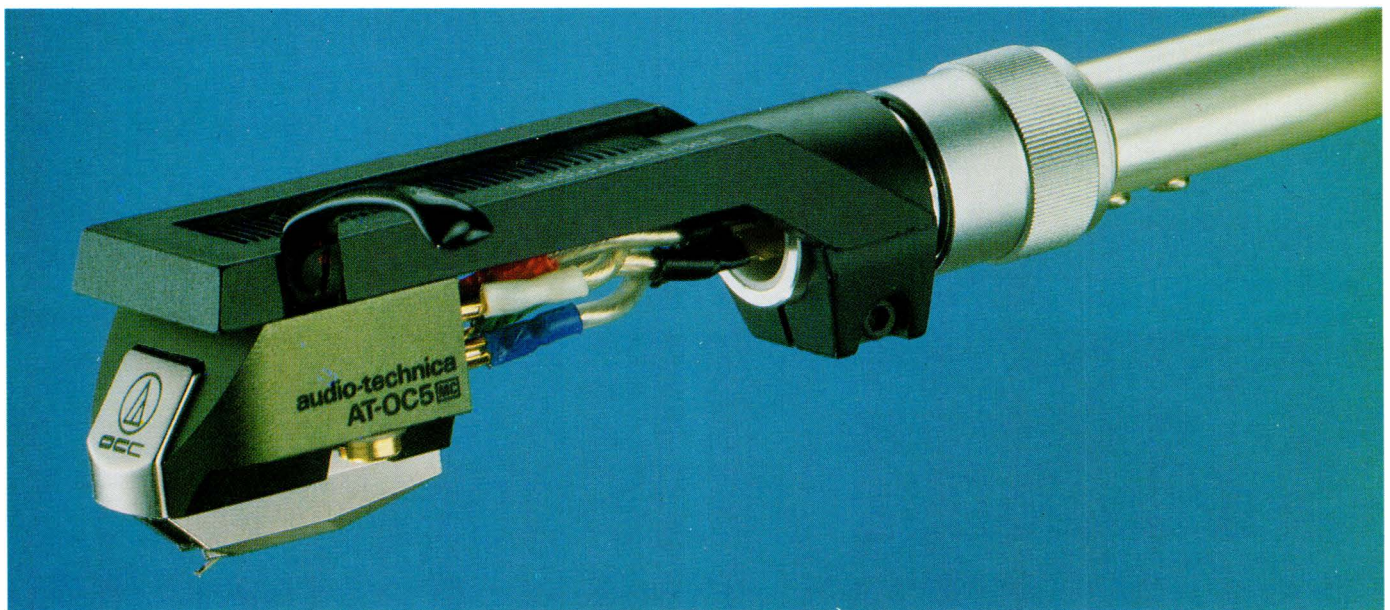
A balanced performer

The OC5 is a very competent cartridge for its price. Most of the moving coil cartridges in this bracket display some form of tonal aberration, being either too dull

or too bright, but the OC5 is neither. It does have a slight lift in the upper midrange, but it's quite subtle and only noticeable on some records. It tracks very well, I should imagine that the severest female operatic voice could upset it, but nothing I put under it caused the slightest lack of confidence. It is also very informative, extracting all the fundamental information from the groove. It does omit the very low level stuff that harmonics, room acoustics and to an extent dynamics are made of but this is only obvious when comparisons with dearer models are made.

Basically, it doesn't seem to add much character of its own to music, but having said that, it could be more dynamic and quite a lot more involving. Don't get me wrong, it can provide great entertainment, a lot of records sound really good, and at the price one cannot ask for a lot more. It has also got a lot more finesse than most £120 cartridges and a few that cost somewhat more, but remember that you will need a decent moving coil input (an increasingly rare beast) and a fairly even handed turntable and arm to give of its best, though its benign character makes the OC5 less fussy about partnering equipment than its predecessor.

In this price range the only competition comes from more ballsy sounding moving magnets such as the Roksan *Corus Black* which is probably better suited to people who prefer a more lively presentation, but otherwise the OC5 must rank as one of the most competitive cartridges in its field.



The Audio Technica AT-F5 is dead. Long live the Audio Technica ATOC-5.

Not content with cornering the market in affordable, and not so affordable, multi-bit CD players, Marantz has quietly been nibbling at the more expensive end of the amplifier market. The products? A rather appealing selection of gold coloured blocks which fall in the company's *Music Link* category of audiophile oriented products.

The missing link

All the units in the *Music Link* amplifier range are the same rather unusual size (250x85x215mm). They are considerably narrower than most components but not narrow enough for two of them to sit side by side on a standard 19" wide equipment rack. Rumour has it that Marantz is planning other products to match the amplifiers, but in the meantime physically integrating them with other components is a tad difficult. They are, however, extremely nice looking and sturdily built little units with cast side panels and thick aluminium fascias, and they're not averse to being stacked up, which goes some way to improving their compatibility with regular width gear.

The system reviewed consists of the *PH-22* phono equaliser (£900), *SC-22* line preamp (£800) and two pairs of *MA-22* monoblok power amps (£1,400 a pair). Making for a complete gramophone-ready system price of over three grand, this is heavy stuff, but it really is gramophone record-ready. The *PH-22* offers three other types of equalisation apart from the standard RIAA, one of them specifically for 78s and the other two designed to tailor records cut with European SP1 and SP2 equalisation. Moving coil and magnet cartridges are catered for with two sensitivity/loading options apiece, MCs having their outputs stepped up passively with onboard transformers that are wound with OFC copper. The latter is an unusual approach by European standards, where active stepping up is far more popular, but this method is well established in Japanese high-end circles, partly as a result of their fascination with tube electronics but equally because step-up transformers work remarkably well. The *PH-22* even comes with a metre long, or thereabouts, inter-

connect of reasonable substance, to hook it up to the control amp.

The *SC-22* control preamplifier (as Marantz calls it), is a very straightforward looking machine. The four inputs (this ain't an A/V control centre by any means) are labelled line 1, line 2 etc so you have to remember what's plugged in where. There's a tape monitor switch and a chunky volume knob but that's about it, no balance control or other such luxuries. Under the skin, however, there's a bit more to it, a low pass filter is used in the output to cut out the sort of RF nasties that digital sources tend to put out. This 6dB per octave device operates above 20kHz and is said to attenuate gently the noise that makes many CD players, especially multi-bit ones, sound aggressive at high frequencies. Apart from output via a

and equipped with captive twin core mains leads in the standard American colours (or should that be colors?) of black and white.

In the context of what are now known as Audio Note *J* (once Audio Innovations) loudspeakers and a Voyd/SME *IV* turntable and arm combo with alternately *AT-OC5* and Ortofon *MC2000 mkII* cartridges, the *Music Link* amps made very pleasant sounds. Apart from a slightly sweet top end they proved remarkably true to the signal being fed to them, the review of Audio Technica's *OC5* in this issue's *Sessions* being largely based on these amps, although since an Audio Innovations *Series 1000* step-up transformer gave better HF extension than the MC stage in the *PH-22*, it was pressed into service for most of the listening. Making transform-

ers is a fine art, and those used to step-up the output of moving coil cartridges seem to vary quite significantly in their bandwidth capabilities, not to mention their susceptibility to stray magnetic fields, so it's not surprising that a fairly expensive standalone unit such as the *Series 1000* should give better results than the one in the *PH-22*.

The most impressive aspect of the set-up was its bass performance, which was significantly more powerful than I am used to with the *Second Audios*. It seems that even with quite sensitive

speakers like the *Js*, a respectable wattage is required really to plumb the depths. Bridging in another pair of *MA-22*s reinforced this and revealed more dynamic and extended grumbly bits on my favourite records. So appealing was this combination, that it managed to bring out the utter marvellousness of FZ's *One size fits all*, a record which has the tendency to sound muddled and frankly (!) hard work, when played on lesser equipment. The latter trick could only be turned with the assistance of the Ortofon cartridge: these amps don't make things sound good unless they start off sounding good in the first place.

Going over to CD, courtesy of an Arcam *Alpha*, the advantages of the noise filtering system were subtly apparent. The HF graininess found on many discs was tamed to the extent that some of the normally

Statements

Jason Kennedy auditions a modular Marantz amplifier while Roy Gregory looks at the Macormack Prism CD player and Richard Black listens to the huge ATC SCM50 loudspeakers.

transformer, which will tend to do the same thing as the filter, the only other novel feature is a pair of phase inverted main outputs for running an extra pair of *MA-22* monobloks in bridged mode.

Powering up

The *MA-22* power amps are pretty straightforward 50W affairs, their only novel feature being a semi floating, toroidal mains transformer. The idea being that less transformer vibration gets into the chassis and thus the circuitry has a better chance to perform optimally, an effort that must be nigh on wasted if you put the amp on a wooden floor next to the loudspeaker, but then we wouldn't do that, would we?

Otherwise the *Music Link* products are outwardly chunky, heavier than you might expect, especially the phono stage,



Gold bloks - stack it yourself amplifier system from Marantz.

unendurable ones became listenable and the reasonably good ones sounded quite impressive.

Grunt

When compared to triode amplification of admittedly slightly higher price, the *Music Link* gear was found lacking in dynamic and tonal subtlety, but this was nearly outweighed by the transistorised beauties' low end grunt and general finesse. At the end of the day, the full blown bridged *Music Link* system proved itself to be very competent and highly enjoyable when fed with a high quality signal. As it is also very attractive and well made, Recommendation seems appropriate, but this is a *Statements* piece, so a 'put it on

your short list if you're spending this sort of money' will have to do.

Jason Kennedy

Ever since the launch of CD, small specialist manufacturers have been telling us that the Japanese majors (and Philips) don't know how to do it. They've backed up their argument with a succession of modifications to standard technology, and there's no doubt that the results have been pretty convincing - at a price.

In the face of increasing evidence that sound quality is again emerging as a pri-

mary concern for at least part of Japan Inc, can these OEM mods still be counted as value for money? The arrival of a Macormack *Prism II* CD player seemed like the ideal opportunity to find out. Macormack is a brand name used by the American company Mod-Squad, the company which gave us the *Line Drive* passive preamp, among other expensive goodies. In a convergence of ideas, the specialists are taking credibility as seriously as the opposition is taking sound quality. Mind you, they're still worlds apart, and if a new name and image for Mod-Squad moves it away from the garden shed, then it's still a long way to Eindhoven.

What the fancy front plate can't disguise, is the fact that the £1,200 *Prism* started life as a Marantz *CD-60* (or Philips/Magnavox equivalent). When you throw Marantz' *SE* modifications into the equation, things get really interesting. Do the mods make a difference and if so, can Marantz do for £50 what the Mod-Squad, sorry, Macormack, offer for £900?

The £330 Marantz *CD-60* and the £50 more expensive *SE* version will be familiar to most of you. Solid, value for money players, they have be-

come something of a standard against which to measure the competition. The *SE* modifications consist of component (mainly capacitor) upgrades, but the machines are otherwise identical. Interestingly, the *CD-60* arrived clad with heavy zinc end panels, a £50 cosmetic option of which more later.

Un autre kettle de poissons

The *Prism II* is an entirely different kettle of fish. Mod-Squad designer Steve Macormack fits an entirely new filter board and buffered output stage, supplied with regulated power from its own transformer. The on/off switch is deleted in order to leave the player permanently powered, and the display can be dimmed or switched right off. Inside the wrap around casework, the chassis has been

stiffened with a slab of MDF at each end. It is a comprehensive rebuild that goes way beyond the 'tweaks' applied to the CD60 SE.

Listening started with the CD-60 and the 60 SE. Comparisons quickly revealed why Marantz has virtually dropped the standard player. The SE surpassed it in every respect. Tonal colours were better, with a sweeter overall balance, especially in the treble. Stereo separation and spacing, the ability to spread the players in a band across the soundstage was also much better, the 60 tending to create an amorphous blob between the speakers. The SE was also livelier, with much greater dynamic range. The large scale swings in the

Silver produced a muddled hash of sound that was really quite unpleasant. Likewise Siltech 4-56. In fact, the improvement using Masterlink Grey interconnect and speaker cable was nothing short of dramatic. The cheaper AudioQuest Lapis and Green also worked well. So, with two weeks of warm up and Masterlink from mains plug to speaker terminals - how did it sound?

Not all fireworks

The answer is damned good, but damned American. The Prism presents music in a bold and dramatic way, with a tremendous sense of solidity and dynamic range. When it's quiet it's very, very quiet, but

the multi-bit machines, and the Prism II certainly embodies that.

Is it worth £850 more than the CD-60SE? Yes, I reckon it is, but whichever way you look at it, this comparison is further evidence that if you're going to buy a CD player then spend around £400 or over a grand. At £1,200 the Prism II pays the price of being imported, you can buy a separate transport and convertor for less. Expensive integrated players seem somewhat wasted when you come to upgrade them, but then I think the Prism is quite capable of giving lasting satisfaction. For £350, the CD-60SE along with the Arcam Alpha and new NAD MASH models offer exceptional music for your money. It really depends on how seriously you take your CDs.

Dagenham dialogue

Hi-fi Journalists use so many car analogies that it's a wonder that hi-fi manufacturers don't use car jargon to 'badge' their products. If they did, then the Marantz CD-60 would be a Sierra 1.6 L, the 60SE a 2.0i Ghia - and the Prism II a Cosworth.

Roy Gregory



The Macormack Prism - a turbocharged Marantz CD60.

Vaughan-Williams Tallis Fantasia (Barbarolli, Sinfonia di London on EMI) were far more convincing with the modified player, which gave a fair sense of the unusual orchestral layout and centrally positioned bass section. The string tone was also better, with violins shrill but not glassy. The dynamic clout also made pop and rock music far more satisfying, while the sweeter tonal balance reduced the aural wear and tear imposed by many modern studio mixes. Given a price differential of £50 this comparison is strictly no contest, the SE being a far more sensible buy.

On then to the Prism II, and a word of warning. Two in fact. Macormack recommends a warm up period of one week. This may not be practical when you audition the Prism, but do give it at least 24-48 hours. I gave it two weeks! Secondly, this is the most cable sensitive player I've ever used. It didn't like silver interconnect or speaker cables. Why? You tell me. All I know is that the normally superb Kimber

when it's loud it's awesome. Not that the Prism is all fireworks. The life and verve is accentuated by a slightly forward balance, albeit combined with an excellent sense of focus and transparency. The bass section in the Tallis Fantasia growled convincingly, and you could place it precisely, on its riser. The whole orchestra was laid out in a coherent acoustic, it was this sense of a complete, enclosed space which had totally escaped the cheaper machines.

The presentation and articulation of detail was also superior. Well recorded percussion and brushwork (the Chesky Jazz discs) was beautifully portrayed, the CD-60SE sounding muddled and splashy by comparison. This deft touch made music flow more readily, everything just bounced along.

Shortcomings? The better low-bit models can offer greater focus, detail and transparency, but at the cost of some sterility. You pay your money and take your choice. Me, I like the 'meatiness' of

While I was preparing the Statements piece on the ATC SCM20 loudspeakers (issue 94), I visited ATC's factory to see the speakers being built and tested. Naturally, ATC didn't waste the opportunity to demonstrate the next model up in the range, the SCM50A - and I started lusting right away.

Strictly speaking, I suppose the SCM50A is the next model but one, since it is an active version of the passive SCM50. However since the price of the 'A' includes 350watts of amplification per channel, and it only costs £3,780 per pair as against £3,065 for the passive, it is still a relatively cheap option. It is also the option preferred by ATC, as the company argues that it likes to know that its speakers are being used with amplifiers which can drive them properly.

The SCM50A is a large loudspeaker, but not unusually so. It stands a little over a yard high on the small stands that are supplied with it, and has a footprint about a foot square, plus the large heatsink, some two inches deep, at the rear. This heatsink is the visible manifestation of the

three power amplifiers and electronic crossover built into each loudspeaker. Without the usual constraints of a standard metal box, ATC has been able to construct a very neat electronics assembly which provides 200W for the woofer, 100W for the midrange driver and 50W for the tweeter. All one needs is a preamplifier with a healthy output (2V being required for best results).

Two of the three drivers used in the SCM50 are built by ATC; the tweeter is bought in. The soft dome midrange unit is probably ATC's best-known hallmark in professional monitoring, while the woofer is an eight-inch paper-cone driver. A reflex port provides extra low-frequency extension. Cabinet construction is conventional but massive: a fully assembled SCM50A weighs nearly a hundredweight.

Hammers on strings

In my own system, the SCM20 works nicely, with a clean, undistorted sound that is easy to listen to - or more accurately, 'through' - for long periods, and a remarkable sense of scale given its small size. However, chez ATC, I noticed at once that the '50A extends that scale considerably, while providing even more fine detail and sounding even smoother and more refined. I did have some doubts about whether the speakers might not be overwhelming in my listening room (5.5x3.35m), but in the event these doubts proved unfounded. What I heard was much the same improvement as in ATC's own demonstration, although admittedly slightly less marked than in the company's much larger room.

This is not to imply that I have gone off the SCM20s, nor that I have suddenly found them to be flawed in some unsuspected way. But the '50s, with their extra volume, more refined midrange driver (ie, dedicated, rather than the integrated bass/midrange unit of the '20) and active crossover system, do reproduce music that little bit more faithfully.

With piano music, for example, one hears the impact of the hammer on the string much as it occurs in real life; a fast but clear transient, accompanied by a rather dull, low-frequency thud which is largely due to the piano's body resonating like a large bass drum, with the pitched part of the note following on after the resonance has built up in the string. Reproducing the transient is already quite a tall order if it is not to be coloured by twangy resonances, but the thud needs a



Three driver designs appear to be coming back in fashion, witness the ATC SCM50A.

loudspeaker with a very good - extended and clean - bass response to do it justice.

The SCM50A manages all of this, and even more impressively it doesn't lose its bottle when asked to do it at very high levels. Being accustomed to hearing a piano at very short range - from the keyboard - I tend to play piano records pretty loud, and it is most refreshing to find a loudspeaker that can put out some really serious peak sound pressure levels without becoming distressed and uncomfortable to listen to. Nor does it compress the dynamic range or lose reverberation and subtle stereo clues.

Detail or overview

Of course, that ability to cover an immense dynamic range is just as useful in large orchestral works, operas and rock music, while the speaker's transparency makes the most of any signal fed to it. Indeed, I happened to be experimenting with some 78-playing equipment while I had the SCM50s, and even recordings

sixty years old sounded as good as I've ever heard them! One of the features of live music that is so often lost in reproduction is the way one can hear all the individual strands that make up the whole structure, while if one chooses not to dissect the sound consciously, it is a cohesive whole. Many hi-fi systems either mash all the strands inseparably together, or highlight some of them so that one can hardly see the wood for the trees. These loudspeakers give one the option of listening, as it were, in detail or in overview. And that's a major achievement.

In summary, ATC's SCM50A is a remarkable loudspeaker, capable of extremely fine results in every department - unless you prefer the 'euphonic coloration' type of sound. Obviously, its market is limited by its price, but when cost is but a minor object this is one hi-fi artefact that can well justify its expense. I would happily recommend it to anyone.

Richard Black

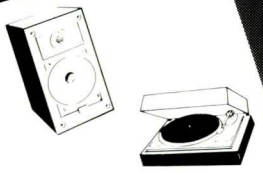


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SUGGESTED SYSTEMS

The suggested systems priced below all include the popular Dual CS503/1 turntable but an alternative turntable or CD player is available at extra cost. Please see "OPTIONS" list below for further details.

SPEAKERS	Goodmans Maxim II Widale Delta 30 Z JPW Minim Gate GS210 JPW Sonata (vinyl)	Celestion 3 JPW Sonata M/Short MS 3.10 W/Dale Diamond 4 Mission 760 Royd A7	Celestion DL4 II Tannoy E11 JPW Sonata+ M/Short MS3.20 Widale 410 Mission 761	Nad 8225e Celestion 5 B&W DM600	Monitor Audio R7 H/brook P15 Celestion DL6 II Tannoy M15 Wharfedale 505.2	Mission 762 Castle Warwick Celestion DL8 II Arcam Alpha Monitor Audio R9 M/Short MS 3.30 B&W DM610	Castle Durham Heybrook HB1/3 Tannoy M20 (Bik) Tannoy DC 2000 (Add £70) Rogers LSAA
Rotel RA820AX	289.95	299.95	319.95	339.95	369.95	379.95	419.95
Rotel RA820BX4	319.95	339.95	349.95	369.95	399.95	409.95	449.95
Kenwood KA3020	289.95	299.95	319.95	339.95	369.95	379.95	419.95
Pioneer A300	349.95	379.95	409.95	419.95	439.95	469.95	519.95
Rotel RA840BX4	369.95	379.95	399.95	419.95	449.95	499.95	499.95
Harman HK6100	309.95	319.95	299.95	309.95	379.95	449.95	444.95
Rotel RA810A	259.95	279.95	299.95	299.95	399.95	399.95	399.95
QED A240CD II	339.95	269.95	279.95	279.95	329.95	409.95	479.95
Yamaha AX330	249.95	349.95	349.95	359.95	379.95	429.95	469.95
NAD 3240	329.95	369.95	389.95	389.95	419.95	429.95	429.95
Marantz PM40SE	349.95	369.95	369.95	369.95	369.95	379.95	409.95
Kenwood KA5020	339.95	349.95	349.95	349.95	329.95	359.95	369.95
Nad 3225PE	289.95	289.95	289.95	309.95	329.95	389.95	399.95
Nad 3020 i	279.95	289.95	349.95	349.95	319.95	349.95	369.95
Marantz PM 30SE	279.95	289.95	309.95	309.95	369.95	349.95	369.95
Technics SU B10K	309.95	289.95	309.95	309.95	319.95	409.95	419.95
Musical Fidelity B1	329.95	349.95	369.95	369.95	379.95	409.95	459.95



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OPTIONS

The following Compact Disc Player or Turntable may be ordered instead of the Dual CS503/1 in the above systems.

- CDs**
 Aiwa XC700
 Denon DCD560
 Denon DCD660
 Denon DCD860
 Denon DCD960
 Marantz CD40
 Marantz CD41
 Marantz CD50SE
 Marantz CD60SE
 Nad 5420
 Nad 5425
 Nad 5440
 Philips CD618
- add £50**
 add £50
 add £70
 add £125
 add £160
 add £30
 add £70
 add £130
 add £150
 add £60
 add £75
 add £160
 add £50
- Philips CD624**
 Philips CD634
 Philips CD850
 Philips CD610II
 Pioneer PD6500
 Rotel RCD855
 Rotel RCD865
 Sansui CDX211
 Technics SLPG200AK
 Technics SLP6400AK
 Technics SLP6500AK
- add £65**
 add £100
 add £245
 add £35
 add £90
 add £115
 add £165
 add £20
 add £30
 add £80
- TURNTABLES**
 Dual CS503-2
 Dual CS505-4
 AR EB 101
 Nad 5120
 Nad 5120
 Ariston Q Deck
 Rotel RP855
 Systemdek IIX900 +
 MOTH + AT110E
- add £20**
 add £40
 add £90
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The magical hisstory tour

Dolby's S Type noise reduction system has been a long time reaching the market but S Type machines from Pioneer and Harman/Kardon are now in the shops. Can Dolby use the year before the introduction of DCC to establish its format? Alvin Gold reports.

Dolby S, the pared down domestic version of Dolby SR, is aimed at a fast moving target; a home taping industry rushing headlong towards a future whose shape no one can know for certain, but which looks destined to go digital in one form or another in the not too distant future.

Prospects for Dolby S depend on a number of issues, of which the effectiveness of the system is only one, and perhaps not even the most important one. The real issue of the moment is whether Dolby S will receive support from the software producers.

This will be decided one way or another by faceless record company executives in smoke filled rooms, and the public will be the very last to hear. It may already have been settled. If the answer is yes, and if the industry backs the system with real muscle, Dolby B will probably start a slow decline which will eventually see its demise, while Dolby S takes centre stage.

The future

The next question to ask then is whether the record industry will take to releasing Dolby S in parallel with Dolby B. The direct answer to this must surely be no, at least not in any quantity. The almost complete lack of publicly expressed interest in the system by record companies surely tells its own story.

Before setting electronic quill to virtual paper, I spoke to Dolby Labs on the subject. They were unable to point to any example of an important record label committed to Dolby S, or even the prospect of such a commitment. By the time this reaches cold type the situation may have changed, but I still foresee no headlong rush to issue cassette lists for the new format. Although Dolby S duplication presents no real technical problems, it costs money, and, initially at least, would cause confusion without much prospect



Alex De Grassi fans are about the only people catered for by S-Type software.

of increasing sales. Cassettes are, in any case, largely a price driven commodity. Ask most people the first word that comes to mind when cassette is mentioned, and it's almost certain to be convenience - or something close.

My guess - and it's only a guess - is that few will willingly pay extra for Dolby S, at least not after the initial excitement has passed. The majority of those particularly concerned about sound quality are, in any case, likely to have migrated elsewhere, for example to Compact Disc, and no, I'm not forgetting the significant number of people for whom sound quality matters enough to buy 'serious' cassette decks costing upwards of, say, £180.

In any case the industry is rightly worried about the proliferation of prerecorded music media. In addition to records and cassettes, there are now CDs and video discs. The last few years have also

seen a massive explosion of interest in an entirely unexpected area: prerecorded video tapes. Recordable Compact Disc (CD-R) looks as though it's definitely on the way for the not too distant future, and DAT is still beavering away, trying to find a niche for itself.

The trouble of course is that the combination of all these media ties up a great deal of shelf space in the record shops. It is also bad news for the buyer, since the profligate use of precious resources to stock the same material in umpteen different formats militates against diversity, with inevitable effects on the availability of minority interest and back catalogue material. This may well be good for people like Nigel

Kennedy or Jose Carreras, but it isn't good for the rest of us. Without the depth and breadth of material we have had access to in the past, the whole issue of prerecorded music will be diminished. Imagine if Nigel Kennedy's was the only Brahms *Violin Concerto* one could buy. In some shops it already is.

This is a scenario in which the big multiples - the WH Smiths, Woolworths and Boots of this world - will be the only winners, and in which the specialists will have the ground cut from under them. For me this is the nightmare scenario, one in which an increased apparent range of options (of media) actually leads to a real life narrowing of choice and diversity. This isn't an argument either for or against Dolby S, but an indication of how convoluted the arguments have become, and how little technical issues are to the fore.

If we accept that dual inventories of Dolby B and Dolby S tapes are an extravagance neither the industry nor record buyer can afford, what about simply

ditching Dolby B in favour of Dolby S? If this could be done, a comparatively painless switchover could be engineered that those with Dolby B players might hardly notice, and that anyone with appropriate replay machinery could readily use to enjoy considerably higher standards of performance. Is this really a practical possibility?

Well this is exactly the scenario that Dolby Labs appears to be encouraging. Dolby doesn't explicitly claim that Dolby S tapes are compatible with Dolby B replay processing, but it does suggest that Dolby S tapes can be replayed in Dolby B equipment quite satisfactorily. My own tests suggest otherwise. It is true that there is comparatively little obvious music or noise 'pumping' when this is done, but there is quite severe overall compression which might go down quite well in a car but which, in the context of a domestic hi-fi system, leads to severe losses of dynamic freedom and depth of imagery. The effect is leaden and coarse, vocals being strident and unexpressive.

A taste of the changes can be had by listening to a music broadcast on FM and then on AM, where the sound jumps forward and all signs of subtlety of expression are submerged in a big, bold and rather crudely presented soundstage. Clearly, compatibility is extremely limited and even in the context of a car system or personal stereo, I'd judge that the results are barely acceptable at best, and generally speaking unacceptable. Even those unfamiliar with hi-fi standards would find the lack of subtlety and range wearing.

Dolby S is not to be criticised for not replaying correctly through a Dolby B processor, but the suggestion that it can strike me as mischievous, and, if taken literally, will leave millions of people with an inferior sound to that which they currently enjoy, unless they make a switch to Dolby S equipped hardware.

Dolby S, DAT and DCC

The other claim for Dolby S is that it is much better than Dolby B and C (obviously) and that most people are unable to distinguish Dolby S encoded tapes from DAT (and presumably DCC). So far the evidence for this, whilst inconclusive, is thin, and that's putting it mildly.

To be fair, I am unfamiliar with the most people mentioned in the above statement, and my hands on experience is limited to two cassette decks, both from Harman/Kardon, one of which is the new

three head TD4800 with which I've spent most time. Both H/Ks use the three-IC chipsets produced by Sony as an interim measure prior to the release of the single chip version, which is said to be already in production. These two Harman/Kardon decks may be the only ones ever to reach the market using this early chipset, and both Dolby and H/K are categorical in asserting that the different generations of Dolby S ICs sound identical. But they would say that, wouldn't they?

The results I got on audition are not easy to express in a single line form. It is not simple to distinguish the effect of the Dolby circuit from residual shortcomings elsewhere in the recorder itself for example, but I did establish firmly that the H/K's electronics were not too transparent even when used without noise reduction. A Sony DAT and Nakamichi *Cassette Deck One* both fared better here, and truth to tell, both were capable of superior overall sound quality, in the Nakamichi's case using Dolby B noise reduction (as recording without Dolby proved too noisy to allow a fair comparison, and Dolby C clearly sounded worse).

The real reason for the latter's good showing however, has little to do with noise reduction processes and much to do with the inherent quality of the record and replay amps and, of course, the transport and heads.

Replay levels

One very powerful argument in favour of Dolby S is that replay levels in the home have increased since the introduction of Compact Disc with its much reduced noise floor. For many people and systems this is certainly the case. With cassettes recorded to Dolby B or C standards, high replay levels tend to expose all the fundamental weakness, especially the noise modulation and any Dolby replay tracking er-

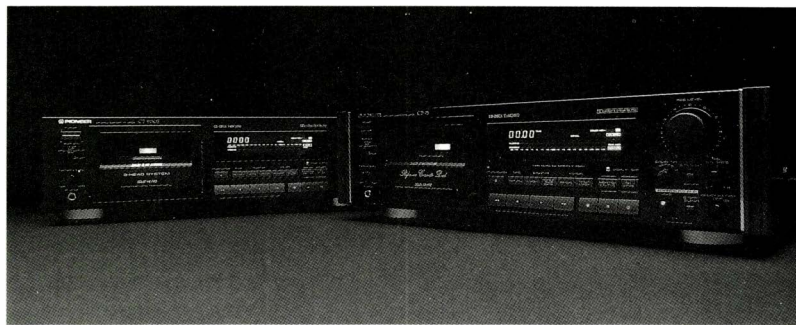
rors. Even the effects of the anti-saturation network on Dolby C could sometimes be heard as a localised very high frequency hiss with occasional sibilance on particularly poorly set up decks. A key aim with Dolby S is to make the sound more consistent and better able to sustain the kind of analysis that high replay levels bring in their wake.

Sound quality

Turning to the sound of Dolby S, or the character it imparted to known music material (known in this context means being a tape/source monitor button push away from the original, though most listening was done using short passages of



Harman/Kardon was first to introduce an S-Type machine.



With Pioneer not far behind.

the source, then off tape and so on), the picture is complex. Certainly the system did most of what is claimed. The noise floor was consistently low and at anything other than unusually high replay levels hiss wasn't an issue at all, though it could sometimes be detected at very high volume levels by the sudden release of an almost inaudible presence when switching to the source feed.

The freedom from modulation noise was, as promised, very striking, and in my view clearly the best advertisement for the system. Modulation noise has a variety of insidious effects: it mucks around with low level sounds, sometimes

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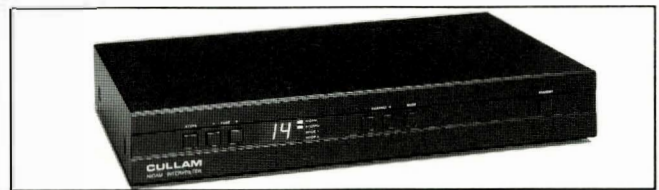
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making individual strands hard to follow, adding a layer of fudge and kludge and generally destabilising the sound. Modulation noise, in a way, is the sound of cassettes; it is what makes them sound qualitatively different from other sources.

With Dolby S, much of the residual low level uncertainty and loss of clarity cleared; it was almost as though a subtle and practically unnoticed screen of mist had cleared, leaving everything much as before, but somehow cleaner, more sharply etched and more vividly coloured. Dolby S recordings sounded consistently sharper and above all, more stable than the other Dolby processes.

But to suggest that the Dolby S tapes were 'indistinguishable' from DAT, or

CD for that matter, is putting it too strongly. Dolby S is good, but it's not that good. Compared to the other recorders mentioned above, the Harman/Kardon still sounded a little grey and messy, even with simple, open sounds like unaccompanied vocal material where the advantages of Dolby S are at their greatest. It's important not to take too much note of the first couple of decks to reach the market. Later models, especially those with the single chip Dolby circuit, may well perform better.

Above and beyond all these things, Dolby S is the replacement for Dolby C, which came, failed to conquer and which over the next few years will almost certainly start to be written out of the story,

though the circuit will remain on cassette decks for compatibility reasons.

Intriguingly, the overall performance figures for Dolby C and S are not dissimilar - Dolby C offers a 20dB noise reduction in the mid and high frequencies, and S offers somewhere below 24dB in the same region, and about 10dB at lower frequencies where Dolby B and C don't perform any processing at all. Of course Dolby S is a vastly more subtle and complicated system than either of the two that preceded it, and, as we have seen, its effect is much harder to pin down. It is a considerable improvement on what has come before, but in my judgement and for all the reasons covered above, I can only conclude that it may be too little and too late.

How Dolby S-Type noise reduction works

The starting point for Dolby S processing is the same as for other Dolby noise reduction processes. The signal to be recorded is boosted in level before it hits the tape to increase the gap between signal and noise. On playback, the signal is reduced by the same amount, and as the relationship between signal and noise is now fixed, tape hiss is reduced by a similar amount.

Of course, signals which start off very loud would overload the tape, and so a threshold is set above which the boost applied is progressively shut down. There is also a frequency selective element in Dolby noise reduction processes. As the ear is chiefly affected by high frequency tape hiss, the noise reduction process is switched off at lower frequencies. This is a very simple outline of the Dolby B noise reduction system.

There are problems though. One of the main ones is noise modulation, in which the background hiss varies with the music signal level. With Dolby B for example, as the signal level rises, perhaps in a very limited frequency band, the record boost is reduced, which means that the hiss becomes more audible. With a wideband music signal, the music signal will often mask hiss quite effectively, but this is not the case when the hiss has an appreciably wider bandwidth than the wanted music signal.

Dolby S is an immensely intricate system, in fact it is really a complicated package of measures, most of which

influence the way others work. It's important to try to keep a fix on the main ideas though. These can be summarised as follows. Dolby S provides strong noise reduction at all frequencies, and at high frequencies (over about 1kHz) the power of the noise reduction process is increased in accordance with the audibility of the noise in the region.

Then come the clever bits which muck around with the way the encode compressors work in such a way that exposed noise (not masked by music) is clamped down firmly, and not simply allowed to run free because music elsewhere in the band is going berserk, which is what happens in the case of Dolby B and C. This in turn reduces noise modulation; the tendency of hiss levels to vary with the music content.

In addition, some complex equalisation is applied at the frequency extremes to 'desensitise' the way the system operates, and place it less at the mercy of small frequency response errors which are always most severe at the frequency extremes. Dolby Labs claims that Dolby S is less sensitive to setup and frequency response errors than Dolby B or C, and in particular that the effects of Dolby tracking errors are reduced.

Hardware standards

There is another element in the Dolby S story that hasn't been mentioned so far. Dolby S is more than just a coding standard; it is a package deal that includes a comprehensive set of hardware standards. For the first time, Dolby Labs insists

that cassette hardware with Dolby S conform to a range of requirements, for which appropriate test tapes are available. Replay head azimuth, for example, must be within three minutes of arc (equivalent to 75 degrees phase error at 12.5kHz). Overload margins from 50Hz - 15kHz must be at least 15dB, whilst distortion, speed accuracy and other parameters are similarly defined. There's even a maximum wow and flutter figure in the specs of 0.10 per cent CCIR wtd or 0.20 per cent unweighted.

The decks must be equipped for auto tape type sensing, and provide bias and sensitivity adjustments so that different brands and types within each tape group can be matched correctly to the deck.

These requirements strike a nice balance between being not excessively onerous for a respectable manufacturer and ensuring good mechanical and electrical standards. It is the sort of specification that should have been laid down years ago.

It remains to be seen how this element of the Dolby S story works out; whether manufacturers take the figures as a minimum for all production players, or an average which specific individual models may fail to match. It will also be interesting to see whether Dolby S is limited to high grade domestic hardware since the standards as set will not readily be met by portable equipment. Perhaps a relaxed playback only standard will be set for such players.

A total conversion

Alvin Gold has had some rather unusual visitors in the shape of Meridian's £7,000 D6000 'digital' loudspeaker system. Could this be the future of hi-fi?

Hi-fi isn't always exciting. Most advances are made by standing on the shoulders of others, and using the extra altitude to gaze a little further into the distance. Most products are refinements of what already exists, not that there's anything inherently wrong with that. The Meridian 6000, however, is original. *Seriously* original. Original to the point where even some of its most familiar components work in surprising, unfamiliar ways.

However, nothing in the D6000 could be described as unprecedented. Most people are familiar with digital audio as a tool for storing musical data, as in CD. However the idea of using digits to completely reshape the architecture of a hi-fi system, or to reinvent such common everyday features as the balance control is rather less common. The D6000's significance is that it introduces a number of such ideas to the market for the very first time, albeit at what for most people will look like science fiction pricing.

Hyperactive

The 6000 is a fully active loudspeaker, with built-in electronic crossovers and power amplification. It also performs key functions expected of a preamplifier, and in addition it acts as the seat of the system's 'intelligence'. It is addressed directly by a system remote control which transfers commands back to the source components where called for, though the system can also work with 'dumb' source components, record players or non-Meridian CD players for example, which cannot understand commands from the remote control. When used with 'intelligent' components - a Meridian CD player or tuner, say - the messages fly in both directions, and information such as track

numbers and FM station preset IDs are relayed to the display on the front of the two speakers. The display also gives a wide variety of rather tersely presented status information - input, volume level, absolute phase and so on.

All this is unusual enough, but what makes the 6000 unique are two factors. The first is that no analogue inputs are provided whatsoever. The system is driven through one or more of its two optical and two electrical (coaxial) links from one or more digital sources, or

operate mainly in the digital domain. It is the D6000 which introduces the ideas of digital signal processing - DSP - into the home.

Preamplifier functions include a very sophisticated part digital, part analogue stepped volume control with a 1dB action and an almost complete absence of step switching noises, though the complication is aimed not at this but at increasing dynamic range across the complete volume range.

Acoustic Design & Equalisation

The acoustic design of the 6000 is nothing less than fascinating. Most of the output - everything above about 200Hz in fact - is handled by the small, trapezoidal, self-contained, downwards spiked enclosure that sits on the main pillar, making a structure over 130cm tall. This enclosure, connected electrically with the pillar by an umbilical cable, consists of a 170mm synthetic cone bass/midrange unit and a metal dome tweeter, the latter being a high grade custom specified unit made by SEAS. The enclosure is complex in construction because of the angles involved, boxes being easier to make when all the angles are right angles. The materials used are of unusual quality and the result is extremely solid.

And so too is the main pillar, which contains the digital electronics, power amplification and bass section of the system. To handle the bass there are four similar 210mm units, two on each side, each pair operating in phase with the other so that there is no net rocking moment on the enclosure to upset stability, which is further enhanced by extremely solid build quality. The enclosures are spike coupled directly to the floor.

Separating the two parts of the enclosure has a number of benefits. The mid/top enclosure can be designed for good dispersion and for strength, and is almost



The Meridian's bass drivers are hidden away on the side of the panels

analogue sources that have first been converted into the digital domain. At its simplest, and a number of systems are said to have been sold in this form, the D6000 is driven by a 602 CD transport, one half of Meridian's complete 602/606 CD player. The second factor is that everything upstream of the power amplifiers, and this includes the electronic crossover and all preamplifier related functions,



speaker to keep the image correctly centred off axis as well as on. As a result it is possible to sit at the foot of the loudspeakers, or for that matter anywhere else in a room, sitting or even standing, and still achieve a level of performance from the speaker comparable to what would be expected from a 'normal' listening distance. The means by which this is achieved by the user however are not entirely straightforward; I'd like to see the digital steering accomplished by something like a joystick or rockerswitch with two planes of movement.

Powering up

The power side of the *D6000* is taken care of by two 150watt amps for the bass and two 75 watters for the midband and treble, giving a total wattage which is simply too frightening to contemplate. The design of the

amplifiers follows established Meridian practice, featuring DC coupling and servo control to eliminate DC offsets. There is some sharing of power supply components, and of course the amps are connected directly to their respective loads, eliminating the usual problematical loudspeaker wiring.

The tall, lanky appearance of the *D6000* when viewed from a typical listening position belies the stature of the enclosure which is determined in large part by its very considerable depth. The front of the pillar is black and covered in a glass sheet, which can take on the appearance of its surroundings, helping it integrate into at least some traditional surrounds almost as well as it works in a more modern setting. The mid/treble enclosure has a black gloss finish to match. Subtle feature lines link the two components. The effect is striking and, in my opinion, startlingly effective, but I've heard a diversity of views on this. Either way it's strong meat.

Using the *D6000*

Installing the *D6000s* is a procedure best handled by a trained dealer, and involves

completely insulated from the high levels of low frequency ambient 'noise' in the bass enclosure.

No attempt has been made to produce a flat acoustic output from the driver complement in the usual way, ie by adjusting the characteristics of the drive units so that they match. Instead, this task is handled by active equalisation in the digital domain.

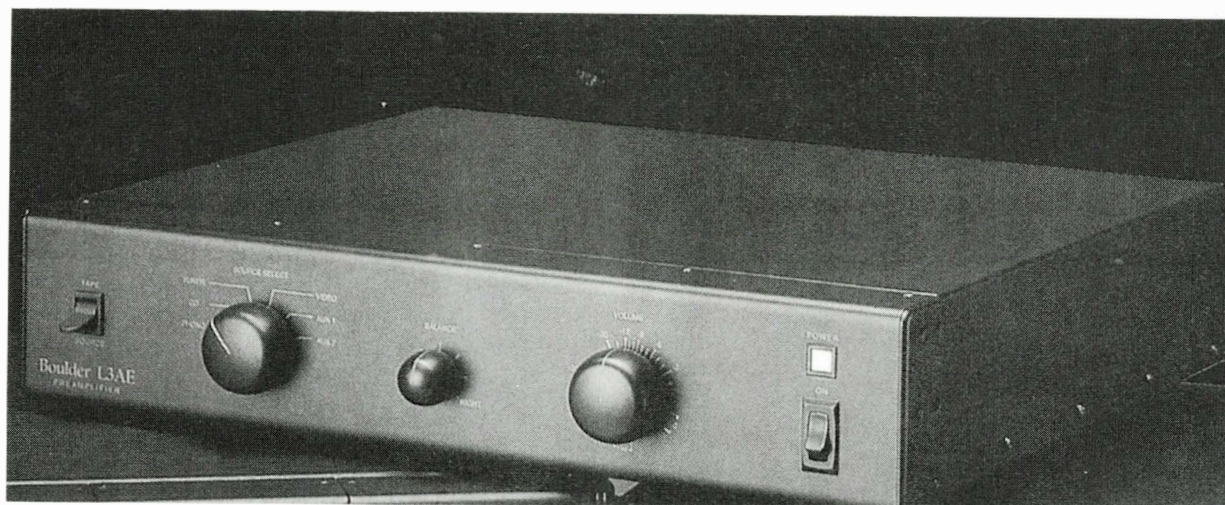
This would have been almost inconceivable and certainly musically ruinous had it been attempted by passive equalisation; the construction of complex multipole filters is one area where DSP is clearly superior to analogue. The bass for example is extended downwards to provide an in-room response curve flat to around 20Hz.

Meridian's propensity for extended bass and very sharp out of band rolloffs has led to a rather tight, dry 'ringing' LF quality with some of their previous designs; here the designer (Bob Stuart) has been able to indulge himself, and provide the extra benefits that accrue from the extra bass extension, without the usual compromises.

Active equalisation is not restricted to the bass. Similar curve flattening is performed in the mid/treble area, which presumably has allowed other aspects of the design to be optimised without needing to worry about response shaping. The crossover points are also handled digitally, and with slopes that would cause severe headaches were they carried out in the analogue domain: -36dB/octave at the 200Hz crossover point for example.

Even this isn't the extent of the *D6000s* DSP capabilities. Digital equalisation is also employed to provide a 'tilt' facility, and a loudness contour which operates in near textbook fashion because SPL levels for given volume control settings are 'known,' the only important variable being room size. In addition, and this is unprecedented in any loudspeaker to the author's knowledge, the listening axis can be varied by controlling the crossover phase responses to account for different listening angles, whilst in-band responses are varied to counteract the usual polar response changes that occur off axis. Related to this, the balance control employs digital delay of the signal to the nearby

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programming a whole series of defaults, extending from which speaker acts as 'master,' the number and nature of source components connected (eg Meridian or non-Meridian) through to the volume setting when the system is turned on. Meridian recommends using the coaxial inputs over the optical alternatives, and this is good advice, at least until Meridian implements AT&T optical connectors, which I understand is on the cards.

During my spell with the 6000, I had access to a Meridian tuner, the 204, and an A/D converter, the 607, which was connected to the output of a conventional Meridian preamp and fed in turn by a record deck, the *Rock Reference*. This sounded absolutely marvellous. No other record deck I tried was able to stand up as well as the *Rock* to the unblinking bass analysis provided by the Meridian. Combined with its other good qualities, records are far from being the poor relation in this system, despite the excellence of the 602 CD transport, and despite having to be converted to digital form before being restored back to analogue.

The 6000 is some cookie. It has its faults for sure, and they're serious enough to take notice of. They may even be serious enough to turn some people off. The faults are tantalising in their way: the rest of the system runs somewhere between amazing and miraculously good on a routine basis, and this makes any residual shortcomings, however small, all the more objectionable. But the things that make the *D6000* good are hard to do without, and in some cases just cannot be matched.

The most important of these is the system's amazingly wide dynamic compass. I routinely test big amplifiers and expensive, capable loudspeakers with power ratings measured in the hundreds of watts, but I can think of no system I have used in the last decade that can match the ability of the *D6000* to play wide ranging music at realistic sound pressure levels, peaking if necessary well into the pain threshold if it was sustained for long. Of course any number of loudspeakers can be made to play loud enough given a suitable electric shock up the backside, but the ability to make useful music whilst doing so is an altogether rarer and more precious commodity. Much rarer than you might suppose in fact.

Although most loudspeakers can be coaxed into playing loud, they almost always change in sound radically as they do so. The bass usually becomes drier and more limited, and dynamics shrink as the

music becomes louder. These paradoxical constraints don't apply here: as the *D6000* goes louder, the sound retains its original generosity and openness, and astonishingly the headroom available above even the loudest sounds seems to be practically limitless.

Signs of compression, especially in the bass, with normal speakers, are often not heard for what they are, but still mark the sound as artificial. The *D6000* on the other hand simply swells to accommodate the music in a manner devoid of strain or compression, with the result that it has a peculiar rightness about it at almost any level.

Captain Morgan

It was Bob Stuart of Meridian who suggested an organ transcription of Mussorgsky's 'Pictures...' which has the

I can think of no system I have used in the last decade that can match the ability of the D6000 to play wide ranging music at realistic sound pressure levels.

most astonishing LF extension as a means of showing what the system could do. I rounded up a copy forthwith and proceeded to use it to make the listening room's window frames rattle, though they couldn't be moved by hand, which was good fun.

The bass output truly goes down to the point where it is almost possible to feel each wavecrest separately, but more astonishing still is the utter lack of 'ringing' of the kind that eliminates or changes pitch relationships, and the complete lack of overhang. The Meridian bass has a truly vice like quality: it starts and stops quickly, and is both uncoloured and open.

The Meridian's bass, which in my opinion sets new standards for domestic reproduction, is not a blunt instrument, but a subtle one wielded with utter precision. Radio speech, which often sounds chesty via hi-fi systems, was perfectly controlled with no hint of this problem, though low frequency noises from the studio that usually escape attention could be heard from time to time.

The rest of the system turned out to be utterly consistent with what I've said

about the bass. Again there is that wide open, airy quality, the utter control, the enormous dynamic range and the absence of most forms of coloration. Stereo soundstaging benefitted immeasurably from the consistency and clarity of the design, and the result was the ability to support a massive soundstage with a great sense of physical presence, even when listened to from a considerable distance.

The down side

The shortcomings I alluded to earlier are confined to the upper midband (more correctly perhaps upper harmonics that affect the perception of the midband) and the treble itself, and take the form of a degree of intrusiveness or obviousness that at times inhibited the system from sounding completely transparent.

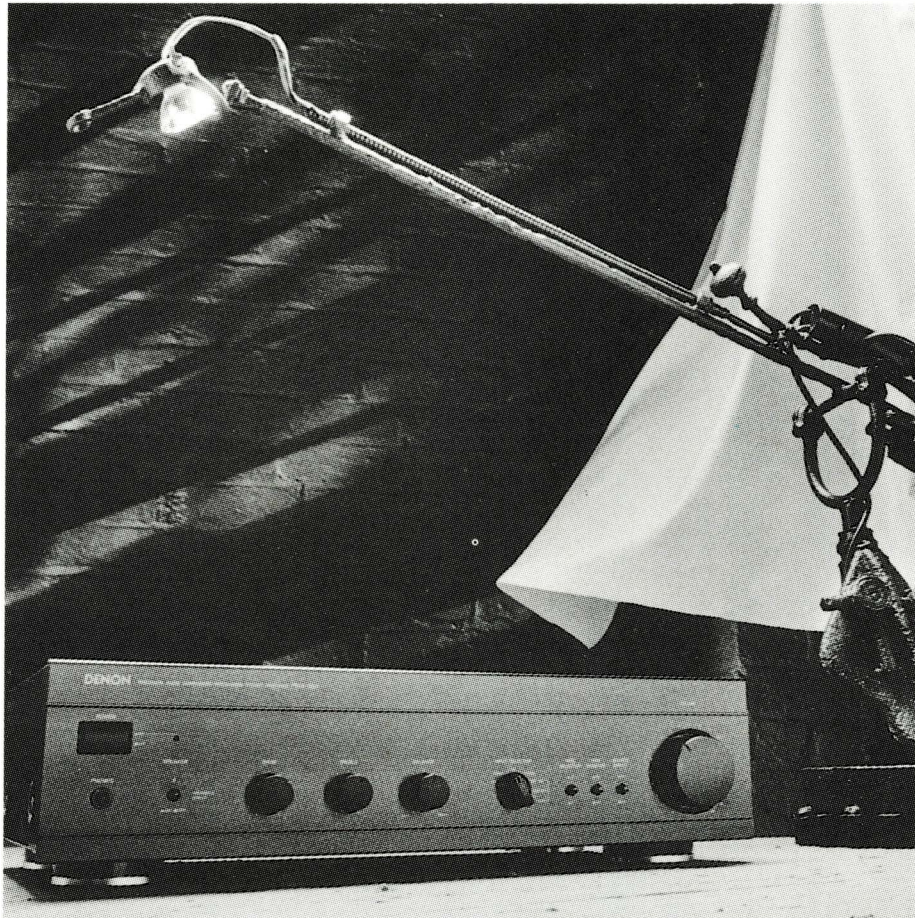
Rather breathy sounding vocals, an occasionally astringent string tone and a closeness with some material almost as though the performer is leaning over you whilst performing were the main shortcomings. These were occasionally severe enough to cause the suspension of belief, though it's worth restating that few speakers are good enough for such retrenchment to be even a possibility.

Generally the effect was to sharpen up transients and increase the forcefulness of the sound, leaving some Sixties EMLs sounding like Deccas from the same period, and some of the latter sounding like late Eighties DGs: slightly confused and stringy in tone.

There is some suggestion from conversations I have had with Meridian since the *D6000*s were sent back that the pair I had may not have been typical in their treble behaviour. Meridian is not claiming that they're faulty though, and this is one area that clearly needs working on as the product develops. If and when a new filter algorithm or a revised tweeter is eventually called for, existing owners will of course be able to have their *D6000*s upgraded.

None of this detracts from the main gist of my argument which is that the *D6000* sets standards in certain important areas, and that the shortcomings, such as they are, are minor. The DSP development work carried out by Meridian is soundly based and coupled to fine audio engineering in other areas to produce a remarkable system that for once benefits from innovation, and which therefore acts as a pointer to the future.

The PMA 350 A Giant Killer



The PMA 350 is the result of a collaboration between the Denon Skirakawa factory, Denon's UK staff and a noted UK amplifier designer.

The object of the exercise was the production of an amplifier that by sound quality alone would establish Denon as the premier amplifier supplier in the under £200 market. As with the highly successful Denon PMA 250/II, the PMA 350 is an exclusive model for the UK and has circuit features and componentry not seen in other markets.

BRIEF CIRCUIT DETAILS

50 watts per channel RMS into 8 ohms (over 80 wpc into 4 ohms) • The internal circuit path is straight line • Expensive 'cerafine' audiophile

capacitors have been used at critical points throughout • An oversize power transformer is fitted for high power output and substantial power reserves • The tone control circuit is completely passive to eliminate sound degradation

WHAT THE PRESS SAY

"The Denon PMA 350 is the finest £160 amplifier I've ever had the pleasure to audition"

HIGH FIDELITY, JANUARY '91

"...much as I hate to use the term, I think it's rightly called a bargain."

HI-FI WORLD, MARCH '91

"The PMA 350 is a fine amplifier, a solid performer that will suit a wide range of budget ancillaries...Recommended."

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Readers Write

CHOICE ANSWERS

Dazed and puzzled

I am puzzled about *The Directory* ratings and in particular the rating for SOUND of the Naim NAT 01 (£1294) tuner, relative to the SOUND rating awarded to the £150 Akai AT-52L tuner - i.e. both got the same rating of Very Good in spite of your comments about the Naim "There may be better sounding tuners in the world but we have yet to hear one."

If I was puzzled then, I am not quite sure what I am now since I have just read a Supertest report on ten tuners in another hi-fi magazine and the same Akai AT-52L was rated joint bottom for sound quality.

You both can't be right. No wonder we readers are advised to listen for ourselves, but I think you would agree it is not always as simple as that, and trying to find a shop that stocked the two tuners mentioned above in order to make a comparison could be difficult. T.W. Grimsby, South Humberside.

Keeping the ratings in The Directory up to date and consistent is something of a nightmare. Not only do values change over time but different reviewers have different ideas about what is Very Good or Good, and some reviewers get caught by the limitations imposed on them by previous entries. Which is basically what has happened here. Paul Messenger's entry for the NAT 01 is probably a little conservative and Richard Black's more up to date entry for the Akai is a reflection of how he thinks it sounds in the context of the majority of tuners on the market.



We will correct this by giving the Naim an honorary Excellent rating, but at the end of the day these assessments are far too simplistic and they shouldn't be given any more weight than the comment. Base your judgement on the whole review, which gives a more complete picture.

Leak replacement

My much loved, twenty year old Leak Stereo 70 amplifier has finally turned up its toes. I wonder if you could recommend a replacement, with a similar sound?

I am getting all sorts of conflicting advice from dealers, though Rotel, Arcam and Creek seem to be the frontrunners and I have looked at, but not listened to, the Rotel RA870BX. I would

like tone controls, because I am used to them and because some of my cassette recordings are a bit suspect.

I am also looking for a CD player and have been recommended the Rotel 855. My budget for the two is around £550.

My other equipment is similarly classic/old and consists of KEF Concerto speakers, a Trio KX 600 cassette deck and a JVC turntable with Ortofon cartridge. However, I rarely play records.

Stephen Cooper, London SE10.

I'm afraid that recommending an amplifier with a similar sound to your Leak won't be possible as it was never reviewed by Choice. The best we can do is recom-

Two 'Very Good' sounding tuners of dramatically different price, that were assessed by reviewers with dramatically different tastes!

mend an amp and CD player combination that sounds good and fits your budget. The amps you mention are all very competent, but recent competition from the Far East has upset the game somewhat. I am talking of course of the Pioneer A400 and to a lesser extent the Marantz PM40SE. Both cost £230 and both, but especially the former, give much of the homegrown competition a hard time when it comes to CD replay. You could do a lot worse than give one of them an audition.

When it comes to budget CD players, the market is possibly even more competitive. We found three new Best Buy players in the last round-up (issue 95), none of them costing over £200. The most highly acclaimed was Aiwa's XC-700, but NAD's 5425 also did well with its unusually open sound.

Read The Directory entries for the aforementioned components and scan through for others that suit your pocket and taste, then go and listen for yourself.

Proper hi-fi

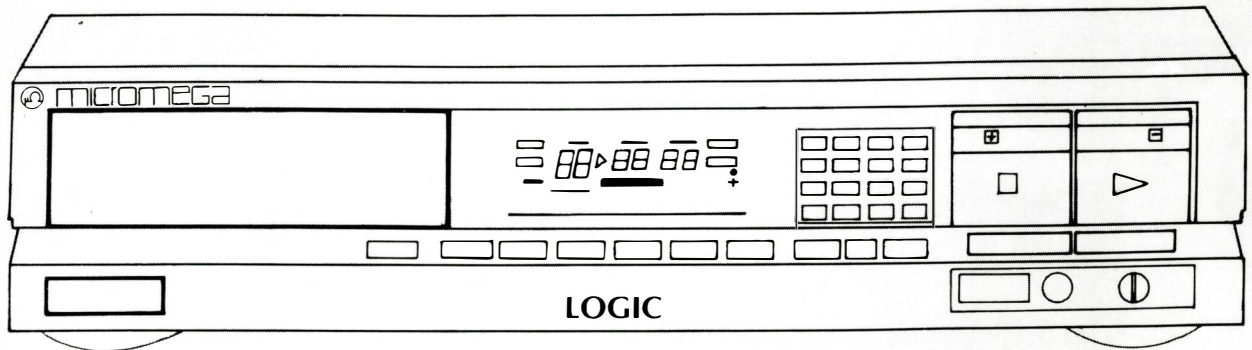
Having recently upgraded from a cheap midi system I currently own an excellent Denon DRM-600 cassette



A bit of a wolf in plastic clothing, NAD's 5425 CD player with its diminutive remote control.



MICROMEGA



MICROMEGA AND MUSICALITY

You only have to look at a Micromega CD Player to see that it is very different from the mass of more 'normal' machines on the market. You only have to use one to see that the differences are more than skin deep. In fact, everything about the Micromega range is the result of a fundamental reappraisal of the ideal conditions for CD replay.

It's all very well us talking of power supplies and data integrity, but as a customer you want to know how these things affect what you hear.

CD has had specific musical failings. In general these can be summed up as a lack of the following: deep bass weight, upper range tonal accuracy, dynamic coherence and many aspects of stereo performance. It has also been accused of having an antiseptic or clinical sound. The upshot of all this is that many CD players sound gutless with screeching highs. The sound can sound harsh and 'glarey' when the music gets complex or loud, and the soundstage is wide yet mostly flat.

Many 'audiophile' players try to compensate for this by adding pleasant second order harmonic distortion to 'sweeten' the sound, and a midrange suckout to give an impression of depth. Thus they try to hide the problems rather than solve them.

Micromega players retrieve much more information than other CD machines. This is because of the way they are built. The result is a more complete sound. High frequencies and harmonics are sweet and airy, the music swells with a true sense of body, and it does not get hard as it gets loud. The soundstage is open, with width, depth and height, and properly proportioned images which do not wander. Even more importantly, music is preserved with a natural sense of ebb and flow, which allows you to hear how an instrument is being played, and gives melodic lines a clear and well defined shape. And that all adds up to increased musicality.

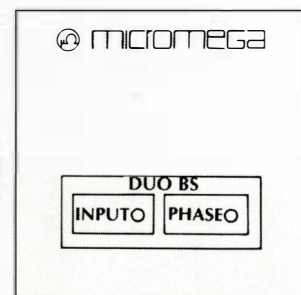
These effects benefit any type of music, yet they are more easily recognised on well recorded acoustic performances. In our experience, recordings on the Chesky, Reference Recordings and Harmonia Munddi labels are particularly revealing. Once you have heard the difference, you will hear it with every type of music.

How often have you heard natural sound and natural perspectives from a CD? How often have you tapped your feet or been swept along by the emotive swell of an orchestral crescendo? With a Micromega player this is normal.

THE LOGIC

'The purpose of any piece of audio equipment is musical performance. The purpose of the new bitstream Micromega Logic is to bring unparalleled levels of musical performance to the most competitive of fields; affordable compact disc players. Tucked inside this attractive package, brim with useful facilities, is a player of superb constructional and component quality standards. At £499 the Logic resolves more detail, more space, more control and more musical understanding than its competitors. Ambience and scale is reproduced with an eye to the truth not the understated, not the overblown. Music has colour, texture and emotion. This is what transforms mere listening to a true experience. Experience the Logic.'

DUO BS II



'Micromega's separate bitstream digital-to-analogue converter, the Duo BS, has been extremely well received by press and consumers alike. Now in its Series II guise, the Duo BS II hits new heights of performance at a remarkably affordable price (£499). Working from either a co-axial or optical output the Duo BS II will simply transform your existing player's performance.

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deck and a Kenwood KA-660D amp bi-wired with QED 79 strand to Tannoy M15s. As a newcomer to 'proper' hi-fi I am still getting over the difference! I would now like to purchase both a CD player and a turntable, at a budget of (up to) £300 for each.

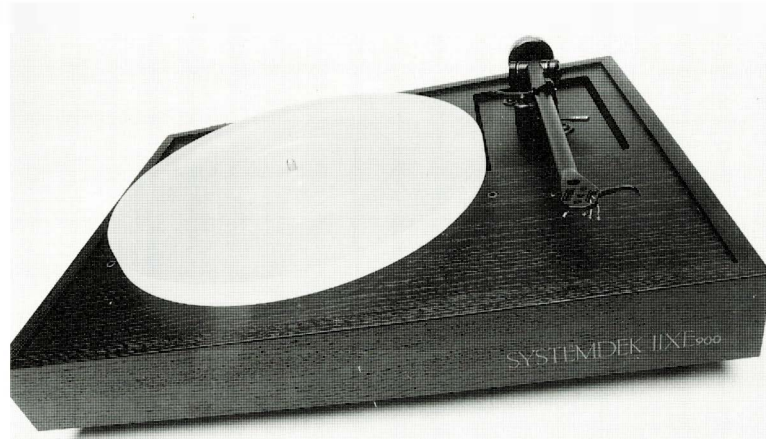
I have recently had the chance to listen to both the Rega Planar 2 and Planar 3 and was impressed by the sound from both. I am also interested in the Systemdek IIX/900. I have virtually no experience of CD players. My listening room is 10ft by 20ft and the system is currently at one end. My taste in music is fairly contemporary, and includes bands such as The Doors, REM and most indie music, along with the odd classical piece. What can you recommend?

I would also like to know how much difference decent speaker stands would make to my system, and whether it would be possible to construct my own? Do they only need to be heavy and rigid? Matthew Trinder.

It looks like you are on pretty solid ground with your shortlist for turntables, but a few things worth remembering are that the Rega's require better isolation than suspended decks like the Systemdek. The IIX/900 and its electronic brother are among our favourite budget decks; they work very well with both the Rega arms and Goldring cartridges; make sure you hear one.

As for CD players, as we have mentioned elsewhere in Readers Write this month the £200 mark is becoming the battleground for great sounding budget players. The survivors at the moment are NAD's 5425, Aiwa's XC-700 and Sansui's CD-X211, though the latter is apparently in short supply because of a fire at Mission (the distributor) last spring.

When it comes to building your own speaker stands, rigidity seems to be a primary factor but mass is an area of some debate. Heavier stands tend to have a damping effect and work well with a lot of speakers; however, there's another school of taste that



The Systemdek IIXE/900 in its latest acrylic platter'd and metal armboarded guise; a big hit in Lapland!

Far East. Fortunately, at that time the company had produced its own three-motor design which found considerable success among professional users. This in-house capability meant they were also able to concentrate on more specialised

prefers the effect of lightweight frame stands. Basically, if you think your system needs an injection of 'life' go light, but if you want a bit of control build yourself some backbreakers.

And finally, on the subject of indie records, if you haven't got it already go out and buy Dinosaur Jr's Green Mind; it's a killer.

Alive and interviewing

On page 9 of issue 94 you raised the question of NEAL in relation to domestic cassette tape recorders.

The fact that you have not recently seen the name NEAL on a tape recorder bears testament to your recent bout of clean living, for every interview room in police stations throughout the UK boasts a NEAL Interview Recording System. These are sophisticated recorders which provide two identical tapes of an interview with speech on one track and GMT or elapsed time on the other.

In the Halcyon days of the mid-seventies, NEAL became increasingly aware of the fierce competition within the hi-fi market place from the

recording equipment of which the Interview Recorder is an example.

However, back to the point: there must still be many NEAL recorders in service, as every day of every week the company supplies spares to some part of the United Kingdom, the States or Europe.

It is not impossible, with the various development projects in progress, that the name NEAL may be seen again in the hi-fi world. Michael Cooper on behalf of Lee James Electronics, Tyne & Wear.

Roksan Interconnect Winner

Fine tuning

I have been busy digesting some of the contents of issue 90. I wish to address the thorny problem of ancillary equipment for my present music system which comprises the following: Pink Triangle (upgraded to TOO specs by PT)/Helius Orion/Koetsu Black K record player, Magnum MP150 / MF150 pre power amplifier combination and Gale 402 loudspeakers.

The equipment is connected with Absolute Wire Force 4 speaker cable, Chord interconnect cable, and homemade supports.

With approximately £200 at my disposal, which of these items do you think is

the most cost effective enhancement to my system:

Deltec Slink interconnect cable, QED TS22 Tristand speaker supports for the Gales (maybe the Target HJ15/3 are worth considering), two Target shelves to support the turntable and preamp, Deltec 85 speaker cable or the Pink Triangle Pacesetter power supply?

P. Kabrna, Barnoldswick, Lancs.

Tweaking a system from afar is never particularly easy, as hands on experimentation is always the most satisfactory method.

However, the areas that look like they could do with some attention are interconnects, and depending on the design of the ones you use, stands and

supports. The Deltec Slink should definitely improve on the Chord cable that you are using but better turntable support such as that offered by a good wall bracket may be a more effective use of funds. The latter, and substantial speaker stands for that matter, would improve most aspects of performance but particularly focus, detail retrieval and bass articulation.

Improving cables will give greater clarity and thus resolution of detail, but getting supports right is probably the place to start. We haven't fully appraised the Pacesetter but it's probably a worthwhile upgrade, but attend to the other issues first. In fact, why not make a start with some Roksan Interconnect?

Win over £2,500 worth of NAD equipment

Another month means another fabulous free-to-enter competition in Hi-Fi Choice. This month we're giving away two complete NAD systems including turntable, CD player, cassette deck, tuner, amp and speakers. Plus two CD players for the runners up.



How To Enter

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

The Prizes

The first correct entry drawn from our mailbag after the closing date will win a NAD 5440 CD player (£300), 5120 turntable (£90), 6340 cassette deck (£220), 4225 tuner (£160), 3240 amplifier (£200) and 8100 loudspeakers (£300). The second correct entry will win a NAD 5425 CD player (£200), 5120 turntable (£90), 6325 cassette deck (£170), 4225 tuner (£160), 3020i amplifier (£150) and 8225 loudspeakers (£150). The third correct entry will win a 5440 CD player (£300) and the fourth a 5425 CD player (£200).



The Questions

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

1. Which American company does Steve Macormack design for?
2. One of the CD players that's up for grabs in this competition has been awarded a *Hi-Fi Choice* Best Buy, which one?
3. Shindo Labs has named its top power amplifier after a classic triode valve, what is it called?
4. Which company makes Music Link amplifiers?
5. Name one manufacturer of underwater loudspeakers?
6. Whose latest album is called *Green Mind*?

Entry Form

NAME:

ADDRESS:

POSTCODE: TEL:

HFC/AUGUST/91

Closing date: Monday, 2nd September, 1991

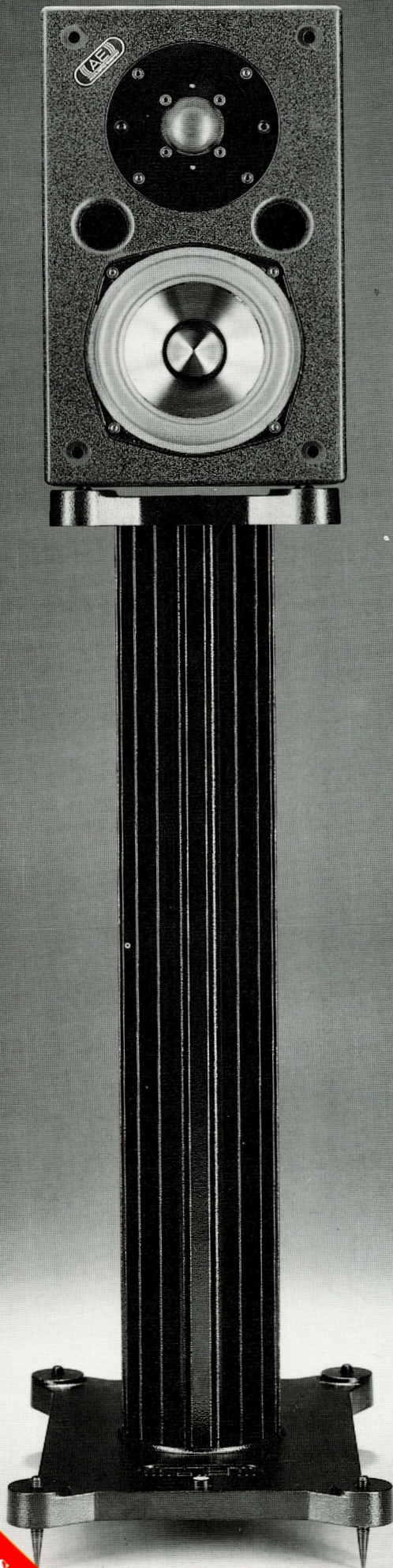
Your answers:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....

COMPETITION RULES

- 1) All entries must be on the entry forms provided. Photocopies will not be accepted. Incomplete forms will not be considered.
- 2) There is no cash or other alternative to the prizes.
- 3) Employees of Dennis Publishing Ltd and associated companies, the manufacturers and suppliers of the prizes, their agents and relatives, are not eligible to enter the competition.
- 4) The competition is not open to readers living outside the United Kingdom.
- 5) The prizes will be awarded to the first sets of correct answers opened after the closing date. No correspondence whatsoever will be entered into regarding the competition. The Editor's decision is final and binding.
- 6) The winners will be notified by post and the results will be published in *Hi-Fi Choice*.
- 7) Please notify us if you do not wish to be informed of special offers and promotions.

Send your completed forms to:
**NAD Competition, Hi-Fi Choice,
 Dennis Publishing Ltd, 14 Rathbone
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21st Century Fox

If there are any developments in the world of audio technology, Barry Fox is the man in the know. This month he discusses DCC, Nicam Stereo and Surround Sound systems.

As predicted last month, Matsushita did commit to DCC and Sony did announce a 2.5inch Mini Disc recording system. To cut a very long story short, the grapevine first got news of DCC in the early Spring 1990. I was given a series of briefings by Philips later in the year, culminating in full system detail embargoed until the start of CES in Las Vegas last January. Philips claimed Matsushita as co-developer. As far back as August both Matsushita and Sony had been on the point of backing DCC. Philips saw a public commitment to DCC by Matsushita as opening the floodgates.

I went to Vegas, but at the last minute, and under political pressure, Matsushita went completely quiet. Philips could only talk about support from a 'large Japanese company'.

Afterwards one of Technics' US managers opened his mouth and admitted support. He was promptly sat on by Japan. At the Philips AGM in Eindhoven I asked Jan Timmer whether he would now confirm publicly the name Matsushita. He wouldn't.

Everyone has been waiting for Matsushita's Japanese execs to commit publicly to DCC. We were tipped that this would happen at the Technics seminar in Nice. The seminar coincided with Sony's MD announcements in NY and Tokyo. In France senior Japanese execs finally said it, with Teiichi Owaki, Engineering Coordinator for the Audio Division saying "We have been working on DCC for two years now and are now into product development".

Ted Abe, the Planning Manager for Advanced Technology in Technics Audio Division, demonstrated an unlabelled DCC deck which he stressed was 'jointly made' with Philips.

It seems therefore, that there have been two years of secret work with Philips, during which time Technics has designed a full set of key components. There are finished chips for DCC players and thin film recording heads. Both Panasonic and Technics clearly see DCC as a low cost mass market product, with both portables and table-top models at low entry prices. Technics showed first generation chips, but is believed to be already on to the third generation.

It is possible, but unlikely that Matsushita will also back Sony's Mini Disc. Everything points to a Philips/Technics/Panasonic push on DCC in Spring 1992.

The manufacturers describe Nicam stereo as a product which "succeeded despite the broadcasters". The BBC developed the system. Then the British Government trade body BREMA and the European Broadcasting Union blessed it. So Texas Instruments, Philips and Toshiba developed decoder chips. JVC, working behind the scenes with the BBC, pushed through the first VCR with built-in decoder.

Then the then-new BBC boss Michael Checkland decided there was no money to provide a service. The IBA saw the opportunity to cash in, and started converting the Channel 4 and ITV networks to Nicam stereo. But the IBA made a terrible hash of the

launch, letting Nicam dribble onto the market with virtually no publicity whatsoever. At one conference Michael Grade, head of Channel 4, made history by replying to a question about Nicam with the classic answer, 'What is Nicam?'.
The IBA, by then on borrowed time before becoming the Independent Television Commission and Radio Authority, never staged a demonstration of Nicam for the national press. For at least a year after the Nicam service began, there were media journalists in the national press who had never even heard stereo.

It was the debacle over Nicam which deterred manufacturers from putting too much money and effort into developing RDS radios and video recorders that program themselves by teletext. Once bitten, twice shy.

But now, at long last, the BBC has internally set a date for the launch of its Nicam service, across most of the UK. The date is August 31st and by that time there will be around 1.25 million Nicam TV sets and VCRs installed in British homes. The BBC is already putting out an average of half a dozen stereo programmes every day in the London area. The service launch will go with a 'big bang' of publicity.

There has long been a secret list of these progs, prepared by BBC engineers and circulated inside the BBC, and round the manufacturers and Nicam-friendly

press. Those who got to see the list kept quiet about it, for fear of upsetting the BBC managers. But now the official launch date of August 31st has been fixed, it's safe to spill the beans.

The history of surround sound is pretty tacky. Around fifteen years ago there were four incompatible systems, SQ, QS, CD4 and UD4. They all died, partly because there were four incompatible systems and partly because not a single one of them worked really well. The two matrix systems, SQ and QS, were re-born, with modifications, as Dolby Cinema and Video Surround Sound. The only decent system, Ambisonics, suffered from two handicaps.

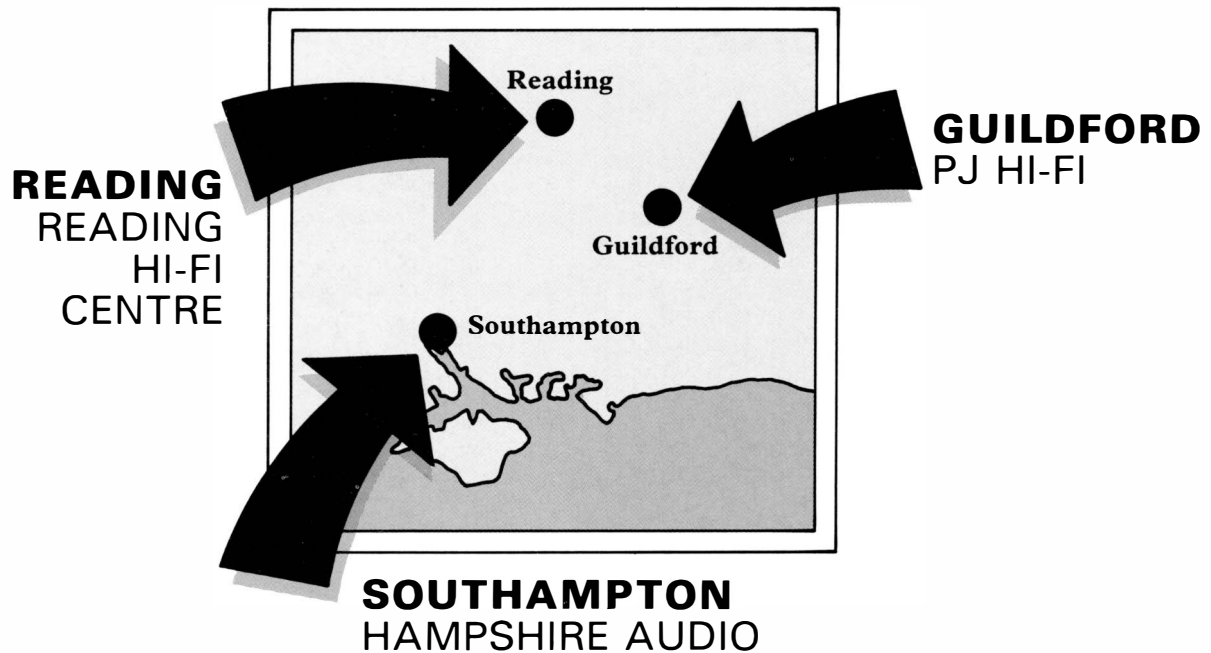
Ambisonics came along just as the other systems had given surround sound a truly bad name. And Ambisonics was handled by the National Research Development Corporation, now the British Technology Group, which employed some awful dead heads who knew nothing about hi fi. As a direct result of NRDC/BTG fumbling, Ambisonics missed the Heaven-sent opportunity of riding into the market on the back of Dolby Surround. There could so easily have been a decoder with both Dolby and Ambisonics switch settings.

Last year Nimbus, always a supporter of Ambisonics, bought the system out from BTG. Since then they have been pushing it to Japanese manufacturers and at last there is sign of exactly the breakthrough which BTG missed out on. In Japan, Mitsubishi is now building an Ambisonic-cum-Dolby decoder into its new audio/video amplifiers and projection TV sets. Nimbus feels confident that other Japanese manufacturers will follow.



JVC was first with Nicam decoder equipped VCR.

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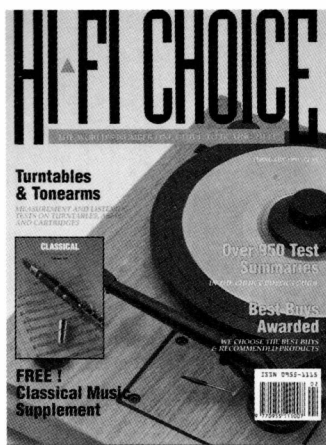
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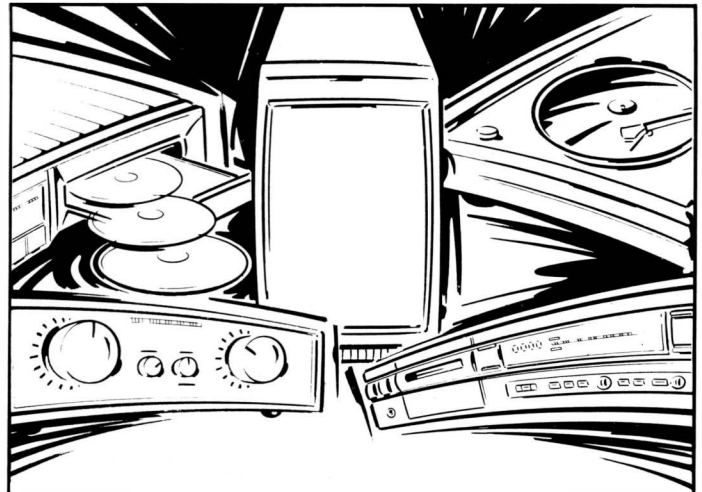
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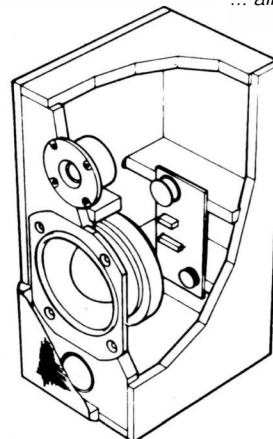
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Choosing and Using . . . Amplifiers

Paul Miller explains the options and gives some hints on what to look for.

Cliché or not, the amplifier is the heart of the hi-fi system. Its purpose is to accept the different signals from the various sources, conform and order them as necessary, and then provide the power to drive and control the loudspeakers. In what is known as an integrated amplifier, the first part of this task is carried out in the preamplifier section, while the power amplifier part deals with the loudspeakers, but the whole is contained within a single box. In more costly systems these two sections are often separate units, and power supplies may also be separately cased. The tasks are quite distinct, so integration is only a matter of cost, convenience and size.

25 years ago amplifiers were mostly low powered, using class A circuitry with valves and output transformers. Then the transistor took over rapidly, offering higher specification power, lower cost, and improved longevity. So far, so good, but the valve amplifier - like the moving coil cartridge - never quite died. And after a couple of false starts it is currently enjoying its strongest revival yet, albeit at prices which will make many readers blanch.

The other historical trend concerns the complexity of the preamplifier section. When hi-fi had to make the best of barely adequate source quality, a complicated and flexible preamplifier section was a useful means of making the best of a bad job. During the Japanese invasion of the Seventies, rival manufacturers vied with each other to invent and incorporate more and more extensive features: tone controls became graphic equalisers, and the often baffled user could fantasise that he was on the bridge of the Starship Enterprise. However, improvements in source quality have since started a 'simple is better' backlash. Fifteen years

ago a fledgling Naim Audio abandoned tone controls on the grounds that they degraded sound quality. This was a major heresy at the time, but the trend is now firmly established, and even some of the Japanese manufacturers have followed suit.

Two markets

There are now two distinct types of hi-fi amplifier. The so-called 'bells and whistles' models still exist, though they now tend to be down-market rather than upmarket products.

The real hi-fi amplifier has seen a movement towards improvements in sound quality, much of which has been due to simplifying the circuitry by eliminating as many frills as possible, and even in some cases omitting a complete gain stage through the use of the latest transistors. The ear has proved a more subtle tool than any spectrum analyser in adjusting circuit topography, simplifying earth patterns, beefing up power supplies, and selecting key passive components, all in the interests of improving sound quality.

As hi-fi amplifiers become increasingly minimalist, the preamp now only retains two key functions: the sorting out of the signals from the vinyl disc source, and the switching of the various inputs and outputs.

Tuners, cassette decks and CD players all put out more or less the same sort of signal, which is already equalised to 'flat'. Vinyl disc apart, the preamp then becomes little more than a glorified switch with volume and balance controls. Which explains why inherently more simple devices - using purely passive components - are now becoming available.

Vinyl disc replay is quite a different kettle of fish. The preamp is connected directly to the transducer itself, with no intervening electronics,

and this introduces all sorts of difficulties. Furthermore, the signal from the cartridge is very small and requires two distinct stages of equalisation to get a 'flat' end result. To add insult to injury, there are now two popular kinds of cartridge, the high output moving magnet and low output moving coil (plus a few odd permutations), and they are different enough to need quite separate treatment. There's not even a standard for the source or input impedance of low output cartridges.

For the future, it is quite possible we will see wider use of turntables with built-in cartridge preamps, so that each source feeds a 'flat' signal at line level to a simple switching and attenuating preamp. But now that the first digital signal source (CD) is fully accepted, with others planned for the future, we are beginning to see a new type of preamp which accepts digital signals directly, carrying out various functions by means of an onboard microcomputer before finally converting the signal back to analogue and feeding it to the power amplifier.

This is the part of the amplifier whose job it is to drive the loudspeakers - and a right old job that can turn out to be. Like the cartridge, a loudspeaker is a transducer, and its task is to turn the electrical model of the music signal back into a mechanical (acoustical) signal for the benefit of the ears.

The loudspeaker is a form of motor, but its task of covering the whole range of audio frequencies is mechanically almost intolerable, and there is an inevitable lack of control at various resonance points. While the amplifier provides the loudspeaker with a voltage which corresponds to the amplified music signal, it is the characteristics of the loudspeaker itself which determine the current

demand. This can be very unpredictable, particularly at resonance points, which is why serious hi-fi amplifiers are usually designed with plenty of surplus current capacity, and an eye on the stability of the voltage signal whatever the current demand.

The main measurements on amplifiers relate to power output and distortion, but more important than the maximum power output itself is the way the power is maintained into different loads, and this is analysed in the reviews.

The various distortion measurements also help explore the limits of the amplifier, but paradoxically, striving for very low distortion seems to prejudice sound quality.

Choosing

There are a number of criteria one could use when selecting an amplifier, but the most valid is probably sound quality. Despite the attention it attracts, power output comes much further down the list, because measured power is by no means a reliable indicator of subjective loudness capability.

The range of facilities required should naturally be taken into account, with particular attention being paid to the type of cartridge that is to be used. But it should also be borne in mind that every unused feature contributes nothing and will probably have a negative effect upon the potential sound quality.

The reviews provide an excellent guide to shortlisting some of the better sounding amplifier bargains around. But as ever they cannot replace an individual's own tastes, preferably in the correct system and ideally in an 'own room' context. Once again, the conscientious specialist dealer provides a vital link.

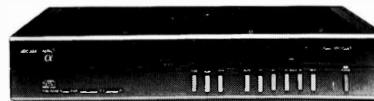
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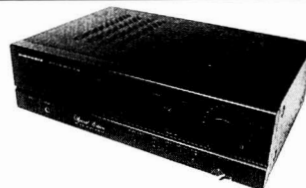
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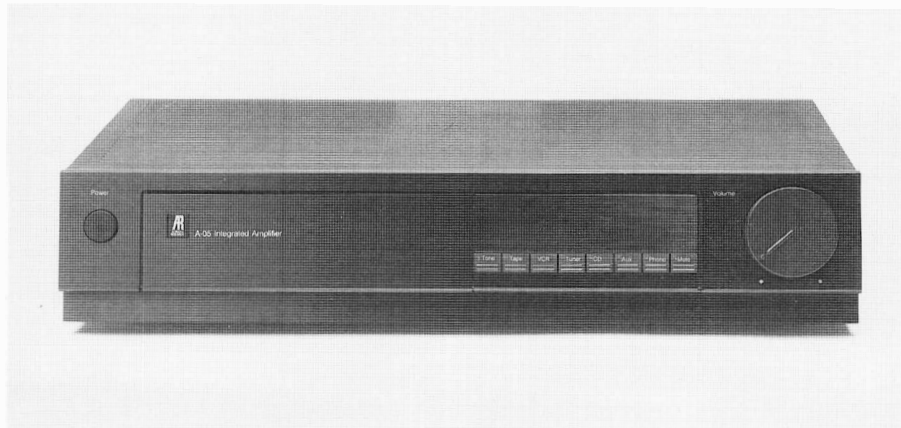
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Acoustic Research A-05

Recommended

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Previous AR amplifiers have had a rather rough ride in recent *Choice* reviews, but the mid-market A-05 looks like being third time lucky. And with good reason too, for the A-05 draws on both the partnering A-03 and A-07 for inspiration while managing to avoid many of their pitfalls.

For instance, it shares the same Sanyo power amp circuit as AR's A-07 and offers but a whisker less output to boot, while avoiding the latter's convoluted speaker-switching facility; yet at the same time it suffers far lower distortion than the cheaper A-03.

None of this is evident from the outside, of course, where the slanted alloy fascia, logic-controlled input selection and rotary volume knob allow the A-05 to blend seamlessly with all other AR separates. As usual you'll find bass, treble and balance controls hidden away behind a flap, while the MC cartridge step-up amplifier is selected via a small switch on the rear of the case.

Both MC and MM vinyl disc inputs use series-feedback RIAA equalisation around a standard NE5532 op-amp. AR has also used decent Signetics op-amps in the line stage though an equivalent JRC IC has to suffice for the tape monitor loop. Elsewhere there are no fancy components or crafty circuit techniques to talk of: the A-05 is unadventurous but solid stuff.

Lab Report

The 67W rating obtained here is only fractionally below the 75W recorded for the £300 '07 model, while at the same time this less expensive amplifier has the advantage of a lower 0.04ohm output impedance and healthy 16.3A peak current capability. Furthermore this A-05 seems to be operating at a richer bias than either A-03 or A-07, and distortion (at 1W) is certainly lower at 0.0025 per cent instead of 0.023 and 0.0061 per cent respectively. The 3D plot simply shows traces of second

order IM distortion while the clean RF IMD spectrum pays tribute to the effective input filtering.

Both MM and MC disc inputs have plenty of headroom (+30.5dB and +28.4dB respectively), and LF responses are unusually extended (-3dB at 1.4Hz and 5Hz respectively). Noise and input sensitivities are all fine too, though the rec-out option is hampered by a high 3.4kohms output impedance.

Sound Quality

Instead of the thin and hazy balance of its stablemates, the A-05 came across as a slightly dry but confident and well-controlled amplifier, especially via the MM vinyl disc input. With CD in play it was mercifully free of sibilance and edginess all panellists agreeing that the sound of the panflute was both smooth and richly detailed. However, strings and percussion did not live and breathe with quite the right vitality and crispness.

There was an occasional fowardness to its presentation, affecting its imagery rather than the tonal balance of certain instruments (harpichord, for example). It was less impressive on our jazz LP where individual instruments became slightly muddled, and there seemed a rigidity in its soundstaging that may explain why it was more successful with some types of music than others.

As if to reinforce this point, we were treated to a marvellously integrated, powerful and involving rendition of Rachmaninov's *Symphonic Dances*. In this instance it certainly makes sense to audition the amplifier with the music of your choice!

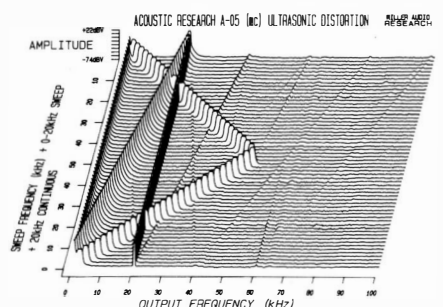
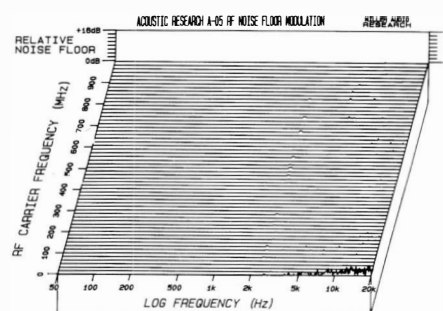
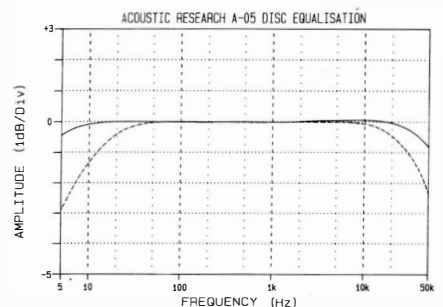
Conclusion

The fine technical performance, sound and build quality of the A-05 thoroughly justifies its £200 price tag, whilst also somewhat undermining the more costly

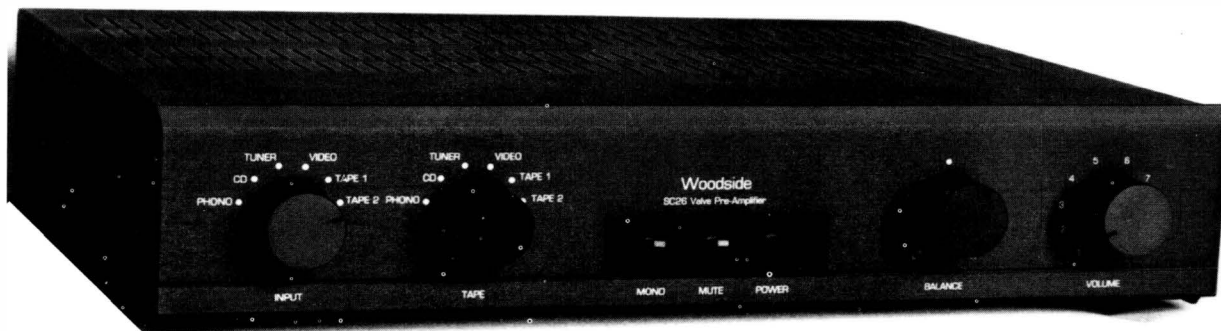
A-07. All in all, this amplifier was greeted with considerably more enthusiasm than previous models from AR and deserves hearty Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	57.5W	66.9W	61.8W
4ohms	87.5W	96.1W	94.1W
Dynamic Headroom (IHF)	+1.0dB	(84.3W)	
Peak Current (5msec, 1% THD)		16.3A	
Output Impedance	0.043ohms		
Damping Factor	186.3		
Stereo Separation (1kHz)	71.4dB	69.8dB	67.8dB
(20kHz)	46.9dB	46.7dB	46.5dB
Channel Balance			
(1kHz, -20dBV)	0.27dB	0.28dB	0.29dB
(-60dBV)	1.19dB	1.10dB	1.08dB
Total Harmonic Dist.			
(0dBW)	-92.2dB	-88.4dB	-86.6dB
(Two-thirds power)	-91.6dB	-88.1dB	-86.0dB
CCIR Intermod. Dist.			
(0dBW)	-97.0dB	-89.9dB	-87.9dB
(Two-thirds power)	-96.2dB	-87.6dB	-85.5dB
Noise (A-wtd, 0dBW)	-85.1dB	-83.7dB	-71.2dB
(Two-thirds power)	-98.7dB	-87.4dB	-71.5dB
Residual noise (unwtd)	-71.6dBV	-71.6dBV	-71.6dBV
Input Sensitivity			
(for 0dBW)	29.7mV	457uV	35.4uV
(for full output)	232mV	3.52mV	267uV
Disc Overload (1kHz)		168.0mV	13.1mV
(20kHz)		529mV	123.8mV
(50kHz)		2166mV	190.5mV
Tape Output/Impedance	10.25V (disc) / 3.37kohms		
Input loading	22kohms/450pF	31kohms/330pF	100ohms
DC offset, left/right		-5.5mV/-6.0mV	
Retail Price			£200



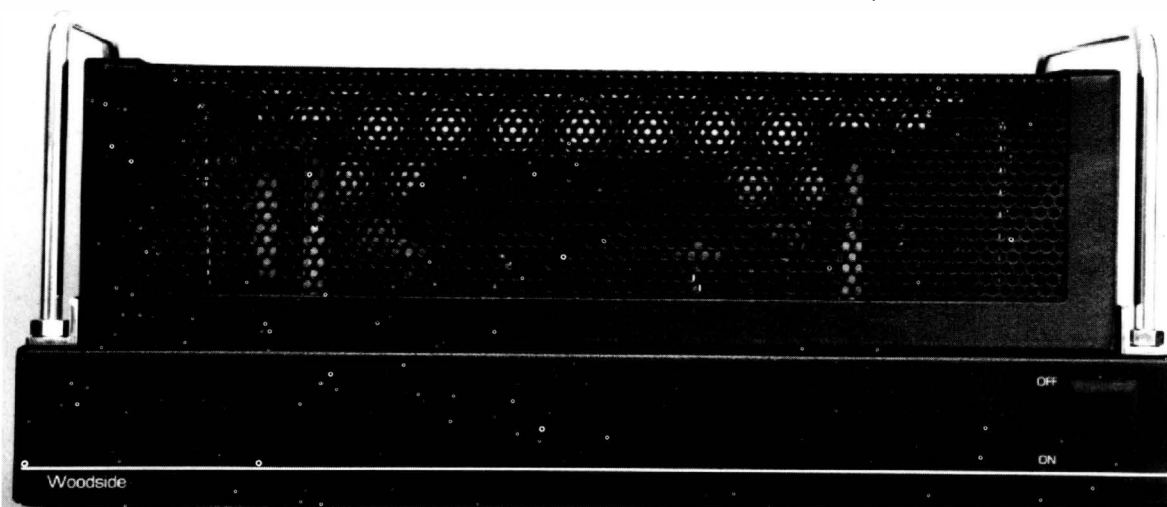
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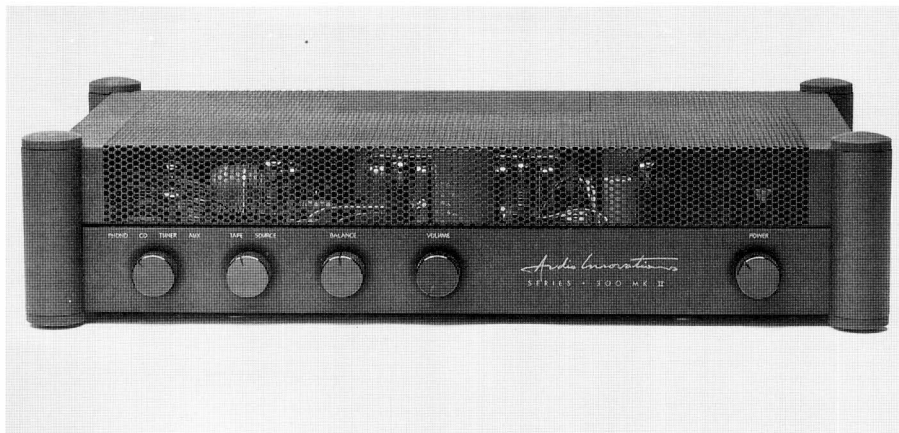
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Recommended

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"I've just bought one of the worst amplifiers in the world" is a quote from JB's review in issue 63 soon after he had awarded the original *Series 300* a Best Buy ticket. Well the *300* has just got worse, er, better. Audio Innovations was recently sold as a going concern (without affecting any existing policies) while the tin-pot *300* has been transformed with rugged new casework, a beefed-up power supply and a price rise to £500.

Not only does the *300 MkII* now look much more the professional product, but it's also more user-friendly with decent rotary controls, inputs for MM vinyl disc, CD, tuner and aux, plus a set of tasty 4mm terminals round the back. The background noise has been successfully reduced by replacing an *ECC83* with an *ECC82* double-triode in the line stage while the entire (passive) disc network relies on a single *ECC83* to bump-up the gain. A pair of push-pull *ECL86* pentodes provide the muscle via a newly-revised transformer with a nominal 6ohms output tapping.

Lab Report

The 3D plot is like something out of the *Boys Own Book of Technical Horrors*, with every conceivable distortion mechanism represented in generous quantity. Still, it's as well to consider that these distortions (adding up to around 0.18 per cent on CD and 2.5 per cent via MM vinyl disc) are very consistent over much of the available power range.

Not that this will set any records at just 9W into 8ohms. Severe slewing limits power at higher frequencies, so THD increases from two per cent at 2.4W to five per cent at 4.3W (20kHz). I couldn't even measure a sensible peak current output.

Inputs sensitivities are rather low, stereo separation is awful at HF (just 20dB),

channel balance nonexistent at -60dB and the disc headroom an almost laughable 12.9dB. Hence the vast 35 per cent IM distortion recorded as the MM input is plunged into clipping. The disc response has a nice, warming subsonic 'bump' while the premature treble cut matches the old *Series 300*.

Sound Quality

This amp was auditioned blind on more than one occasion, each time without any true consensus being achieved. One listener announced confidently that it was the best he'd heard all day, while others adamantly refused to accept its various colorations.

Nevertheless it seems this is not your archetypal lush-sounding valve amplifier, but one that extends its grasp into the furthest reaches of the treble, pulling out the finest percussive detail from a broad and delightfully airy acoustic. A metallic tinge coloured the sound, however, and became more obvious with busier pop and rock tracks. The balance here was less even, perhaps lacking a little in weight and "mildly under-exposed, fogged or defocused" in the view of one listener.

Still, for all its foibles most listeners felt that this was an inherently musical and communicative amplifier with a broadly involving and warm sound, albeit one that proved to be more open and spacious on CD than vinyl disc.

Conclusion

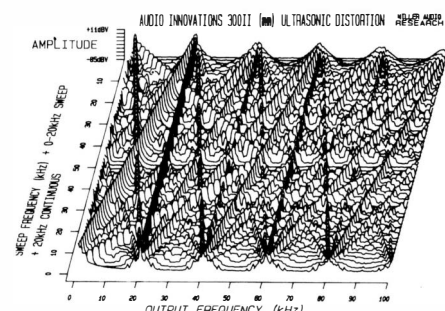
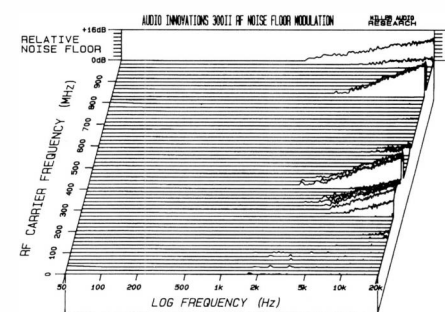
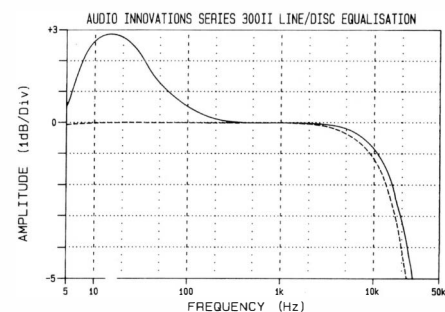
This is not necessarily the right product for someone with a wedge burning a hole in their pocket and in the market for an amp - any amp - at £500. Nevertheless, it is probably the only amp for the enthusiast with a genuine desire to get to grips with the ongoing renaissance of valves without

being stung for a second mortgage. Please note that sensitive speakers and an open mind are prerequisites.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	4.4W	9.2W	1.4W*
4ohms	3.2W	6.4W	0.64W*
Dynamic Headroom (IHF)	+0.51dB (10.3W)		
Peak Current (5msec, 1% THD)	-		
Output Impedance	0.31ohms		
Damping Factor	25.5		
	CD/Aux	MM	
Stereo Separation (1kHz)	42.3dB	44.5dB	
(20kHz)	20.1dB	19.1dB	
Channel Balance (1kHz, -20dBV)	1.59dB	1.11dB	
(-60dBV)	34.8dB	32.8dB	
Total Harmonic Dist. (0dBW)	-70.1dB	-32.2dB	
(Two-thirds power)	-54.7dB	-32.1dB	
CCIR Intermod. Dist. (0dBW)	-56.9dB	-9.1dB*	
(Two-thirds power)	-46.6dB	-9.0dB*	
Noise (A-wtd, 0dBW)	-86.8dB	-67.5dB	
(Two-thirds power)	-92.7dB	-69.5dB	
Residual noise (unwtd)	-63.7dBV	-63.7dBV	
Input Sensitivity (for 0dBW)	200mV	151uV	
(for full output)	625mV	4.59mV	
Disc Overload (1kHz)		22.3mV	
(20kHz)		111.3mV	
(50kHz)		142.2mV	
Tape Output Impedance	1.4V (disc) / 20.7kohms		
Input loading	91kohms/75pF 47kohms/120pF		
DC offset, left/right	0mV/0mV		
Retail Price	£500		

* Refer to lab report



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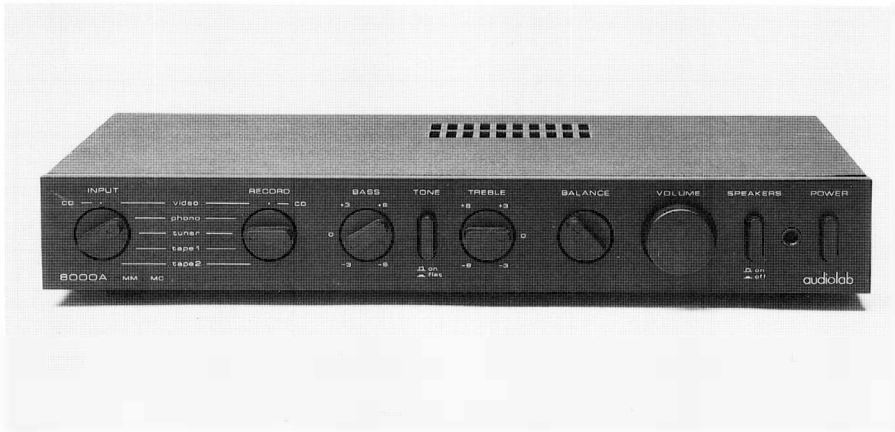
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Audiolab 8000A

Recommended

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Designing an award-winning amplifier is one thing; maintaining the competitiveness of such a product year in and out is something else altogether. Audiolab's successful 8000A integrated amplifier has achieved this by the implementation of regular and ongoing, if subtle, improvements.

One of the most recent changes is much more obvious, with a change in the basic colour of the amp from bronze/grey to a satin black - ironically, perhaps, just as fashion seems to be moving the other way. The layout of controls remains as before, but a further tape input, labelled 'video' in this instance, has been added, independent rec-out and input selectors now catering for three VCR/tape decks, tuner, CD and both MM and MC vinyl disc cartridges.

Audiolab has employed a new CAD (computer aided design) system to reorganise much of the circuit board, paying particular attention to the earth layout and HF compensation networks. Either way it's hard to criticise the construction, and it's also a joy to operate.

Lab Report

How have these changes affected the technical performance? Power is up by nearly 10W to 81W into 8ohms and 134W (+2.2dB) into 4ohms, as a result of improved regulation, though dynamic headroom is correspondingly somewhat reduced. Relay-operated protection limits the peak current output to 7A, which is far too conservative in my view.

Stereo separation is now an almost unprecedented 71dB at 20kHz (MC), though the channel balance error on our sample has deteriorated to 3dB at -60dB (a function of the volume control). Distortion has been reduced, from typically 0.003 to 0.0018 per cent via CD, though the amplifier is now more susceptible to RF noise which causes broad changes in the

noise floor from 200Hz to 20kHz. In consequence, the new 8000A is likely to be more player-dependent than before.

MC vinyl disc is noisier than before (-74dB instead of -80dB) and has less headroom at high frequencies (22.1dB instead of 26.1dB); IMD is therefore higher via MC than either MM or CD.

Sound Quality

The panel immediately recognised this as a very classy product; its pronounced and distinctive sound is packed with detail and held together with an excellent sense of stereo focus. The panpipes sounded very neutral on this occasion, the instrument's natural exuberance being contained with impressive conviction.

At the same time it could be both tranquil and delicate when required, reproducing the subtle tonal colours of the harpsichord without exaggeration or unnatural colour. All but one of our listeners praised the 8000A for its very clean, precise and refined sound, though another chose to interpret this lack of character as itself 'intrusive'.

Still, a consensus was reached for the MM vinyl disc input. There's a certain uniformity between all the inputs, but the MM disc struck the most appropriate balance with its extra touch of warmth. There was a real power and weight behind the low strings on our Rachmaninov LP, interspersed with the delicate tinkling of triangles. The guitar on the Sting LP was resolved in a similarly intricate fashion, just as his voice appeared open and civilised without sounding bland.

Conclusion

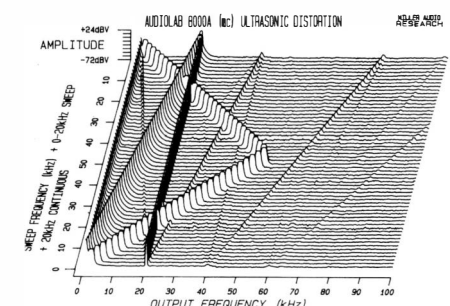
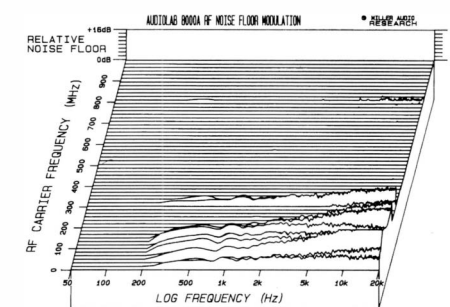
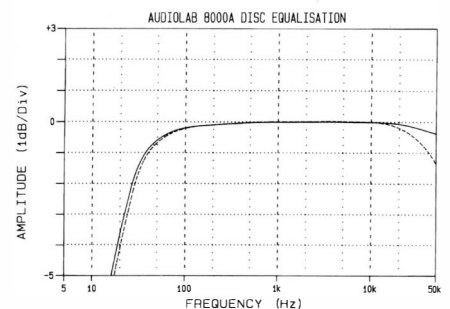
Audiolab has been refining the popular 8000A for many years, though these recent improvements are perhaps the most significant to date. So much so that today's 8000A offers a crafty blend of atmosphere, refinement and clarity without the

harshness or blandness for which earlier examples were sometimes criticised. It's expensive at over £400, but nevertheless warrants strong Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	78.1W	81.3W	79.4W
4ohms	125.9W	134.4W	128.7W
Dynamic Headroom (IHF)	+0.86dB(99.1W)		
Peak Current (5msec, 1% THD)	7.1A*		
Output Impedance	0.036ohms		
Damping Factor	220.1		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	73.3dB	76.6dB	72.4dB
(20kHz)	57.0dB	65.8dB	70.6dB
Channel Balance (1kHz, -20dBV)	0.32dB	0.29dB	0.28dB
(-60dBV)	3.09dB	3.07dB	3.05dB
Total Harmonic Dist. (0dBW)	-94.5dB	-94.3dB	-93.7dB
(Two-thirds power)	-96.9dB	-96.8dB	-96.1dB
CCIR Intermod. Dist. (0dBW)	-96.0dB	-70.8dB	-66.7dB
(Two-thirds power)	-96.1dB	-70.4dB	-66.6dB
Noise (A-wtd, 0dBW)	-80.9dB	-77.7dB	-73.0dB
(Two-thirds power)	-94.2dB	-82.1dB	-74.0dB
Residual noise (unwtd)	-68.3dBV	-68.3dBV	-68.3dBV
Input Sensitivity (for 0dBW)	16.1mV	318uV	16.9uV
(for full output)	145mV	2.74mV	152uV
Disc Overload (1kHz)		185.6mV	9.78mV
(20kHz)		1570mV	63.5mV
(50kHz)		1690mV	102.5mV
Tape Output/Impedance	9.3V (disc) / 1.52kohms		
Input loading	24kohms/130pF 39kohms/90pF 107ohms		
DC offset, left/right	-1.3mV/+0.5mV		
Retail Price	£410		

* Refer to lab test



Audiolab 8000C/8000P

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GODMANCHESTER, HUNTINGDON, CAMBRIDGESHIRE PE18 8LN. TEL: (0480) 52521



Reflecting the changes introduced in the very latest *8000A* integrated amplifier, Audiolab has implemented a similar series of revisions to the matching *8000C/P* pre/power combination. Once again the old grey casework has been discarded in favour of a satin black fascia and wrap-around bonnet, while the preamp is fitted with an extra line in/out socket for use with a VCR. The power amp has sprouted some extra 4mm binding posts too - unswitched parallel outputs designed to make bi-wiring as simple as possible.

The preamp has the flexibility of independent record-out and input selection for up to five line sources. MC and MM vinyl disc cartridges are both accommodated, a small pushbutton on the rear of the case engaging a discrete, low-noise headamp before returning the MC-boosted signal to the MM stage with its all-active equalisation network. LED fascia tell-tales confirm this selection and double as power-on indicators.

Dual-film electrolytics are used for decoupling purposes in the disc and line stages, while all regulators feed off a single-rail power supply (unusual, since almost all amps use a split-rail power supply). Audiolab has also stuck with its tried-and-tested passive tone controls, including a tone defeat switch that really means 'tone defeat' (earlier *8000C*s left a few components in the signal path, even though bass and treble controls were nominally disengaged).

The familiar black plastic knobs are scattered across its fascia, though the volume control now has a more secure feel about it thanks to a new high-grade Noble pot with die-cast metal housing.

The main line output stage has been designed rather like a mini-Class A power amp, with what Audiolab refers to as current-mirror biasing. This is a standard technique using a pair of transistors, each with the same base-emitter voltage to stabilise the flow of current.

Slim but surprisingly heavy, the *8000P* power amp plays host to a large 400VA toroidal mains transformer which feeds a pair of 10,000uF reservoir capacitors per channel. The entire amplifier has been re-laid onto a single board, keeping the L and R channels as symmetrical as possible while also minimising the need for wire connections.

Grounding is optimised by placing the DC servo reference closer to the main supply earth - sensible but hardly innovative stuff. Otherwise the three-stage circuit with its degenerative feedback and high-speed bipolar output transistors remains pretty much the same.

Two new heavy-duty muting relays have been installed, a sensible precaution bearing in mind this amp can sink some 250W into 4ohms. Nevertheless the sensing circuitry is a trifle over-cautious, causing the relays to trip-in with any burst of current over 16A or so.

Lab Report

Nothing out of the ordinary here: the *8000C/P* delivers the solid set of results expected of an equally solid and dependable design. There's plenty of power under the bonnet so long as impedances don't fall much below 4ohms or so while the +1dB headroom implies outputs as high as 200W will be momentarily supplied into conventional 8ohms loads.

Stereo separation is dictated by the preamp, where crosstalk is 50-56dB at 20kHz, but at least the new volume control keeps a tight rein on channel balance. Distortion is kept firmly in check too, with best figures of 0.0009 per cent for the preamp and 0.0014 per cent for the power amp. THD does increase to around 0.005 per cent (MC) and 0.01 per cent respectively at 20kHz, but both 3D plots show that second-order IM distortion is more prominent. Slew-limiting restricts the MC vinyl disc headroom to +25.8dB at 20kHz for instance, which is still good but allows CCIR IMD creep up to 0.02 per cent. Both MM and MC vinyl disc responses are sensibly tailored, with -3dB points at 7Hz and 11Hz respectively.

Sensitivity, input loading and noise are all bang on target, so there should be no problems matching a favourite cartridge. Furthermore the preamp has a usefully low 102ohms output impedance, so long pre-power interconnects will be no problem either. The only slight fly in an otherwise very linear ointment concerns a hint of RF IMD at 290MHz and 440MHz, breakthrough that has only come to light since Audiolab revised the power amp's board layout! Still, I'm not losing much sleep over it.

Sound Quality

Although I might admire the *8000C/P* as well-reasoned and dependable pieces of engineering, such qualities were lost on our listeners who responded to the sound with confusion. Not that the panellists were disagreeing with one another, instead all felt the product was idiosyncratic, or at any rate inconsistent.

Bass was very nimble and controlled via CD, carrying the music along with a flair and bounce similar to the 8000A. The treble was pure, and the quietest moments in the music were free of any 'parasitic' colorations, but taken as a whole there was also a certain lack of substance to the sound which caused our listeners to lose interest in the music itself.

If I interpret their impressions correctly, it seems that although the amplifiers are undoubtedly neutral, the sound is also rather stark. Even the subtlest of inflections start and stop with an unnatural abruptness. There is no obvious colour to the sound, and no hash to muddy the background, yet everything seems somehow unrealistically neat and tidy.

Chris Rea's voice seemed to lose its roughness, but sounded a little thin and unconvincing as a result, while the panpipes also appeared to lack their usual fulsomeness, even though the accompanying guitar sprang to life in a way that was missed by several of the integrated amplifiers.

The combination sounded somewhat warmer but also more coloured when changing source from CD to MM vinyl disc. The vibes on our jazz LP could have done with a little extra body but the bass was both more powerful if woollier than it had been via CD. Sting's voice enjoyed a fair sense of weight, but everything else on the track seemed to be interfering with his articulation. The sound was just too busy, suggested one listener.

These are all examples of the mixed reactions experienced by our panel. There would always be aspects of the performance that were attractive or even compelling, but the overall impression, whether the music be pop, jazz or classical, was one of disinterest.

Conclusion

Technically this pre/power combination is on the straight and narrow, yet subjectively it fails to hang together with the same confidence. The trap of sounding overly forward and aggressive is avoided, but its very civility proves to be the main weakness. Which is a pity, for a lot of care has obviously been lavished on design and construction, ensuring the amp is destined to provide years of trouble-free service. In the end we are left with a very distinctive sound, one that lacks the cohesive balance of the 8000A and, truth to tell, the previous 8000C/P combination.

TEST RESULTS

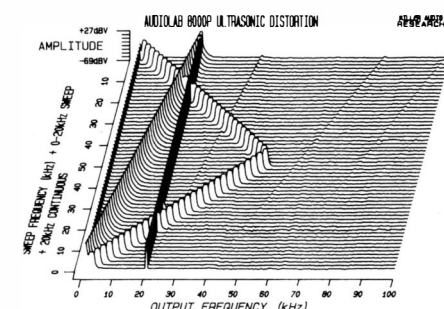
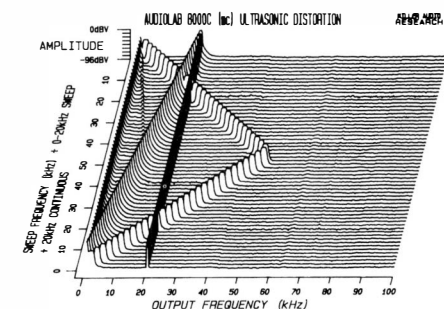
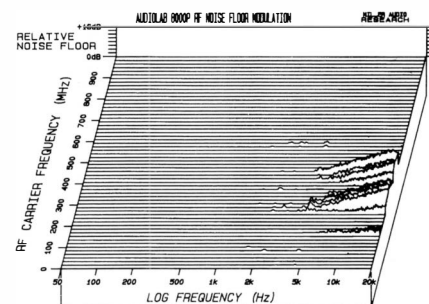
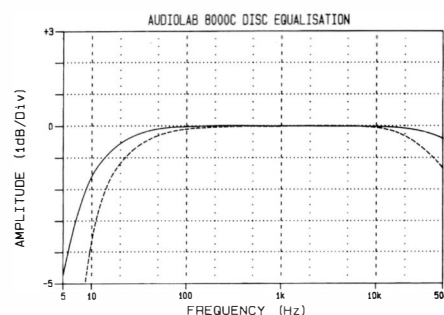
Pre-amplifier: Audiolab 8000C

	Aux/CD	MM	MC
Stereo separation			
(20Hz)	95.2dB	96.2dB	81.8dB
(1kHz)	72.2dB	76.5dB	77.5dB
(20kHz)	56.5dB	51.2dB	50.9dB
Channel Balance			
(1kHz, 0dBV)	0.01dB	0.03dB	0.05dB
(-20dBV)	0.27dB	0.26dB	0.25dB
(-60dBV)	0.59dB	0.24dB	0.23dB
Total Harmonic Dist.			
(0dBV, 1kHz)	-98.0dB	-100.5dB	-92.6dB
(20kHz)	-98.6dB	-89.7dB	-85.5dB
CCIR Intermod. Distortion			
(1:1)	-98.6dB	-72.8dB	-68.2dB
Noise			
(A wtd, 20Hz - 20kHz)	-97.2dB	-83.0dB	-80.3dB
Residual noise			
(unwtd)	-97.4dBV	-97.3dBV	-97.3dBV
Input Sensitivity			
(for 0dBV)	156mV	3.09mV	165uV
Disc overload			
(1kHz)		199mV	10.6mV
(20kHz)		1855mV	97.5mV
(50kHz)		2365mV	121.5mV
Input Loading		23kohms	120pF
		120pF	107ohms
Pre-amplifier Output (max)/Impedance		9.6V (disc)	102ohms
DC Offset, L/R		-440uV/-447uV	
Retail Price			£375

Power amplifier: Audiolab 8000P

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	148.7W	157.4W	144.5W
4ohms	244.8W	256.6W	239.4W
Dynamic Headroom (IHF)	+1.0dB (198.6W)		
Peak Current (5msec, 1% THD)	16.0A		
Output Impedance	0.029ohms	0.036ohms	0.054ohms
Damping Factor	271.7	219.6	147.1

Stereo Separation (0dBW)	97.7dB	99.5dB	76.0dB
Total Harmonic Dist (0dBW)	-93.4dB	-95.1dB	-79.3dB
(two-thirds power)	-94.0dB	-96.9dB	-82.6dB
CCIR Intermodulation Distortion (0dBW)			-96.1dB
(two-thirds power)			-96.1dB
Noise (A wtd, 20Hz-20kHz) 0dBW			-94.9dB
(A wtd, 20Hz-20kHz) two-thirds power			-113.4dB
Residual noise (unwtd)			-79.1dBV
Input Sensitivity (for 0dBW)			105mV
(for full output)			1308mV
Input loading			48kohms
DC offset, left/right			+4.4mV/+3.4mV
Retail Price			£545



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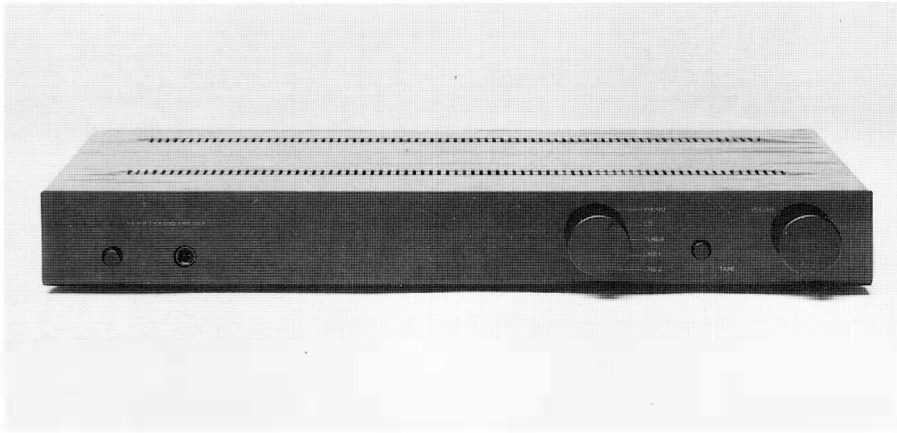
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This review should serve as a salutary lesson to all those manufacturers who are nervous of how their pride and joy will stack up in a fair and blind listening test. We nearly missed out on Aura's £200 VA-50 for this reason, yet it turned out to be one of the star performers of the test.

In essence this VA-50 is a polished version of the cheaper VA-40, itself based on an amplifier known as the MA-80 which was manufactured by ITL. The company and the rights to this design were bought by B&W, who then formed the Aura brand that we know today. The VA-50 shares the same sleek appearance as its forebears, with little to disturb the glossy fascia but a volume control and input selector.

One tape, four line and MM vinyl disc sources are accepted while a single pair of speakers are accommodated via a set of very chunky binding posts. There's also a new tape monitor facility, but inside it's clear that plenty of effort has gone into tidying-up the layout and choice of components. The Hitachi power MOSFET's are unchanged, for instance, but the driver stage is a simpler and more elegant affair.

Furthermore, the old RC5532 op-amps have been swapped for decent Signetics devices in the disc stage. The shunt-feedback RIAA equalisation topology remains unchanged, but the Signetics chips sure sound a whole lot better!

Lab Report

The VA-50's power supply has not been 'beefed up' so much as refined. The upshot is that the 8ohms power figure increases from 55W (VA-40) to 65W although the dynamic headroom is reduced to just +0.4dB. Peak current delivery remains an unchanged 10A.

The output impedance has increased by a factor of three, stereo separation has improved but channel balance, noise and distortion (particularly via MM disc) have

all deteriorated. Vinyl disc headroom has fallen from 27.4dB to 25.9dB though sensitivity is largely unchanged.

Much of this is reflected in the 3D plot, which shows a similar spread of multiple-order IM mechanisms to those found with the VA-40 (see issue 80). One effect of this 'carpet distortion' may be to disguise the audible effects of RF IMD, should this occur due to spurious activity in the 100-250MHz region.

Sound Quality

Aura's policy of 'tweaking by ear' has been rewarded by the reaction of our panel. Listeners were especially impressed by a liquid and easy style that reinforced the sense of weight and body behind Chris Rea's voice - a very expansive sound, utterly free of strain, if not quite as dynamic as possible.

This unforced and subjectively clean (though not uncoloured) quality extended from the bass right through to the treble, the VA-50 managing to strike a good balance between percussion, vocals and the overall rhythm of the piece - rather like the difference between a good and bad conductor, suggested one listener.

The vinyl disc input produced a sound of similar balance, and also seemed less critical of surface noise than many competitors. There is a slight congestion of notes in the upper bass, a mild thickening that was most noticeable on our jazz piece, but this is no serious drawback. Indeed Aura's VA-50 turned out to be the most listenable and engaging amplifier of the day.

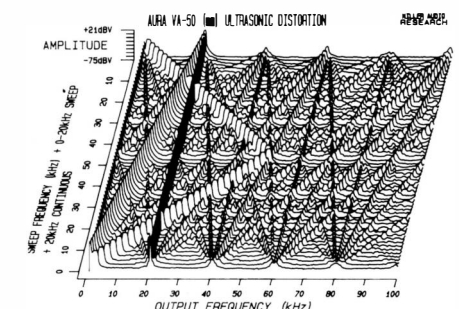
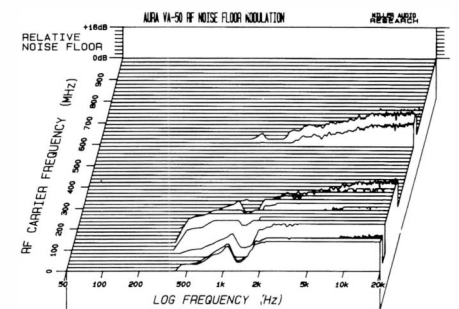
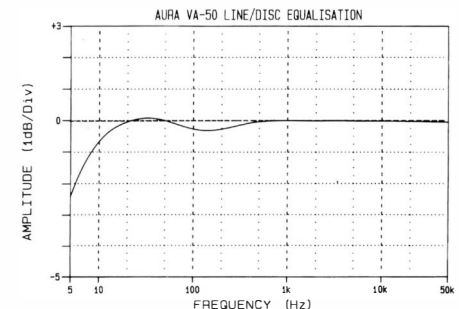
Conclusion

By hook or by crook the lads at Aura have managed to claw back much of the magic that infused the original ITL MA-80, leaving the VA-40 somewhat high and dry as the poor relation. Many of the measurements suggest the 50 might be

speaker and system-sensitive, but the fine results obtained in the listening tests thoroughly justify a Best Buy rating.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	60.2W	64.5W	54.4W
4ohms	69.0W	72.7W	66.6W
Dynamic Headroom (IHF)	+0.44dB (71.3W)		
Peak Current (5msec, 1% THD)	10.0A		
Output Impedance	0.099ohms		
Damping Factor	80.1		
	CD/Aux	MM	
Stereo Separation (1kHz)	69.4dB	67.8dB	
(20kHz)	45.5dB	45.1dB	
Channel Balance (1kHz, -20dBV)	0.96dB	0.84dB	
(-60dBV)	4.04dB	3.85dB	
Total Harmonic Dist. (0dBW)	-77.6dB	-77.8dB	
(Two-thirds power)	-56.2dB	-56.1dB	
CCIR Intermod. Dist. (0dBW)	-77.1dB	-70.9dB	
(Two-thirds power)	-60.2dB	-59.2dB	
Noise (A-wtd, 0dBW)	-83.7dB	-65.8dB	
(Two-thirds power)	-95.4dB	-69.6dB	
Residual noise (unwtd)	-53.4dBV	-53.4dBV	
Input Sensitivity (for 0dBW)	29.6mV	417uV	
(for full output)	240mV	3.49mV	
Disc Overload (1kHz)		97.9mV	
(20kHz)		874.0mV	
(50kHz)		1017mV	
Tape Output/Impedance	6.93V (disc)/109ohms		
Input loading	45.6kohms/80pF 46.7kohms/160pF		
DC offset, left/right	9.1mV/-28.6mV		
Retail Price	£200		



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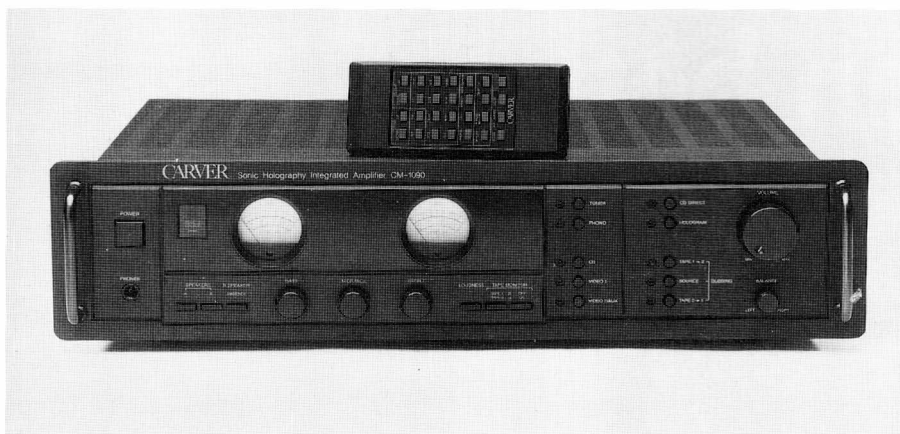


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Convention is not something that appeals to the Carver Corporation, which has been busily blazing its own, very distinct path for about ten years now. Consistency is another matter, however, for this £495 CM-1090 integrated amplifier is still based on principles espoused in those early days.

For example, it employs the patented Magnetic Field Amplifier Technology, a system that hops between three alternate power supply rails in response to dynamic changes in the music signal. The electrical efficiency of this system has its rewards, particularly in the professional market where high-output, low power-consumption and low waste heat production are major advantages.

Another Carver development that finds a home on the CM-1090 is Sonic Holography. This processing circuitry incorporates delay lines and filters to modify both the signal response and content (specifically L minus R) in an attempt to 'correct the basic imaging flaws inherent in conventional stereo'.

Nor does the appearance of this amplifier fit into any mould, with its logic-operated input selection, bass, treble and midrange tone controls plus a system remote control. The volume knob is motorised while two mini-fishbowl meters give a broad account of the amplifier's output. Inputs for MM, four line and two tape sources are provided, though the spring-clip speaker terminals are about the naughtiest I've clapped eyes on.

Lab Report

Hi-tech or not, the power supply seems unable to support the amplifier's output voltage into loads lower than 8ohms - hence the power level remains fixed at 135-140W while peak current (into 1ohm) is reduced to a paltry 6.6A. The high 1.3ohm output impedance is the icing on the cake as far as I'm concerned, due in no small part to the looms of thin wire that

run between the power amp, A/B speaker selectors and terminals.

Distortion is unusual too (see 3D plot) because IMD occurs ahead of THD which, when it does pop up at high frequencies, is mainly third-order in nature. Sonic Holography influences mid/high frequency noise by about 5-7dB rather than distortion, but its effect on frequency response (via pre-out) can be seen on the plot (large dashes).

Sound Quality

A generally lively, uncompressed and expressive sound greeted our panel, but it was far from clean in the treble. In fact the busier the music was the dirtier the treble became. This was not a harsh nor even a fatiguing coloration though, instead the panel suggested there was a peculiar in-fill between individual instruments, blurring the distinction between panpipe and guitar, for example.

One listener was far less enamoured of its sound than the others though, finding it blurred and electronic in character. Nevertheless with Sonic Holography engaged the sound was obviously fuller and weightier, and was in many instances actually preferred to the original.

Changing to vinyl brought about a further improvement. Although there was still a lack of spaciousness and separation, the sound somehow had a more dramatic feel. It proved more than capable of pulling out low level woodwind detail from the Rachmaninov LP, but for all this new found drama there was still a lack of refinement, and this in itself made the amplifier sound rather cheap.

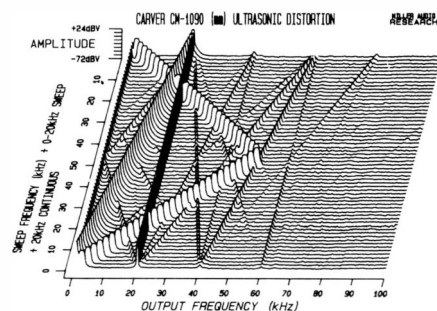
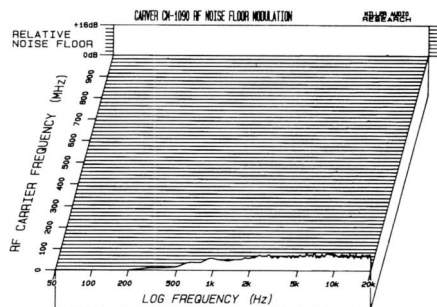
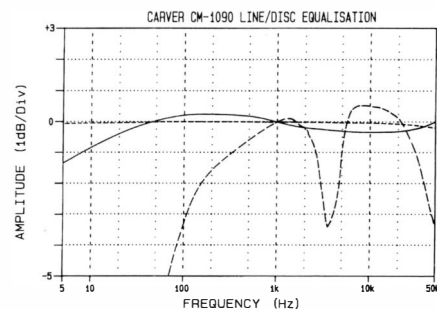
Conclusion

Plenty of gadgets here to help the curious while away the small hours. But beneath all the trickery beats the heart of a sad little amplifier, its deficiencies overlooked in the interests of packing in the hi-tech

wizardry. Adherents of Sonic Holography may have it otherwise, but in my opinion the CM-1090 is a rather unsuccessful mish-mash offered at a not inconsiderable price.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	135.4W	141.1W	135.4W
4ohms	136.7W	135.5W	133.2W
Dynamic Headroom (IHF) +0.91dB (173.9W)			
Peak Current (5msec, 1% THD)		6.6A	
Output Impedance	1.284ohms		
Damping Factor	6.23		
	CD/Aux	MM	
Stereo Separation (1kHz)	62.2dB	62.1dB	
(20kHz)	36.4dB	36.5dB	
Channel Balance (1kHz, -20dBV)	0.60dB	0.71dB	
(-60dBV)	0.76dB	0.88dB	
Total Harmonic Dist. (0dBW)	-92.0dB	-93.3dB	
(Two-thirds power)	-76.7dB	-76.2dB	
CCIR Intermod. Dist. (0dBW)	-95.1dB	-83.4dB	
(Two-thirds power)	-95.6dB	-83.5dB	
Noise (A-wtd, 0dBW)	-77.1dB	-75.1dB	
(Two-thirds power)	-94.5dB	-79.0dB	
Residual noise (unwtd)	-66.7dBV	-66.6dBV	
Input Sensitivity (for 0dBW)	15.6mV	248uV	
(for full output)	186mV	2.90mV	
Disc Overload (1kHz)		126.4mV	
(20kHz)		1244mV	
(50kHz)		2649mV	
Tape Output/Impedance	7.9V (disc) / 752ohms		
Input loading	21kohms/140pF	44kohms	
DC offset, left/right		+0.5mV/-6.0mV	
Retail Price			£495



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For many years Dual was only really known for its popular budget turntables, but recently the partnering electronics began to attract attention, largely it seems because Dual has started using Rotel's manufacturing facility: refer back to issue 92 and the review of the CV-5600 amplifier.

This £250 CV-5670 companion amplifier is a bigger and more comprehensive beastie. Inside the heavy alloy and steel casework is a whacking great power supply teamed-up with an equally robust power amp. Rotel's favourite power transistors are present in generous quantity, but there are none of the quality ICs and passive components we've come to expect from that brand.

Dual's use of an 'Audiophile Concept' logo for this amp sits uneasily next to the tone controls, subsonic filter and loudness button, none of which do much to project a minimalist/purist image. Yet there are some nice touches like remote relay selection for the MC vinyl disc input and A/B speaker outputs, even if the CD direct and input select facilities are routed in the normal manner. All in all, this seems to be a lot of amplifier for the money.

Lab Report

There are plenty of watts too, the CV-5670 belting out a solid 128W into 8ohms, rising to nearly 200W into 4ohms, all supported by a massive 21A current reserve (stopped in its prime, I might add, by the relay-operated speaker protection). Note that the main outputs are phase-inverting with the tone controls engaged, a further reason to opt for CD Direct whenever possible.

The 3D plot reinforces the low distortion figures (typically better than 0.003 per cent), betraying just a hint of IMD which picks up slightly via MM (0.0028 per cent) and MC (0.005 per cent) vinyl disc inputs. In contrast with Dual's CV-5600, both disc responses are influenced by an odd +0.8dB 'bump'

below 100Hz. Furthermore, the MC disc input is about 10dB too noisy in my opinion, while the CD input lets through sufficient RF noise to risk problems at 300, 400 and 590MHz. (The CV-5600 is free of this blight.)

Sound Quality

Whereas the cheaper CV-5600 had proved distinctly Rotelesque in character, the bigger CV-5670 failed to inspire such favourable comparison. The generally open and spacious quality of its sound was nice enough, but the lean and topky balance together with a rather mechanical delivery quickly doused enthusiasm.

There seems to be a metallic tinge to the highest treble octaves, a coloration that changed the naturally rich character of the panpipes, for instance, to one that was both thinner and somehow 'stretched'. One listener appreciated the bass definition, though others were less impressed, implying that a little extra welly was needed.

Tonally both the MM and CD inputs offer a similar but marginally light balance; even the saxophone from our jazz LP was slightly box-bound, hanging about the speakers rather than projecting convincingly outward.

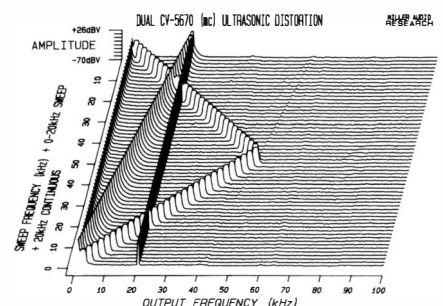
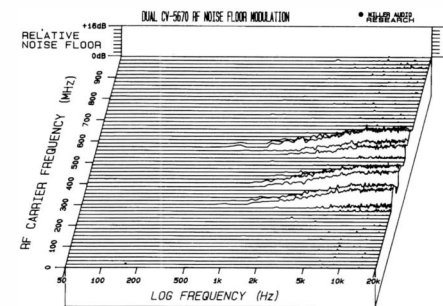
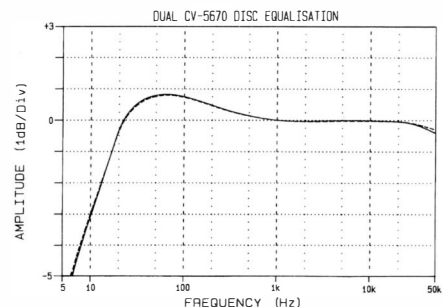
Conclusion

Sadly the CV-5670 has not managed to retain the nimble, vibrant and communicative quality that so distinguished the CV-5600. Instead the sound is but a silhouette of the bold and tactile presence offered by the best at this price. Which is a pity, considering the prodigious reserves of power tucked under the bonnet.

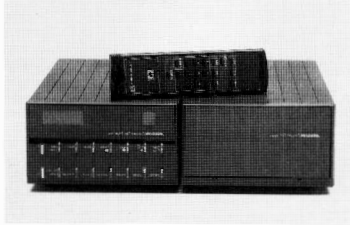
In material terms the CV-5670 represents superb value, and could provide an ideal basis from which Dual might fashion a genuine 'audiophile' amplifier.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	124.3W	128.2W	124.3W
4ohms	181.8W	198.2W	191.3W
Dynamic Headroom (IHF)	+1.40dB (176.7W)		
Peak Current (5msec, 1% THD)	21A*		
Output Impedance	0.067ohms		
Damping Factor	119		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	68.3dB	68.1dB	68.2dB
(20kHz)	43.6dB	44.1dB	44.6dB
Channel Balance (1kHz, -20dBV)	0.31dB	0.34dB	0.35dB
(-60dBV)	1.55dB	1.51dB	1.52dB
Total Harmonic Dist. (0dBW)	-95.9dB	-93.5dB	-91.9dB
(Two-thirds power)	-90.6dB	-92.6dB	-91.6dB
CCIR Intermod. Dist. (0dBW)	-93.5dB	-85.6dB	-80.2dB
(Two-thirds power)	-91.2dB	-84.3dB	-80.1dB
Noise (A-wtd, 0dBW)	-80.9dB	-78.6dB	-63.0dB
(Two-thirds power)	-97.1dB	-82.5dB	-62.8dB
Residual noise (unwtd)	-68.8dBV	-68.8dBV	-68.8dBV
Input Sensitivity (for 0dBW)	21.0mV	251uV	20.4uV
(for full output)	237mV	2.78mV	231uV
Disc Overload (1kHz)		146.6mV	11.9mV
(20kHz)		1355mV	114.9mV
(50kHz)		3022mV	251mV
Tape Output/Impedance	11.8V (disc) / 2.05kohms		
Input loading	42kohms/700pF 47kohms/480pF		
		100ohms	
DC offset, left/right	-31.0mV/-21.1mV		
Retail Price	£250		



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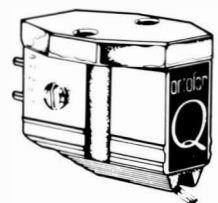
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Goodmans GSA-600

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Best known for producing down-to-earth loudspeakers of all shapes and sizes, Goodmans is also marketing a range of budget price electronics. Amongst these the £140 GSA-600 is the costliest and most recent amplifier, built to an agreed specification out in Korea. It's a standalone unit, designed to work in isolation if need be, but really comes into its own when partnering the matching tape deck, CD player, tuner, equaliser (aargh) and turntable. In the complete system the amplifier serves as the nerve-centre for a full system remote control, each of the other separates being steered via a series of BUS connections at the back of the case.

The amplifier itself can be powered-up by a remote control handset which also gives access to the motorised volume knob, mute facility and some of the input functions like CD and tape monitor. All the inputs are controlled by CMOS logic but the vinyl disc (MM only), tuner, aux and tape options must be selected by hand; bass, treble, balance, loudness and A/B speaker selection are also manually operated. Compared to this sophisticated switching, rather less attention has been paid to the quality of the disc, line and output stages themselves. The latter consists of an integrated STK power amp, for example, while RIAA equalisation is based around a standard JRC op-amp.

Lab Report

This is a classic example of an amplifier that furnishes a serviceable batch of test results yet ends up sounding like (surely tasting like? - Ed) the proverbial dog's dinner. It comfortably exceeds its 50W rating by 25W or so, even managing a respectable 97W into 4ohms. The MM disc stage rolls-off a little prematurely but has good (28.6dB) headroom and a textbook 2.3mV sensitivity. The best A-wtd noise figure of -76dB via MM disc could stand some improvement while the

unweighted (hum) figure is a significantly poorer than average -59dBV.

Distortion hovers around 0.04 per cent, but begins to deteriorate into lower impedance loads (see 3D plot), a series of nasty-sounding odd-order IM products wending their way into the audio band (far left of the plot). The output impedance is also too high at 0.35ohms, which will make it more susceptible to any crossover nonlinearities in the partnering loudspeaker.

Sound Quality

In the words of one distraught listener: "there's nothing screamingly wrong with this amp, it just sounds horrible". This somewhat contradictory statement was reinforced by the suggestion that the GSA-600 reduces all forms of music, whether pop, jazz or classical, to the level of muzak - a bland whitewash of sound.

Inoffensive but faceless and wishy-washy via CD, it still lacked depth and guts once vinyl disc was brought into play. Here the compressed quality of the vibraphone (jazz LP) had everyone falling about in disbelief, prompting the remark that the instrument sounded like something you might find in the toy department of Woolworths. This is not gratuitous exaggeration: the amplifier was roundly condemned.

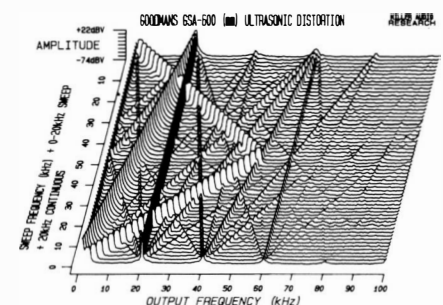
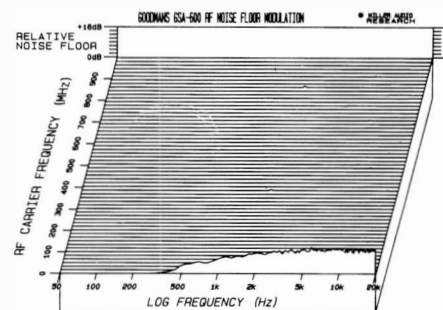
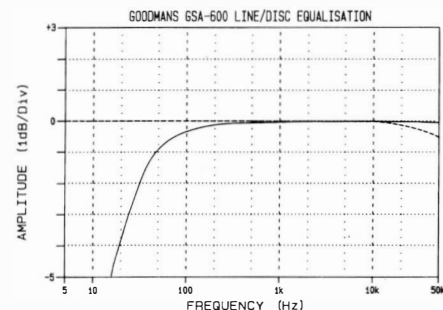
Conclusion

Uninspiring sound quality is matched in this instance by an unappealing moulded plastic fascia and grotty spring-clip speaker terminals. Nevertheless it is somewhat unfair to stack the GSA-600 alongside budget favourites from NAD, Rotel and Kenwood because the bulk of its engineering is geared towards operating with Goodmans' other separates. The truth of this is reflected in the low cost of the matching tape deck and CD player, which at just £90 and £130

respectively are destined to form the crux of an affordable midi-beating separates system. But as a standalone hi-fi amplifier? Forget it.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	75.1W	76.3W	73.9W
4ohms	90.3W	97.0W	93.6W
Dynamic Headroom (IHF) +1.5dB (107.7W)			
Peak Current (5msec, 1% THD)		9.0A	
Output Impedance	0.351ohms		
Damping Factor	22.8		
	CD/Aux	MM	
Stereo Separation (1kHz)	68.5dB	62.9dB	
(20kHz)	46.9dB	45.6dB	
Channel Balance (1kHz, -20dBV)	0.57dB	0.25dB	
(-60dBV)	0.39dB	0.42dB	
Total Harmonic Dist. (0dBW)	-75.3dB	-76.6dB	
(Two-thirds power)	-68.5dB	-69.2dB	
CCIR Intermod. Dist. (0dBW)	-72.6dB	-73.4dB	
(Two-thirds power)	-64.9dB	-65.0dB	
Noise (A-wtd, 0dBW)	-74.6dB	-72.3dB	
(Two-thirds power)	-90.3dB	-76.1dB	
Residual noise (unwtd)	-59.2dBV	-58.9dBV	
Input Sensitivity (for 0dBW)	19mV	270uV	
(for full output)	166mV	2.32mV	
Disc Overload (1kHz)		134.0mV	909.9mV
(20kHz)			902.5mV
(50kHz)			
Tape Output/Impedance	9.2V (disc) / 1.59kohms		
Input loading	46kohms/400pF	43kohms/590pF	
DC offset, left/right	-1.8mV/-11.9mV		
Retail Price	£140		



Hafler SE100/SE120

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Imagine, if you will, the archetypal American amplifier. A vastly over-engineered crate with an equally over-ambitious pricetag may well come to mind. David Hafler himself has been responsible for one or two humungous designs over the years (the *XL-600* for instance), but compared to much imported US gear these two new Haflers are models of under- rather than overstatement. Such unpretentious, value-oriented kit as the *SE100* preamp and *SE120* power amp is unlikely to appeal to the 'it's expensive therefore it's good' school of hi-fi.

The new *SE100* preamp maintains Hafler's tradition of function taking precedence over form. You'll just have to put up with the solid but mundane fascia, populated with a variety of rotary controls for bass, treble, balance and volume. Still, a full tone defeat option is included, while the volume pot is actually a high calibre item sourced from Noble.

This is the first indication of the quality that lies behind its humdrum fascia, though I should point out that the step in volume between each detent varies from 2.5dB to 7dB up to the 12 o'clock position. Sound quality might be marvellous, but the lurches in volume between each step might be found a trifle inconvenient.

In its most basic form the *SE100* has no vinyl disc stage, which is as much a reflection of vinyl's reduced importance in this digital age as the extra cost of providing this comparatively complex circuitry. However, an optional vinyl disc board is available for about £100, and this can cope with any MM or MC cartridge that crosses its path.

The elegant circuit uses a differential J-

FET input to offer a combination of low noise and high gain (up to +59dB), while quality components such as polypropylene capacitors help make up the part-active, part-passive RIAA equalisation network.

To partner this aesthetic nonevent, Hafler offers the equally sober *SE120* power amp, a mini version of the *SE240/XL280* designs. In fact it's a modernised version of the original *DH120* power amp, complete with bridging option but minus the level controls and 'ambience recovery' facility. Today's *SE120* is a basic no-frills power amp, conservatively rated at 60W but equipped with a substantial power supply. Tweaky components include metalised-film capacitors and a rugged complementary output stage based around Hitachi MOSFET devices.

Lab Report

Hafler always tries to reduce distortion as far as possible without swamping the amp with feedback, and, on the whole, is pretty successful. The *SE120*, for instance, suffers just 0.001 per cent THD at two-thirds its 96W output. This rises to 0.006 per cent at 20kHz (as the influence of feedback declines, a factor that's also reflected in the abrupt increase in output impedance from 0.05ohm, 1kHz to 0.34ohm, 20kHz).

More importantly, the amplifier retains its linearity at lower impedances, as can be seen from the lone second-order IM product on the 3D plot. Don't push the *SE120* with awkward speakers, however, because the peak current rating is hardly generous. Beyond the closed-loop the amplifier does become susceptible to RF noise, particularly around 175MHz,

290MHz and 420MHz as depicted on the RF IMD plot. Conventional THD is low, so any RF IMD is likely to be relatively more audible - the 'wispieness' perhaps?

The decent volume control keeps a tight rein on channel balance down to -60dBV, while stereo separation is better than 50dB until close to 20kHz. The disc card offers a flat and extended response for both MM and MC cartridges, together with low levels of noise (-86dB and -77dB respectively). The overload margins are acceptable, but all inputs are very sensitive indeed, requiring less than 1mV for 1V out via MM vinyl disc, for instance.

THD is about ten times greater via MM/MC vinyl disc than CD, but the nature of this distortion is subjectively pleasing. The 3D plot is a classic: pure second-order harmonic and intermodulation products in perfect balance with one another, and not an odd-order nasty in sight.

Sound Quality

Having compared the *SE100's* disc and line inputs over an extended period, our panel declared a preference for the latter, offering compliments on the quiet, spacious and generally very transparent sound. This free and airy character has been attributed to other Hafler pre/power amps, so the correlation here was quite gratifying, even if one or two listeners also remarked upon a mild 'wispieness'.

Nevertheless, everyone thought it superior to the Audiolab pre/power combination that had been auditioned a few moments earlier. The Hafler pair seemed smoother and less abrupt, without compromising the music's natural energy

and dynamics. For instance, the guitar line that runs through the Chris Rea track now led the music with more intent, adding a new sense purpose to the music as a whole.

Even at its busiest it was still possible to discern individual players in balance with one another. Via CD at least, this combo delivered a very sympathetic and even-handed style of presentation, rarely permitting one instrument to overwhelm another, except where this was a feature of the music itself. Our panpipe CD created a greater sense of anticipation, each fluttering note decaying with the faintest of previously inaudible echoes.

Yet not all in the Hafler garden is rosy, for along with this open and expressive sound there's also a hint of forwardness. Still this did little to deter the enthusiasm of the panel, which was genuinely moved by the dynamic and involving quality of these amplifiers.

Although lacking the stark 'blackness' and the stop-start precision demonstrated by the Audiolabs, there was something indefinably 'right' and satisfying about the Hafler sound. It's a pity then that these emotive qualities were not realised as successfully when using the MM vinyl disc input.

Here the panel pointed out subtle restrictions in both stereo depth and punch, even though busy interplay between different instruments still heightened anticipation. Brass instruments, for example, sounded a little smaller and perhaps a little more relaxed than usual, building up a superb spread of sound yet without quite the guts and projection to do it justice. Attractive though it was, the sound simply bobbed along without the purposefulness of the CD input.

Conclusion

Look past the dour exterior of these amplifiers and you'll be rewarded with a surprisingly natural and engaging sound. Flexibility is a key issue too, for if you're snared by the open and unforced quality of the SE120s but are hungry for more power, you can always buy a second power amplifier and operate them in bridged mode. The 200W or so available in this instance should be muscle enough for all but the most insensitive of speakers.

Similarly you are under no obligation to purchase the plug-in discboard, making the line-only SE100 an absolutely ideal choice for the modern CD-based system. As a £750 combination, however, this Hafler pair represents exceptional value and may be heartily Recommended.

TEST RESULTS

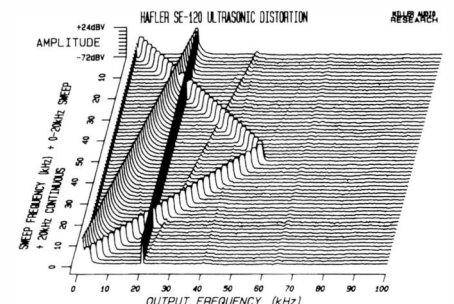
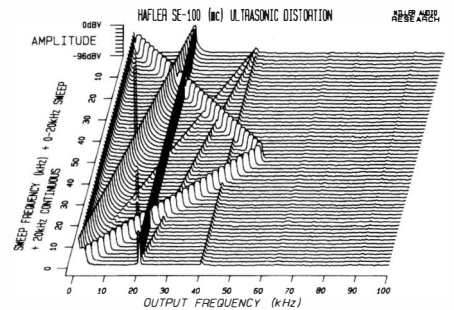
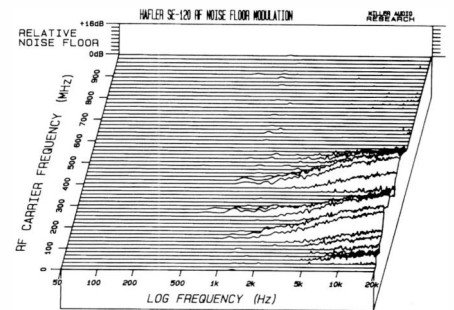
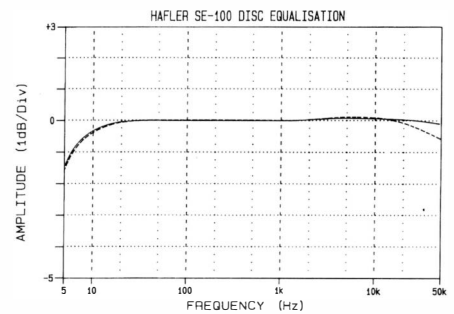
Preamplifier: Hafler SE-100

	Aux/CD	MM	MC
Stereo separation (20Hz)	80.6dB	80.4dB	80.3dB
(1kHz)	57.4dB	58.6dB	59.1dB
(20kHz)	48.0dB	48.0dB	47.9dB
Channel Balance			
(1kHz, 0dBV)	0.12dB	0.12dB	0.12dB
(-20dBV)	0.36dB	0.36dB	0.36dB
(-60dBV)	0.73dB	0.75dB	0.81dB
Total Harmonic Dist.			
(0dBV, 1kHz)	-86.7dB	-68.3dB	-66.5dB
(20kHz)	-87.2dB	-60.6dB	-57.9dB
CCIR Intermod. Distortion			
(1:1)	-79.6dB	-78.5dB	-77.8dB
Noise			
(A wtd, 20Hz - 20kHz)	-90.9dB	-85.6dB	-76.6dB
Residual noise (unwtd)	-91.0dBV	-90.9dBV	-90.9dBV
Input Sensitivity (for 0dBV)	96.9mV	988uV	95.1uV
Discoverload (1kHz)		95.8mV	9.14mV
(20kHz)		86.7mV	74.7mV
(50kHz)		202.7mV	192.5mV
Input Loading	28kohms/120pF	45kohms/220pF	100ohms
Preamplifier Output			
(max) Impedance		7.4V (disc) / 432ohms	
DC Offset, L/R		-41uV / -47uV	
Retail Price		£365 + £97.50	

Power amplifier: Hafler SE-120

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	95.7W	95.8W	93.0W
4ohms	118.7W	130.9W	120.9W
Dynamic Headroom (IHF)	+1.35dB	(130.8W)	

Peak Current (5msec, 1% THD)	9.1A		
Output Impedance	0.052ohms	0.052ohms	0.335ohms
Damping Factor	152.9	154.5	23.9
Stereo Separation (0dBW)	136.8dB	97.7dB	72.1dB
Total Harmonic Dist.			
(0dBW)	-97.1dB	-95.6dB	-88.3dB
(two-thirds power)	-96.7dB	-99.7dB	-84.5dB
CCIR Intermod. Dist. (0dBW)			
(two-thirds power)			-95.7dB
Noise (A wtd, 20Hz-20kHz) 0dBW			-102.6dB
(A wtd, 20Hz-20kHz) two-thirds power			-118.9dB
Residual noise (unwtd)			-88.8dBV
Input Sensitivity (for 0dBW)			144mV
(for full output)			1413mV
Input Loading			23kohms
DC offset, left/right			-33.1mV / -15.5mV
Retail Price			£375



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As companion model to HK's budget 6100, the brief for the 6200 is very simple: more of the same, only better! Not that this is immediately evident from the appearance, which aside from its logo is visually indistinguishable from its stablemate. The same black alloy fascia comes complete with chamfered edges and a row of identical-looking controls for speaker selection, bass, treble, balance, tape monitor and input selection.

Squint to the right of the volume control and you'll find the loudness button, though there's no all-defeating Source Direct option of any kind. Two tape decks are again accommodated, along with three other line sources and MM vinyl disc. The same fiddly speaker terminals are fitted too, but alongside you will also notice an 8/4ohms 'speaker mode' switch.

This represents one of the fundamental differences between the 6100 and 6200, the latter allowing selection of either of two secondaries on the mains transformer to suit the loudspeaker's nominal impedance, which is all a bit rough-and-ready bearing in mind the degree to which the impedance of a speaker tends to vary with frequency. Still, the adoption of an all-discrete circuit topology - including the disc equalisation stage - shouldn't be sniffed at.

Lab Report

The 6200 is rated at around 45W, some 15W above the 6100, though on our tests the 6100 clocked-in at 47W while the 6200 nudges slightly further ahead with 50W. Lower impedances reveal a difference of about 10W between the two amps while the 6200 (in 4ohms mode) also squeezes out a little extra current at 14.7A, though this is still a far cry from the 30A claimed by Harman, and of little practical advantage over the 6100.

There are other similarities too, like stereo separation, channel balance and

output impedance (slightly worse with the 6200), while THD is practically identical at 0.032 per cent via MM vinyl disc. Comparison of the 3D plot with that of the 6100 in issue 80 shows the duplicated 'fingerprint' of third-order distortions. For all this, the RIAA network does seem to have been tweaked a little. Headroom might be down from 29.5dB to 27.0dB, but the MM disc response is flatter and more extended into the low bass (-3dB at 2.7Hz).

Sound Quality

The 6200 was in fact rather better received than the chunky and more expensive HK6600, although a little lightweight via CD it was also refreshingly clear and spritely. There is a tendency to sound slightly spikey or edgy, however, particularly when reproducing powerful vocal material, which can lack its full body and richness. However, the MM vinyl disc input seems less forward, better balanced overall and, in the view of most listeners, that much more involving.

Returning to the CD input, the amp was praised for its broad soundstaging but then criticised for offering precious little stereo depth. This was linked to the light and fresh sound, which also seemed slightly superficial; in other words, we were hearing the top and foremost layer of detail but without the necessary weight or purpose to back it up. For example, the bowed cello on our Vivaldi CD seemed but a shade of the instrument, lacking its full resonant weight. Nevertheless there is jolliness, a freedom from compression and thickening about the sound that is very attractive: lightweight it may be; dull, never.

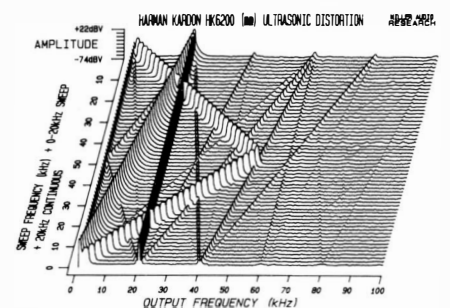
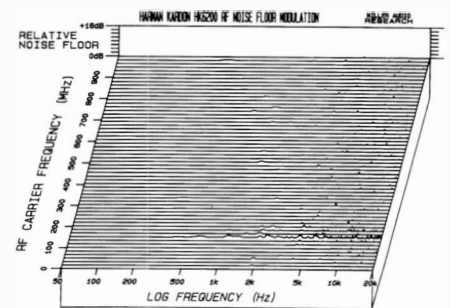
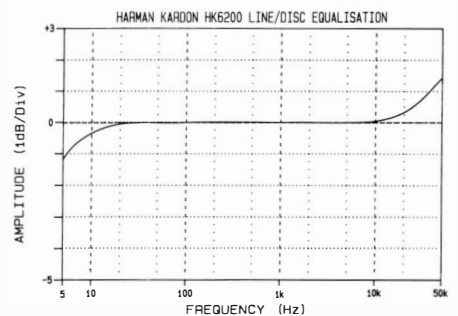
Conclusion

It does seem that the 6200 sounds rather similar to the 6100, which is no bad thing considering the latter was Recommended in issue 80. Yet the 6200 seems to offer

little technical or subjective advantage to justify the £75 price gulf that separates them. My advice is to buy the HK6100 and spend the extra on new discs.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	50.1W	49.9W	50.0W
4ohms	78.4W	80.2W	78.9W
Dynamic Headroom (IHF)	+1.2dB (65.8W)		
Peak Current (5msec, 1% THD)	14.7A		
Output Impedance	0.146ohms		
Damping Factor	54.6		
Stereo Separation (1kHz)	CD/Aux	MM	
(20kHz)	82.6dB	77.2dB	
Channel Balance (1kHz, -20dBV)	57.5dB	52.0dB	
(-60dBV)	0.70dB	0.75dB	
Total Harmonic Dist. (0dBW)	1.31dB	1.26dB	
(Two-thirds power)	-78.6dB	-70.1dB	
CCIR Intermod. Dist. (0dBW)	-74.3dB	-69.2dB	
(Two-thirds power)	-76.1dB	-71.1dB	
Noise (A-wtd, 0dBW)	-74.1dB	-73.2dB	
(Two-thirds power)	-82.7dB	-81.5dB	
Residual noise (unwtd)	-94.1dB	-84.4dB	
Input Sensitivity (for 0dBW)	-75.0dBV	-75.1dBV	
(for full output)	21mV	351uV	
Disc Overload (1kHz)	150mV	2.55mV	
(20kHz)		111.6mV	
(50kHz)		810.5mV	
Tape Output Impedance		1086mV	
Input loading		6.8V (disc)/993ohms	
DC offset, left/right		29kohms/105pF 45.5kohms/125pF	
Retail Price		-3.9mV/-2.9mV	£250



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Appearances can be deceptive, particularly when taking a close look at Harman's seven strong range of amplifiers. We've already discovered that the *HK6100* and *HK6200* look and perform very similarly, as do the more costly *HK6800* and *HK6900*. Since the *HK6600* looks just like an *HK6500* with a couple of extra buttons, might it be unreasonable to suspect they sound similar too? Not on your nelly!

True enough, the *6600* offers the same range of bass, treble, balance, loudness, subsonic cut and mono-mode facilities as its cheaper companion. Add to this independent record-out selection, an extra line input, a high-cut filter and a (useful) tone defeat option.

But inside it's a different story altogether, the *HK6600* bearing little resemblance to any of the others in key areas. Sure enough, it adopts the broad HK concepts of discrete circuitry, wide bandwidth and low overall feedback but otherwise it's quite different. The power amp is a true dual-mono style design with separate L/R power supplies feeding pairs of heavy-duty Sanken power transistors. I believe I'm right in saying that all other HK amps use Toshiba-based output stages fed from single power supplies. This distinction is probably crucial to the sound quality differences.

Lab Report

Technical differences emerge on the test bench, particularly in the vinyl disc stage. This has a flat and extended response (-3dB at 0.8Hz for MM) and also has considerably more headroom than either the *6500* or *6800* (26dB at 20kHz via MC, compared to 11.5dB for the *6500*).

Slew-limiting at high frequencies is therefore improved, and this has repercussions as far as CCIR IMD is concerned: 0.11 per cent here compares favourably with the 0.84 per cent

measured for HK's *6500*. The *6600*'s 3D distortion plot is in fact closer to the *HK6800* in 'character'.

The faint burble of RF IMD should cause no concern, while the benefits of the stiff power supply regulation are revealed in the healthy +2.1dB rise from 87W (8ohms) to 141W (4ohms). This is usually traded against dynamic headroom, but the 1.2dB recorded here is pretty respectable, as is the 20A or so measured for peak current, even if does fall short of the figure quoted in the literature.

Sound Quality

For whatever reason, this amplifier failed to generate the sort of enthusiasm I've come to expect from HK designs. It was neither as even-handed or effortless as the *6800*, nor as confident or dynamic as the cheaper *6500*. In fact it seemed rather light in the bass, delivering a dry and bland sound that lacked the vitality and pizzazz our listeners had recognised in these other HK offerings.

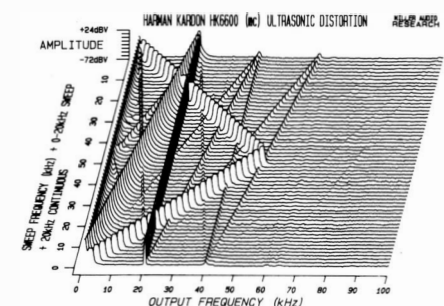
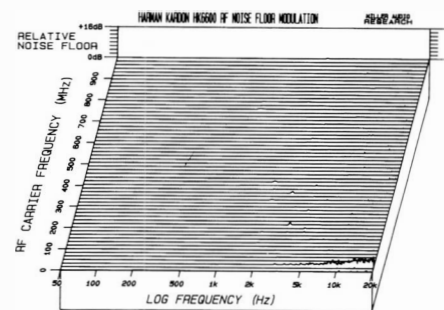
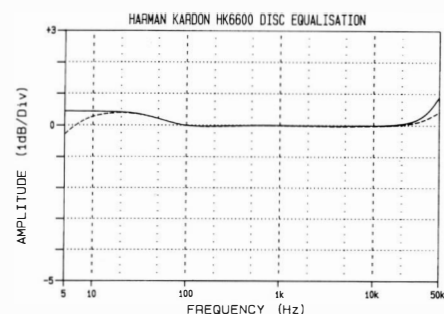
The sound was significantly more forward and jolly via the CD input, yet most listeners still felt the panflute recording was intrusive rather than compelling. Still, the MM vinyl disc input does provide a richer and more natural balance, even if it seemed reluctant to grasp the dynamics of either pop or classical LPs. It's this stiffness or sluggishness that somehow knocks the stuffing out of the music and, it has to be said, bored the pants off our assembled listeners.

Conclusion

Powerwise the £500 *6600* lands squarely between the *6500* and *6800* which flank it pricewise. But the sonic performance is flat and unemotive, in contrast to the other models in HK's range, a result that's presumably linked to the significant internal design detail differences.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	87.0W	87.0W	87.3W
4ohms	126.4W	141.4W	136.7W
Dynamic Headroom (IHf) +1.15dB (113.4W)			
Peak Current (5msec, 1% THD)	20.1A		
Output Impedance	0.102ohms		
Damping Factor	78.3		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	78.3dB	79.6dB	62.5dB
(20kHz)	55.5dB	56.2dB	57.3dB
Channel Balance (1kHz, -20dBV)	0.27dB	0.16dB	0.12dB
(-60dBV)	0.30dB	0.22dB	0.19dB
Total Harmonic Dist. (0dBW)	-89.3dB	-86.4dB	-77.0dB
(Two-thirds power)	-91.4dB	-88.7dB	-77.3dB
CCIR Intermod. Dist. (0dBW)	-95.6dB	-83.7dB	-52.9dB
(Two-thirds power)	-96.2dB	-84.1dB	-52.9dB
Noise (A-wtd, 0dBW)	-78.4dB	-78.3dB	-75.8dB
(Two-thirds power)	-92.3dB	-83.5dB	-79.3dB
Residual noise (unwtd)	-70.8dBV	-70.6dBV	-70.5dBV
Input Sensitivity (for 0dBW)	14.8mV	235uV	13.2uV
(for full output)	139mV	2.13mV	121uV
Disc Overload (1kHz)		201.8mV	11.4mV
(20kHz)		1733mV	99.5mV
(50kHz)		3111mV	132.4mV
Tape Output/Impedance	13.0V (disc) / 1.02kohms		
Input loading	30kohms/330pF 30kohms/170pF		
DC offset, left/right	+26.6mV/+61.5mV		
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Kenwood delivered a successful combination of power, facilities and sound quality in our last amplifiers issue, so it seemed a good idea to take a look at the 3020 budget model for this edition. The amplifier is equipped with a standard array of features including tone, loudness and balance controls, all of which may be defeated via the Source Direct option.

In typical Kenwood style, the black alloy fascia is dominated by a large rotary volume control. There are also separate input and record-out selectors for two tape, CD, tuner, aux and MM disc sources. The internal design and layout is straightforward enough, using an integrated Class A stage to drive a discrete, Class B power amp. Like Yamaha, Kenwood makes much of the 'Logical Flow' construction, which is supposed to keep all signal runs as short as possible.

Lab Report

In practice, however, any Logical Flow topology is completely undermined by the lengths of ribbon cabling that travel across the amplifier to the A/B speaker selection switches, and then back again to the 4mm binding posts! Local relay switching is used as part of the protection circuit (limiting peak current to 8.3A), but not in the main selection circuit. A healthy 66W output might be sustained across the full 20Hz-20kHz bandwidth, but the output impedance is quadrupled to around 0.13ohm.

Noise is very low (around -82dB at 1W), input sensitivities are fine and disc headroom is more than adequate (28.8dB at 1kHz). Distortion suffers with increasing level and frequency, and both second and third-order intermodulation distortions are clearly visible on the 3D plot - all of which are linked to the integral power amp, rather than the MM vinyl disc input. THD increases from 0.0028 to 0.02 percent from 1W to two-thirds output.

The RF IMD plot may look spectacularly clean, but this has more to do with Kenwood slugging the inputs than the inherent open-loop linearity.

Sound Quality

Bog-standard stuff by all accounts, yet the 3020 was still sufficiently well judged to prompt a very enthusiastic reaction from our panel. All praised the solid, methodical and weighty sound which, in the words of one listener, constructed a substantial foundation for the music's roots. For instance the cellos from the Vivaldi concerto were more menacing than usual, growling with a fulsome resonance. This bolstered the tension of the piece and created a level of anticipation that hooked our listeners, introducing a sense of occasion rather than simply impressing with exaggerated dynamics.

On the debit side Chris Rea's voice was a little gravelly while the accompanying cymbals sounded slightly edgier and harder than usual. Nevertheless, the panpipes and guitar from our Mosaic CD were superbly separated, if lacking the full, natural woodiness that distinguished models like the Aura VA-50.

Switching to MM vinyl disc did not dampen our enthusiasm; there was a genuinely delicate touch to Sting's guitar, the whole piece taking on an evenness and fluidity that was missing on many other presentations. The Rachmaninov *Dance* bounded along at a fair old pace, led by the brilliance of the strings and reinforced by the ensemble of brass and percussion: a bit rough about the edges perhaps but stirring stuff nonetheless.

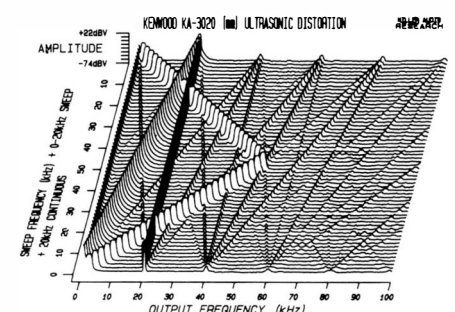
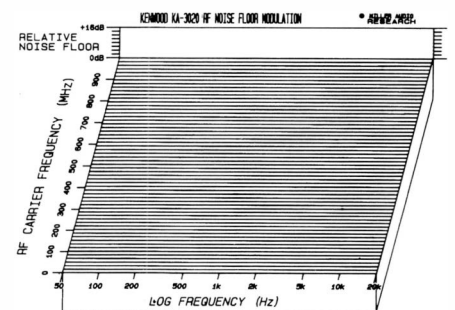
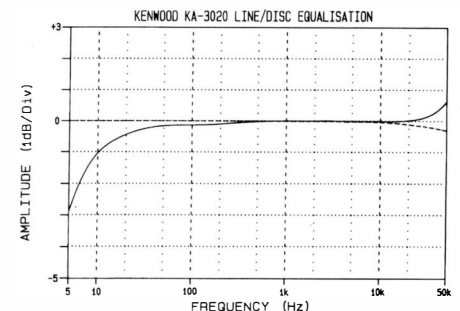
Conclusion

There is nothing outwardly special or tweaky about the design of the KA-3020 but the music it makes has an uncluttered and genuinely unpretentious feel that cannot fail to communicate. All this plus

good build quality and sensible features at a realistic price makes up the necessary ingredients for a Best Buy.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	65.9W	65.5W	64.6W
4ohms	87.5W	91.2W	88.1W
Dynamic Headroom (IHF)	+1.5dB (91.8W)		
Peak Current (5msec, 1% THD)	8.3A*		
Output Impedance	0.129ohms		
Damping Factor	62.0		
	CD/Aux	MM	
Stereo Separation (1kHz)	70.5dB	70.6dB	
(20kHz)	45.4dB	45.9dB	
Channel Balance (1kHz, -20dBV)	0.23dB	0.01dB	
(-60dBV)	1.80dB	1.63dB	
Total Harmonic Dist. (0dBW)	-90.6dB	-92.0dB	
(Two-thirds power)	-73.1dB	-74.9dB	
CCIR Intermod. Dist. (0dBW)	-95.6dB	-75.6dB	
(Two-thirds power)	-73.4dB	-73.9dB	
Noise (A-wtd, 0dBW)	-83.8dB	-80.5dB	
(Two-thirds power)	-98.3dB	-82.1dB	
Residual noise (unwtd)	-76.9dBV	-76.8dBV	
Input Sensitivity (for 0dBW)	34.2mV	436uV	
(for full output)	276.5mV	2.21mV	
Disc Overload (1kHz)		137.9mV	
(20kHz)		1242mV	
(50kHz)		2685mV	
Tape Output/Impedance	10.95V (disc) / 508ohms		
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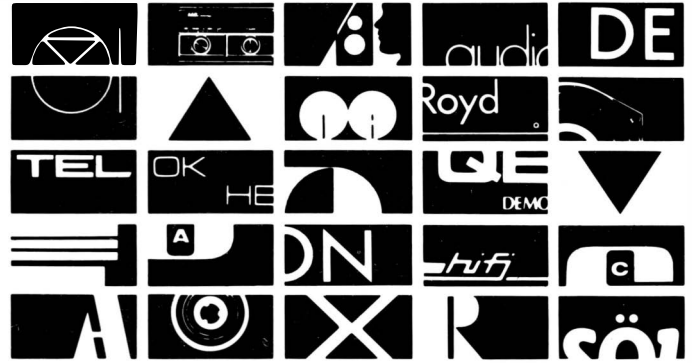


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The KA-3020 turns out to be cracking good little amplifier, if a trifle short in the welly department, so why not beef up the power supply with a larger 200VA transformer and 7500uF reservoir capacitors, exchange the Sanken output transistors for higher current devices and, Kato's-your-uncle, you should have a combination offering extra power and quality.

Unfortunately life and hi-fi design are never so simple. Although the KA-4020 is a jumbo version of the 3020, the latter's delicate sensibilities have become thoroughly jumbled up along the way. The extra 40W or so of power only costs another £30 and Kenwood has also thrown in extra goodies like an MC vinyl disc input and mute facility to sweeten the package. Otherwise the two amplifiers look very similar indeed.

Inside you'll find the same two circuit boards, separated by a large alloy heatsink, but a discrete, low noise headamp is added to the RIAA stage in order to accommodate low-output MC cartridges. All this runs off a separately regulated power supply, further isolating this input board from the main line and power amp stages. Tight RF filtering around all inputs and speaker outlets remains a feature of the 3/4020 design.

Lab Report

All the measured evidence points towards the KA-4020 being closely related to the KA-3020 rather than the bigger KA-5020 (see issue 92). The 100W rating is scrupulously preserved across the entire audio range, while the 1.2dB headroom increases this to 134W for musical peaks. Stereo separation and channel balance are the same as the 3020's because these are related to the input PCB and volume control, while both IMD and THD match the 3020 input for input; notice the similarity between the relevant 3D plots. So what, if anything, distinguishes the

4020? The low frequency response of the MM vinyl disc input is extended to 0.7Hz(!) and the A-wtd S/N ratio is significantly improved to 91dB (ref two-thirds output). Regrettably the unweighted hum figure is some 8dB worse at -69dBV, but the amplifier is slightly more sensitive, requiring 0.34mV rather than 0.44mV for 1W via the MM input.

Sound Quality

However marginal the technical differences, Kenwood's KA-4020 failed to fire the interest of our panel. The MM vinyl disc input did seem a little weightier: this lent extra authority to the Rachmaninov LP, but was just as likely to muddy the solo bass from Marty Paich's jazz offering. The CD input had the edge with its marginally lighter and smoother sound, atmospheric enough but tempered by a very polite and perhaps too civilised treble. It certainly lacks the crispness and stereo focus that brings the 3020 to life.

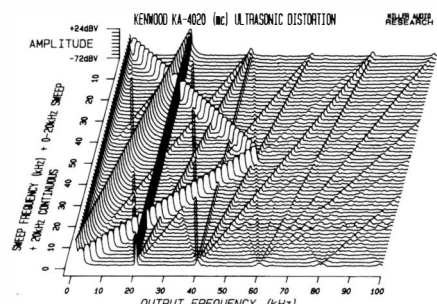
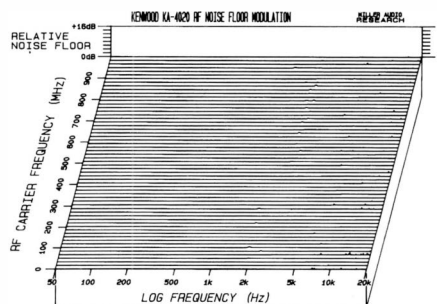
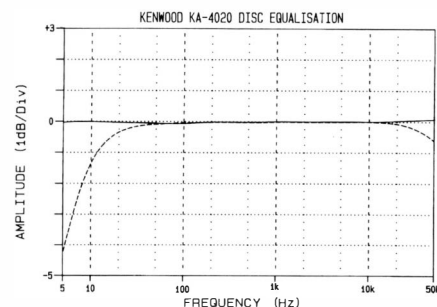
On the other hand the overall sound is often as delicate and relaxing as the 3020. Indeed the panel stressed that this amplifier was still capable of generating an interesting and thoroughly un-fatiguing sound, in spite of lacking the sparkle and conviction of its smaller stablemate.

Conclusion

Fascinating, isn't it, how the most innocent of modifications can so alter the entire character of an amplifier? Sure, the KA-4020 is more powerful than the 3020 on paper, but it actually sounds less open, free and dynamic in practice. Yet there remains an underlying bond between the two models, a sort of Corporate Identity if you like, even if this is as much a function of their common heritage as anything else. But when push comes to shove, the KA-4020 fails to burst free of its trappings and the spirit of the music is lost in the confusion.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	104.4W	102.7W	102.5W
4ohms	148.6W	154.7W	140.2W
Dynamic Headroom (IHF) +1.2dB	(134.4W)		
Peak Current (5msec, 1% THD)	10.4A		
Output Impedance	0.119ohms		
Damping Factor	67.3		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	69.7dB	69.7dB	69.2dB
(20kHz)	44.8dB	44.5dB	44.5dB
Channel Balance (1kHz, -20dBV)	0.18dB	0.05dB	0.00dB
(-60dBV)	1.52dB	1.77dB	1.95dB
Total Harmonic Dist. (0dBW)	-93.7dB	-92.9dB	-92.4dB
(Two-thirds power)	-72.4dB	-73.6dB	-74.8dB
CCIR Intermod. Dist. (0dBW)	-95.8dB	-72.1dB	-76.5dB
(Two-thirds power)	-71.8dB	-71.4dB	-73.0dB
Noise (A-wtd, 0dBW)	-81.6dB	-81.0dB	-72.2dB
(Two-thirds power)	-97.5dB	-90.9dB	-72.9dB
Residual noise (unwtd)	-68.8dBV	-68.7dBV	-68.7dBV
Input Sensitivity (for 0dBW)	28.2mV	344uV	28uV
(for full output)	285mV	3.32mV	278uV
Disc Overload (1kHz)		132.3mV	10.5mV
(20kHz)		1180mV	98.2mV
(50kHz)		1665mV	168.3mV
Tape Output/Impedance	12.6V (disc) / 387ohms		
Input loading	55.6kohms/760pF 42kohms/690pF		
		102ohms	
DC offset, left/right	-2.3mV/-2.9mV		
Retail Price	£170		



Marantz PM-40 SE

Recommended

MARANTZ HI-FI (UK) LTD, KINGSBRIDGE HOUSE, PADBURY OAKS, 575-583 BATH ROAD, LONGFORD, MIDDLESEX UB7 0EH. TEL: (0753) 680 868



Not content with upgrading its standard PM-40 amplifier to *Special Edition* status, Marantz has introduced a further twist by changing the reservoir capacitors in recent production.

The SE version is distinguished by a lack of tone controls and speaker selection switching, though the tape copying, balance and MM/MC vinyl disc cartridge options remain as standard. There's the same bold volume control and rotary input selector too, the only facilities left intact once 'Source Direct' is engaged.

The 40SE also features a chunkier power amp stage, using Toshiba transistors and larger 10,000uF electrolytics in the power supply. Which brings us onto the latest mod. Marantz recently 'auditioned' a handful of alternative electrolytic capacitors in an effort to generate a more up-front and sparkling sound. All new PM-40SE's feature these latest reservoir caps, which can be retrofitted to existing models for just £10. (Ask your friendly local Marantz dealer for details.)

The exact differences between the old and new caps are exceedingly small as both share the same specifications. In fact the only differences relate to the internal construction of the devices themselves and specifically the surface areas of the foils.

Lab Report

There is no measured or indeed subjective evidence to support claims for the superiority of the 'new' Marantz PM-40SE; in fact even the company itself seems to be endeavoring to play the whole thing down.

Both old and new versions turn in very respectable figures, including a substantial 18A peak current capacity to support the 61W (8ohms) and 97W (4ohms) power outputs.

The slight bursts of RF IMD at 250MHz

and 450MHz should be harmless enough, while distortion as a whole is typically better than 0.003 per cent. IMD is up slightly on MC vinyl disc (see 3D plot) though the 30.7dB headroom is very generous. The MM vinyl input's -92dB noise figure is especially impressive.

Sound Quality

This Marantz' big and generous sound made a lasting impression on our listeners. Its hearty balance can pull out strong and clean bass lines from rock and pop Compact Discs without sounding overly deep or heavy. Still, the abiding impression was that this amplifier exerted real grip on the music, sounding controlled but not forced.

The amp did not labour at its task, suggested one listener, and sounded both natural and fresh. The panpipe CD seemed especially atmospheric on this occasion, and the amp picked out tonal shades that had been glazed over by many others. The MM disc input was equally well received, though it was perhaps a little cooler in its portrayal of our classical LPs.

The conviction of Marty Paich's jazz recording, on the other hand, was all the more tangible. Instead of just bobbing along, the rhythm seemed bolstered with added drive and solidity. Far from being smothered, low-level detail remained as vibrant and alive as ever.

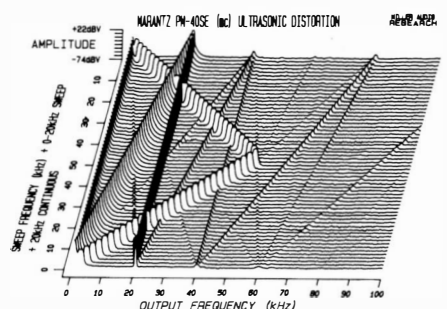
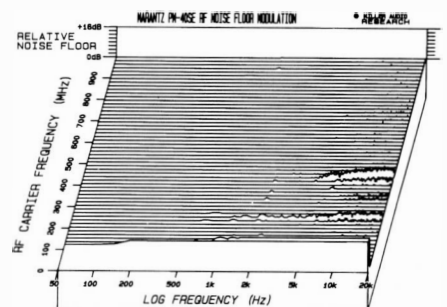
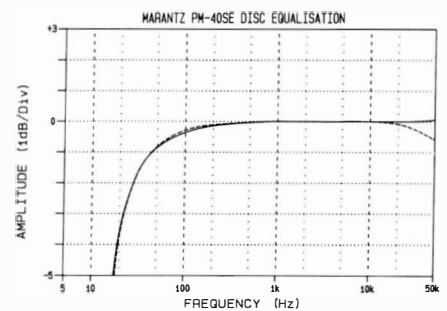
The only real criticism from our panel - mild though it was - concerned a bias towards pop and jazz material rather than the warmth and fullness of our classical selection.

Conclusion

In its latest form the PM-40 SE has emerged as a very fine amplifier indeed, certainly the best that Marantz has ever produced and a most promising sign for the future of the brand.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	59.6W	60.7W	59.6W
4ohms	92.2W	97.0W	95.1W
Dynamic Headroom (IHF)	+1.15dB (79.1W)		
Peak Current (5msec, 1% THD)	17.8A		
Output Impedance	0.047ohms		
Damping Factor	169.0		
Stereo Separation (1kHz)	CD/Aux	MM	MC
(20kHz)	92.1dB	89.5dB	87.4dB
	67.7dB	65.5dB	63.7dB
Channel Balance			
(1kHz, -20dBV)	0.20dB	0.45dB	0.48dB
(-60dBV)	0.68dB	0.65dB	0.68dB
Total Harmonic Dist.			
(0dBW)	-95.8dB	-95.7dB	-95.4dB
(Two-thirds power)	-91.1dB	-92.2dB	-90.2dB
CCIR Intermod. Dist.			
(0dBW)	-95.0dB	-87.9dB	-84.7dB
(Two-thirds power)	-85.2dB	-82.5dB	-80.5dB
Noise (A-wtd, 0dBW)	-89.1dB	-86.2dB	-74.5dB
(Two-thirds power)	-98.4dB	-91.8dB	-74.5dB
Residual noise (unwtd)	-76.8dBV	-76.7dBV	-76.7dBV
Input Sensitivity (for 0dBW)	23.7mV	359uV	38.5uV
(for full output)	184mV	2.75mV	296uV
Disc Overload (1kHz)		160.9mV	17.1mV
(20kHz)		131.2mV	145.0mV
(50kHz)		181.3mV	208.9mV
Tape Output/Impedance		10.7V (disc)/221ohms	
Input loading	29kohms/220pF	45kohms/390pF	100ohms
DC offset, left/right			-7.7mV/5.5mV
Retail Price			£240



Onix OA21s/SOAP

ONIX ELECTRONICS LTD, 5 KENDAL COURT, RAILWAY ROAD, NEWHAVEN BN9 0AY. TEL: (0273) 517 358



Lack of extensive coverage in *Hi-Fi Choice* doesn't seem to have hampered the commercial viability of the Onix brand, a small British specialist that has now been producing amplifiers for nearly ten years, and exporting them all around the world.

Minimalist hardly does justice to the stark appearance, though the large rotary volume control and input selector do lend the £350 OA21s a certain style. It might not be a bad idea to annotate the input knob to help locate either the disc or one of four line options. But once its foibles are appreciated it becomes a doddle to use, and there's even a solid-state protection circuit to prevent the most ham-fisted from blowing it up!

Inside, the amp is constructed on high quality laminated PCBs, with the option of either MM or MC vinyl disc inputs available on interchangeable boards (we tried the MM version). The CD input is 'slugged' by two series-coupled metal-film resistors, so don't be surprised to find, say, the tuner input sounding rather different.

The huge ILP mains toroid looks rather impressive, though it's possible to bolster the supply still further with Onix' outboard reservoir called SOAP. This add-on box employs higher quality caps and rectifiers to act in parallel with the OA21s' own supply, an upgrade that'll set you back another £180.

Lab Report

With SOAP in place the OA21s performs as if it has a very stiffly-regulated supply, offering a 2.4dB increase from 59W (8ohm) to 103W (4ohms), together with a corresponding reduction in dynamic headroom to just 0.7dB.

Most distinctive of all is the massive increase in THD and IMD that occurs with increasing frequency and level (see 3D plot). Hence the quoted power figures at 20kHz represent the amp's hard clip

point. Even at 1kHz, distortion still varies from 0.008 to 0.05 per cent though the effect is less marked via vinyl disc since distortions in the RIAA network precede those in the power amp.

Sound Quality

As oddballs go, this example showed a marked deviation in balance, detail resolution and sheer involvement between its CD and MM disc inputs. Our listeners thought it distinctly muted via CD, as if every transient was squashed by opposing blows from an electronic mallet. Imaginative lot, our panel.

Nevertheless the OA21s did succeed in stripping the Chris Rea CD of its life and dynamics. The panpipes, which are not so pointedly dynamic, seemed to escape this effect, only to fall foul of an impatience in the sound, which seemed to be hurrying along without actually getting anywhere. It was easy to lose track of the music until SOAP was brought into action, for this introduced a keener edge to most CDs while restoring their dynamics. However, they sounded faster, brighter and often unpleasantly shrill too, as if 'clad in metal', to quote one listener.

Switching to MM vinyl disc brought a near miraculous change in character. The music was suddenly richer, fuller, more transparent and considerably more engrossing. The Rachmaninov LP was not skirted over like the classical CD, the amplifier now seeming to have the time to reflect on the subtle qualities of each instrument. The *Dances* carried a menacing threat, a real brooding darkness that hung over the soundstage as if shaking off the restraints imposed with CD.

Conclusion

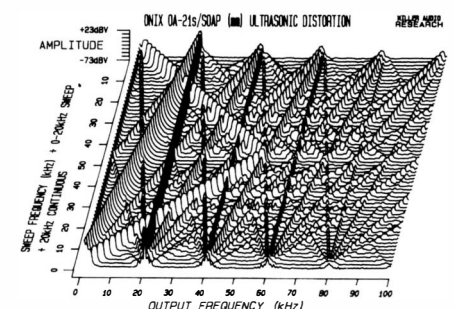
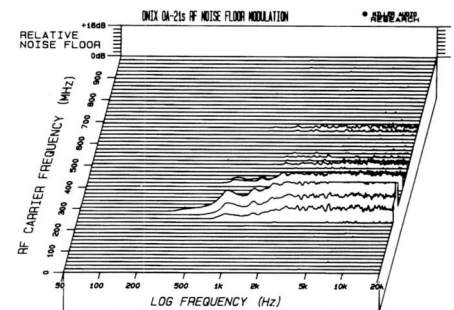
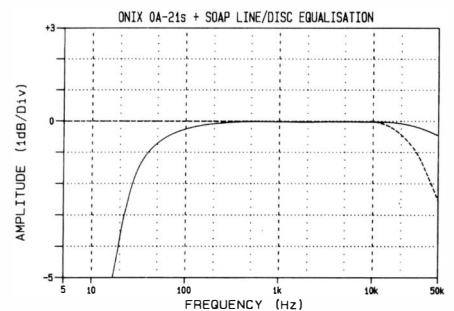
What we seem to have here is a CD-phobic amplifier. Dyed-in-the-wool vinyl users should certainly try for a dem, if only to experience the captivating

'presence' of the MM vinyl disc input. Yet the baffling inconsistency between one input and another precludes formal Recommendation.

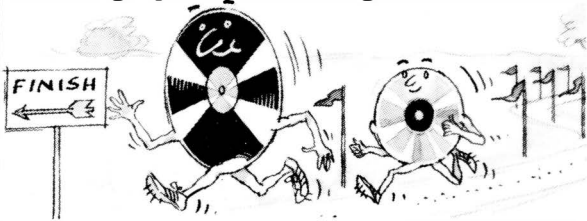
TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	58.6W	58.8W	55.2W*
4ohms	99.0W	103.0W	98.0W*
Dynamic Headroom (IHF)	+0.67dB (68.6W)		
Peak Current (5msec, 1% THD)	9.8A*		
Output Impedance	0.042ohms		
Damping Factor	192.6		
	CD/Aux	MM	
Stereo Separation (1kHz)	58.6dB	60.8dB	
(20kHz)	32.9dB	36.4dB	
Channel Balance (1kHz, -20dBV)	0.12dB	0.14dB	
(-60dBV)	1.09dB	1.11dB	
Total Harmonic Dist. (0dBW)	-82.2dB	-72.9dB	
(Two-thirds power)	-66.0dB	-65.4dB	
CCIR Intermod. Dist. (0dBW)	-85.8dB	-60.5dB	
(Two-thirds power)	-67.1dB	-58.8dB	
Noise (A-wtd, 0dBW)	-80.2dB	-75.2dB	
(Two-thirds power)	-94.3dB	-79.3dB	
Residual noise (unwtd)	-64.7dBV	-64.8dBV	
Input Sensitivity (for 0dBW)	43mV	454uV	
(for full output)	328mV	3.42mV	
Disc Overload (1kHz)	110.9mV	830.3mV	
(20kHz)	830.3mV	755.0mV	
(50kHz)	755.0mV		
Tape Output/Impedance	5.546V (disc)/2.37kohms		
Input loading	16kohms/59pF	46.3kohms/183pF	
DC offset, left/right		-17.4mV/-12.6mV	
Retail Price		£350 + £180	

* Refer to lab report



How fast is CD closing the gap on analogue?



Pretty fast if the latest CD models are anything to go by. Undoubtedly CD has improved considerably over the past couple of years. Even the new modestly priced Arcam shows what giant steps the medium has made recently. So where does this leave analogue devotees? There is little doubt that you have to pay considerably more for a comparable turntable/arm these days. The addition of the new Lingo to the famous Linn has made this a vinyl connoisseur's dream and while we think this combination sounds superb we refuse to have 'a head in the sand' attitude towards CD. We simply sell the best of both mediums.

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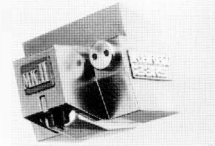
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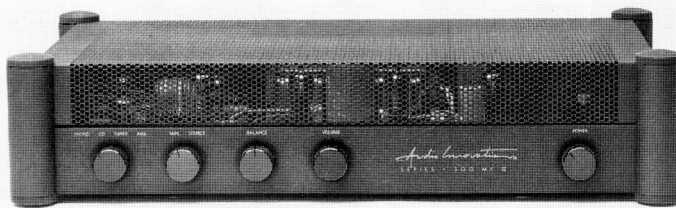
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Philips FA890

PHILIPS ELECTRICAL LTD, CITY HOUSE, 420-430 LONDON ROAD, CROYDON, SURREY CR9 3QR. TEL: (081) 689 2166



Cast your mind back a few years and you might remember the Philips FA880, a competent enough amplifier that proved rather better via MM vinyl disc than CD. Put the new FA890 up against the 880 and you'd be hard pressed to spot - or indeed hear - the difference.

In fact the only crucial 'upgrade' lavished upon the 890 is ergonomic: it now features full remote controlled operation, including a motorised volume knob, for which the price has only gone up by a modest £30.

Aesthetically nothing has changed, so the volume and on/off controls are still illuminated in a garish blue, while the row of input pushbuttons are picked out with red LEDs. Input selection is performed using solid-state CMOS switches (with extra logic to accommodate the IR control), while the separate record-out knob remains a conventional, mechanical device. Both high and low output vinyl disc cartridges are accepted, in addition to six other line sources.

Lab Report

I've checked back over my old circuit notes and the FA890 does appear to use the same low noise FET input and active RIAA stages, plus the same Toshiba driver and power output transistors as the 880. Philips might have tinkered with the power supply, however, because output is up by 11W to 120W (8ohms) while dynamic headroom has decreased from 1.3dB to 1.1dB.

The 7.2A peak current is limited by the invasive protection circuitry, but at least the A/B speaker selector is now routed via these same heavy-duty relays. Consequently the output impedance has decreased from 0.13ohm to 0.057ohm.

The gently tailored disc response (-3dB at 20Hz) still fits the standard IEC curve, while distortion is just as predictable as before: THD hovers around

0.0025 per cent while IMD increases from 0.003 to 0.022 per cent via MC vinyl disc. The 3D plot shows traces of second and third-order IMD as a result.

Differences? The EEC regulations on RF interference appear to have been taken more seriously this time around, the 'clean' RF IMD plot providing evidence of scrupulous input filtering. Channel balance is a bit odd, the maximum error regrettably occurring around the volume control's most commonly used position.

Sound Quality

Without any of this background information to hand, the listening panel still managed to return a remarkably consistent verdict on the FA890. Once again it was considered rather better on vinyl disc than CD.

With CD it would become quickly muddled or congested, particularly as the complexity of the music increased, but whatever seemed to confuse the CD input was absent via MM vinyl disc.

As far as tracking the natural dynamics of a performance was concerned, the panel thought it started slow and carried on that way. Although not obviously coloured, neither did it sparkle with vitality.

Vinyl, however, rewarded us with a smooth and inoffensive sound that was both less muddled but also more delicate in its handling of sensitive vocals. Our jazz selection was buoyed up by a very full and three-dimensional sound, bustling with activity between and either side of the speakers. Yet Rachmaninov's piece, which is punctuated with announcements from the tympani, double bass and piano, tended to bop along in a rather happy-go-lucky fashion instead of swelling abruptly with power and gusto.

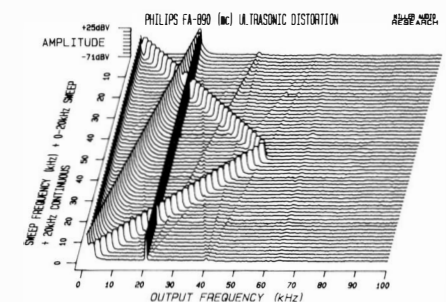
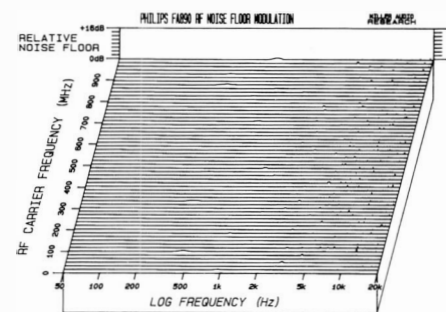
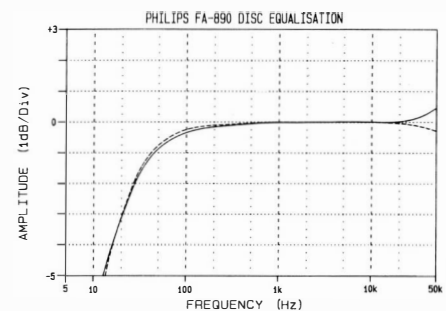
Conclusion

It's *deja vu* time here, with the FA890 emerging from blind listening tests as a

real trier but one that just fails to make the grade, though the convenience of remote control and very respectable vinyl disc performance make it worth considering.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	112.8W	119.6W	118.1W
4ohms	173.2W	188.6W	181.8W
Dynamic Headroom (IHF)	+1.1dB (154.8W)		
Peak Current (5msec, 1% THD)	7.2A*		
Output Impedance	0.057ohms		
Damping Factor	140.4		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	70.1dB	69.8dB	69.1dB
(20kHz)	45.2dB	44.3dB	44.3dB
Channel Balance			
(1kHz, -20dBV)	1.02dB	1.03dB	1.04dB
(-60dBV)	0.33dB	0.34dB	0.35dB
Total Harmonic Dist.			
(0dBV)	-93.9dB	-92.8dB	-92.5dB
(Two-thirdspower)	-91.4dB	-92.5dB	-92.7dB
CCIR Intermod. Dist.			
(0dBV)	-96.1dB	-83.7dB	-81.5dB
(Two-thirdspower)	-96.0dB	-81.6dB	-79.3dB
Noise (A-wtd, 0dBV)	-82.9dB	-81.1dB	-70.6dB
(Two-thirdspower)	-95.9dB	-88.4dB	-71.8dB
Residual Noise (unwtd)	-74.8dBV	-74.9dBV	-74.9dBV
Input Sensitivity (for 0dBV)	16.9mV	278uV	32uV
(for full output)	185mV	3.0mV	346uV
Disc Overload (1kHz)		145.0mV	16.3mV
(20kHz)		121.1mV	14.6mV
(50kHz)		1505mV	195mV
Tape Output/Impedance	8.72V (disc) / 69.9ohm		
Input loading	19.5kohms/340pF 46kohms/670pF		
	97.5ohms		
DC offset, left/right	-40.4mV/-36.9mV		
Retail Price	£230		



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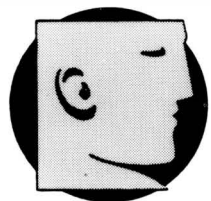
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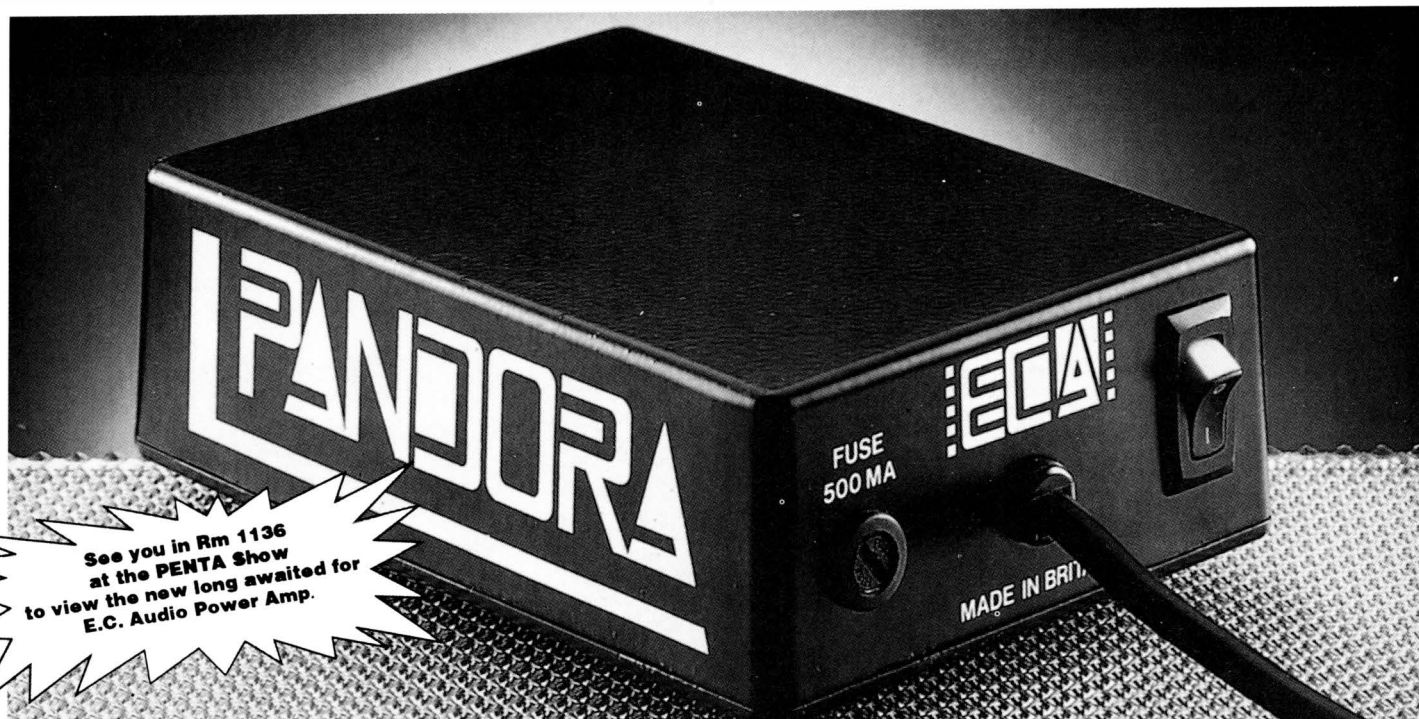
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Since QED's beefy A270 amplifier was last auditioned, the longstanding SA (Super Analogue) vinyl disc board has been superseded by a PA (Premium Analogue) version. Meanwhile QED has also launched its C300/P300 pre/power combination.

Nowadays the A270 and P300 share the same circuit board, power supply and Darlington output stage, and today's 270 now matches the 300 for output power and peak current, though the integrated model is perhaps a little less sophisticated in some areas.

This makes the basic £300 A270CD model, equipped with an elementary MM disc stage, a lustier beast than it once was, while an extra 4mm pair of speaker sockets have been fitted to facilitate bi-wiring.

The same friction-locked volume control, input and record-out selection knobs occupy the fascia but the 'DAT' legend has been quietly replaced with 'Tape 2!'. There's still the choice of five line inputs, while opting for the PA upgrade maximises MM and MC vinyl disc performance too. (The original A270 can be upgraded from SA to PA through a generous part-exchange scheme.)

Lab Report

The PA disc board still relies on a single-rail power supply, but thanks to decent LM317 regulators, low-noise FETs and quality metalised polyester capacitors the A-wtd noise has improved from -72dB to -79dB (MC). The 20Hz response 'bump' has also been ironed out, but the slew-limiting that plagued the SA board has not been entirely banished.

Although headroom on the MC input has increased from 18dB to 19.3dB (20kHz), this still influences THD (0.07 per cent) and IMD (0.63 per cent). Many of the second to fourth order distortions tracking across the 3D plot are linked to this vinyl input as well as the integral

power amp - which, incidentally, suffers the same 200MHz RF resonance detected on the P300.

Sound Quality

This latest A270 delivered a smooth and spacious sound that is clearly evolved from the larger-than-life enthusiasm of earlier 270s. Listeners detected a glint of sibilance exaggeration alongside Chris Rea's voice, but the command of the music's natural dynamics and soundstaging seemed a fair trade-off.

This may not be the most linear amplifier in the world, but it does seem able to dig down and retrieve detail that's often concealed. It separated the component parts of our Vivaldi Concerto more effectively than much of the competition, for instance, conveying a sense of space and ambience. All listeners applauded its ability to generate a real feeling of anticipation, genuinely musical 'silences' helping to maintain the tension.

The MM disc input (PA board) was smoother and warmer still and also lost a little of the air and freshness that kept the CD input bubbling with enthusiasm. The double bass, piano, trombone and vibes from our jazz LP were all nicely split across the soundstage, unclouded despite a narrower soundscape than we sometimes encountered. It's a very likeable sound, very sweet and involving, but perhaps not as crisp as possible - more akin to the older QED sound in fact.

Conclusion

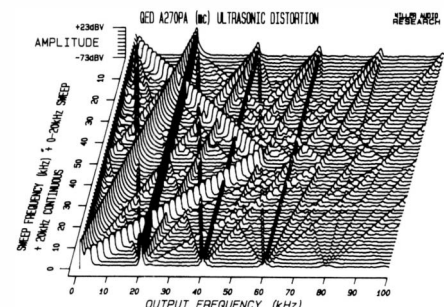
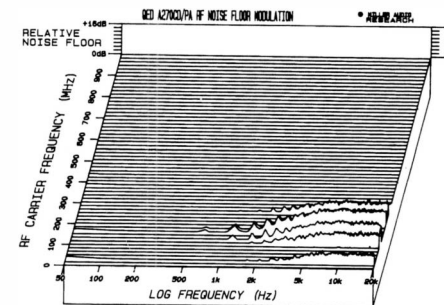
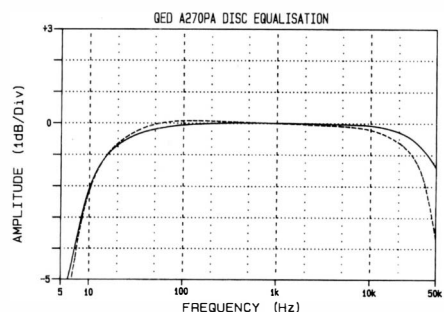
Today's A270 has an extra 20W on hand, together with a real belt of current to keep the most unruly speakers firmly in check. The amp is not as coloured as before, the sound seeming cleaner and drier in a way that helps paint a more neutral and descriptive picture of the musical event. The basic A270CD could form the heart of a cracking CD-based budget system,

though the full PA package is less obviously good value. Fortunately QED does offer a choice, so the A270CD retains its Recommended status.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	54.9W	60.7W	55.9W*
4ohms	81.1W	100.0W	92.2W*
Dynamic Headroom (IHF)	+0.78dB (72.7W)		
Peak Current (5msec, 1% THD)	17.0A		
Output Impedance	0.018ohms		
Damping Factor	434.9		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	77.9dB	81.9dB	76.4dB
(20kHz)	53.7dB	57.3dB	56.1dB
Channel Balance (1kHz, -20dBV)	0.24dB	0.22dB	0.27dB
(-60dBV)	1.08dB	1.03dB	1.05dB
Total Harmonic Dist. (0dBW)	-81.0dB	-80.0dB	-63.1dB
(Two-thirds power)	-71.9dB	-70.5dB	-60.8dB
CCIR Intermod. Dist. (0dBW)	-67.9dB	-50.4dB	-37.6dB
(Two-thirds power)	-49.5dB	-45.0dB	-38.7dB
Noise (A-wtd, 0dBW)	-77.3dB	-76.1dB	-75.1dB
(Two-thirds power)	-91.1dB	-83.3dB	-78.9dB
Residual noise (unwtd)	-56.7dBV	-56.3dBV	-56.3dBV
Input Sensitivity (for 0dBW)	47mV	838uV	38.2uV
(for full output)	364mV	6.4mV	269uV
Disc Overload (1kHz)	229mV	10.2mV	10.2mV
(20kHz)	1585mV	46.3mV	46.3mV
(50kHz)	1000mV	36.2mV	36.2mV
Tape Output/Impedance	8.0V (disc) / 4.88kohms		
Input loading	12.7kohms/50pF 65kohms/280pF		
DC offset, left/right	670ohms		
Retail Price	+4.1mV/+8.4mV		
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* Refer to lab report



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Teac A-X5000

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Whereas recent offerings from Teac have seemed a little on the flimsy side, the new A-X5000 has apparently been designed to look as brutal as possible. Its black alloy fascia is cluttered with chunky controls, though there is a certain symmetry to the layout. For a start the bass, treble, input and rec-out selectors all use the same style knob, surrounding four additional buttons that cater for loudness, subsonic filter, Tape 3 and source direct options.

The other two tape inputs are found alongside CD, aux, tuner and phono (vinyl disc) on the main selector, though MM and MC cartridges must be further distinguished using another button. Volume, balance, muting and A/B speaker selection complete the register of widgets.

Inside I was glad to see localised switching for all the inputs, though any benefits from this (on stereo separation for example) are likely to have been thwarted by blunders further into the circuit. The power supply is substantial enough, and the dual-complementary output stage a novelty at this price, but the speaker switching looks a real botch.

Lab Report

Instead of routing the main outputs direct to the 4mm binding post/sockets, or using a local relay to do the job, the power amps are first connected to protection relays mounted near the disc and line stages; signal is then transferred back across to the A/B switches using more ribbon cable, before passing under the mains transformer to the binding posts! No wonder the output impedance is a highish 0.23ohm and separation an indifferent 36dB at 20kHz.

Although a good 107W is delivered into 8ohms and 140W into 4ohms, at lower impedances the output collapses as current becomes limited to a mere 4.8A - an inadequate figure for an amp of this

power. The vinyl disc RIAA network results in a wobbly response with a 'warm' +0.5dB bump between 50-400Hz, but at least there's plenty of headroom. This plus lashings of feedback keep distortion at bay (typically 0.003 per cent), though this does open it up to RF IMD in the 1-100MHz region, an area kept very 'busy' by most CD players.

Sound Quality

There's always one amp that bombs out in the listening tests, but on this occasion the Teac ran close second to Goodmans' monstrosity. The panel felt it similar, in a disinterested sort of way, to the unfortunate HK6600, but rather than sounding brash or forward, the music simply, in the words of our listeners: "limped from the speakers and proceeded to crawl across the carpet".

The sound initially seemed quite promising with the intro to our Chris Rea CD bopping along contentedly until becoming a little muddled and distracting the attention. Neither panflute nor guitar were adequately resolved, the former giving the impression of someone going through the motions of blowing down a collection of pipes, rather than producing real, involving music.

The tonal balance is about right, but the amplifier simply fails to communicate on an emotional level. The vinyl disc input seems to have a better grasp of perspectives, and is marginally better balanced too, though again the music itself is grey and lacking in sparkle and vitality.

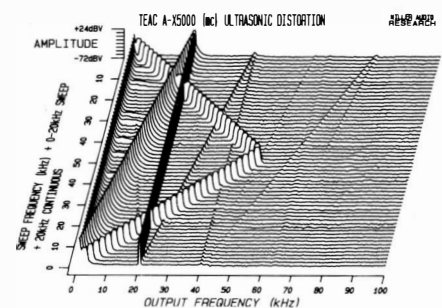
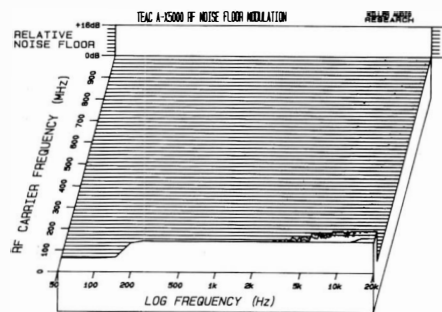
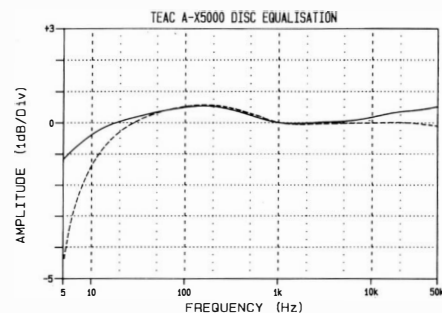
Conclusion

Bearing in mind that Teac has the skill and ingenuity to set world standards in CD transport design, the A-X5000 comes as a genuine disappointment. If only a similarly thoughtful approach could be brought to the design of its amplifiers - whatever the price - then ill-judged units

like the A-X500 could be quickly put out to pasture.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	109.9W	106.7W	108.9W
4ohms	129.8W	140.2W	142.5W
Dynamic Headroom (IHF) +1.25dB	142.3W		
Peak Current (5msec, 1% THD)	4.8A		
Output Impedance	0.229ohms		
Damping Factor	34.9		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	60.2dB	61.6dB	60.7dB
(20kHz)	38.0dB	35.7dB	35.3dB
Channel Balance (1kHz, -20dBV)	0.50dB	0.65dB	0.72dB
(-60dBV)	0.07dB	0.45dB	0.52dB
Total Harmonic Dist. (0dBW)	-90.6dB	-90.4dB	-89.9dB
(Two-thirds power)	-88.9dB	-89.5dB	-91.5dB
CCIR Intermod. Dist. (0dBW)	-91.2dB	-88.6dB	-85.8dB
(Two-thirds power)	-86.4dB	-84.9dB	-83.7dB
Noise (A-wtd, 0dBW)	-78.4dB	-77.6dB	-65.1dB
(Two-thirds power)	-94.6dB	-85.0dB	-65.0dB
Residual noise (unwtd)	-64.1dBV	-64.1dBV	-64.0dBV
Input Sensitivity (for 0dBW)	16.9mV	279uV	28.9uV
(for full output)	176mV	2.92mV	295uV
Disc Overload (1kHz)		106.5mV	10.4mV
(20kHz)		940.3mV	102.5mV
(50kHz)		1790mV	208.5mV
Tape Output/impedance	6.3V (disc) / 1.42kohms		
Input loading	26kohms/230pF 42kohms/600pF		
		108ohms	
DC offset, left/right	-52.5mV/-48.4mV		
Retail Price	£299		





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Yamaha AX-550

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There is one school of thought which proposes that flexibility can be enhanced without compromising sound quality, a proposition that's tested here by Yamaha. The £239 AX-550 amplifier is just one of a new product range distinguished by a gently contoured fascia and stylish titanium finish. Ergonomics are clever too, for although the 550 offers plenty of facilities, the layout is far from cluttered.

Both volume control and input selector can be adjusted by remote control, for instance, selecting any of the five line sources plus MM and MC vinyl disc independently of the record-out position. Conventional tone controls are joined by a variable-action loudness contour that operates over a 40dB volume range. A/B speaker selection, subsonic filtering and mono-mode options complete the role call of widgets.

This brings us onto ToP-ART, or 'Total Purity Audio Reproduction Technology', a snappy legend that refers to the purist aspect of the AX-550. This includes a 'Pure Direct' setting (bypassing all filter, tone and balance controls), symmetrical PCB layout, chunky board wiring and a heavy-duty chassis. There are a few trendy components too, including the Duorex electrolytics also favoured by Audiolab.

Lab Report

Yamaha makes much of the 'I/O Straight Signal Path' adopted within the 550, yet because the motorised selector has to be mounted directly on the fascia, all inputs are actually diverted across the entire length of the case! As a result stereo separation falls to a poor 37dB at 20kHz, though thankfully the A-wtd noise measurements still clock in at a fabulous -97dB (CD) and -90dB (MM vinyl).

Furthermore the 550 is capable of sustaining a thunderous 200W into 4ohms, with a peak current of 18.8A, all via a

usefully low output impedance of 0.024ohm.

Distortion is vanishingly low, better than 0.001 per cent for much of the time in fact - just look at the 3D plot. This may be the 'cleanest' result of the survey, but don't go thinking the AX-550 is perfect; it's simply a measure of the compensation utilised by Yamaha.

Sound Quality

With the Pure Direct facility engaged, the AX-550 did not turn out to be quite the sharply detailed powerhouse we might have expected. Instead it created a very tuneful sound with a solid and well-formed bass, but lacked leading-edge definition at higher frequencies. Although it was always very tidy and inoffensive, there was not the nth degree of detail and it was also rather lifeless and lacking emotion for much of the time.

Phrases like 'very nice', 'comfortable' and 'civilised' cropped up again and again, whether listening via CD or MM vinyl disc. Indeed, the amp proved to be gratifyingly consistent between vinyl and line inputs, which enjoyed the same sense of power and bass extension but were also slightly slow in attack.

The guitar on the Sting LP lacked the freshness and clarity that had been heard with the better amplifiers, for example, a quality that was tentatively linked to a mild vagueness in imaging.

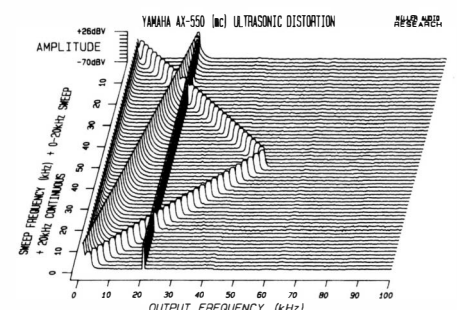
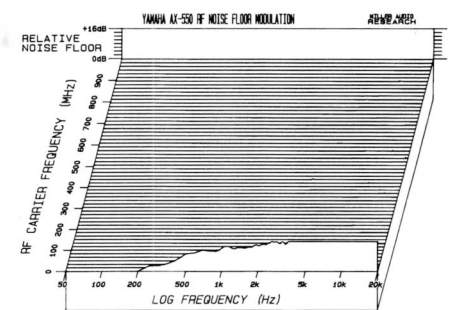
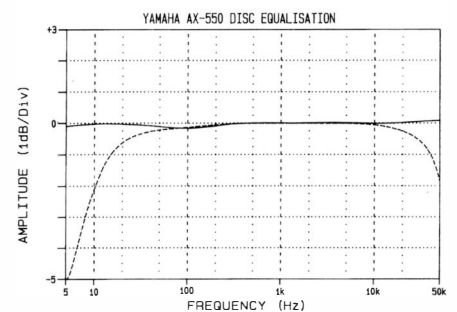
Conclusion

Watts per pound this amplifier represents darn good value. Throw the remote control facilities into the equation and, materially at least, it's hard to avoid recommendation. But sound quality is the main and final arbiter of these tests, and although the AX-550 is a thoroughly competent, consistent and tidy performer, it does lack the necessary sharpness or 'electricity' to bring home the bacon. That

said, those more concerned with convenience and appearance could do a lot worse than check out Yamaha's £240 titanium terror!

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	130.6W	130.6W	127.4W
4ohms	192.7W	202.5W	183.1W
Dynamic Headroom (IHF) +1.25dB (174.0W)			
Peak Current (5msec, 1% THD)	18.8A		
Output Impedance	0.024ohms		
Damping Factor	335.0		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	64.5dB	62.7dB	62.5dB
(20kHz)	39.3dB	37.1dB	37.2dB
Channel Balance (1kHz, -20dBV)	0.07dB	0.12dB	0.19dB
(-60dBV)	0.22dB	0.38dB	0.42dB
Total Harmonic Dist. (0dBW)	-96.3dB	-98.5dB	-97.7dB
(Two-thirds power)	-99.4dB	-101.8dB	-100.1dB
CCIR Intermod. Dist. (0dBW)	-98.5dB	-94.6dB	-93.6dB
(Two-thirds power)	-99.6dB	-94.2dB	-93.8dB
Noise (A-wtd, 0dBW)	-83.2dB	-81.5dB	-74.3dB
(Two-thirds power)	-96.9dB	-90.3dB	-74.9dB
Residual noise (unwtd)	-66.9dBV	-66.9dBV	-66.9dBV
Input Sensitivity (for 0dBW)	17.5mV	301uV	20.1uV
(for full output)	200mV	3.39mV	224uV
Disc Overload (1kHz)		147.7mV	9.7mV
(20kHz)		1259mV	86.9mV
(50kHz)		1830mV	125.5mV
Tape Output/Impedance	8.7V (disc) / 479ohms		
Input loading	56kohms/350pF 48kohms/330pF		
	224ohms		
DC offset, left/right	+8.8mV/+7.8mV		
Retail Price	£239		



Tech Talk

Paul Miller gives a guided tour through the lab tests employed in the amplifier reviews and explains what the graphs mean.

In keeping with the *Choice* rationale, each of the tested amplifiers was auditioned under blind conditions. Both Compact Disc and vinyl sources were pressed into service with a range of software chosen for its ability to reveal different aspects of an amplifier's subjective performance.

The equipment used included a Voyd/SME Series IV/vdH MC Two (analogue) and modified Teac P-10 CD transport feeding a 7350 chip PDM DAC from Deltec (digital).

Snell Type III speakers were pressed into service for the group listening sessions together with lengths of Gore-Tex Black Sixteen cable (manufacturer's own-brand cables were used if so instructed).

The listening programme included excerpts from: Chris Rea, *Auberge* (Magnet CD); Engelberg & Olsen, *Mosaic* (FXCD 81); Telemann & Vivaldi Concertos (BIS CD); Marty Paich Big Band, *The New York Scene* (Discovery vinyl disc); Sting, *Nothing Like the Sun* (A&M vinyl disc) and Rachmaninov's *Symphonic Dances* (Athena vinyl disc).

Measurement programme

The test programme includes both standard IHF A202

measurements together with more advanced techniques made available by the IEEE-controlled digital test equipment currently employed in my laboratory.

Power Output, Dynamic Headroom and Peak Current

Quoted in good old fashioned Watts this refers to the maximum output voltage of the amplifier into 8 and 4ohms loads, one channel driven to 1 per cent THD.

The IHF-A-202 dynamic headroom test employs a gated 1kHz signal, 20-cycles on/480 cycles off, and refers to a maximum of 1 per cent THD into 8ohms relative to the continuous power available into that same load.

For the first time the peak current available from an amplifier has been measured using a 5msec gated 1kHz signal into 1ohm, up to a limit of 1 per cent THD.

Previous peak current measurements have not taken account of distortion, as evidenced by the asymmetric +/- values quoted. The use of a fixed THD benchmark enables all peak current values to be compared directly.

Separation, THD, IMD, noise and sensitivity

All input sensitivities are measured with respect to an

output of 0dBW (=1W) and full power at 1kHz for the integrated and power amplifiers, or 1V = 0dBV out (6dB higher than IHF) in the case of the preamplifiers. Noise was measured with respect to the IHF input levels of 500uV (moving coil), 5mV (moving magnet) and 0.5V (line), input shorted, A-wtd and assessed as the true rms figure of 20 3rd-octave averages.

Disc overload is quoted in mV in the table so that this may easily be related to the peak output of a cartridge, while headroom is discussed in the text as a dB figure relative to these same IHF levels.

Separation was measured some +20dB above the nominal sensitivity as is the THD of each amp. For CCIR IMD the respective peak composite (19kHz + 20kHz) levels were 10mV (moving coil), 100mV (moving magnet) and 2V(line).

Broad-Band Radio Frequency Intermodulation Test

In general terms this test - recently presented at an AES lecture - reveals just how sensitive an amplifier is to spurious Radio Frequency noise, whether introduced directly or indirectly.

Conventional measurements examine the performance of the amplifier under closed-loop conditions where many of the inherent circuit nonlinearities are compensated for by the feedback network. By contrast the RF test probes the linearity of the amplifier under open-loop conditions where it is both non-linear and uncompensated.

A precision RF signal generator is employed to produce an RF carrier signal at 20mVp-p, modulated to a depth of 100 per cent using an external pseudo-random noise source. The resulting non-correlated AM/RF signal is then ramped between 1MHz-1GHz (1000MHz - now covering TV and satellite

baseband transmissions) by controlling the generator through an IEEE interface BUS and using a dedicated program developed in this laboratory.

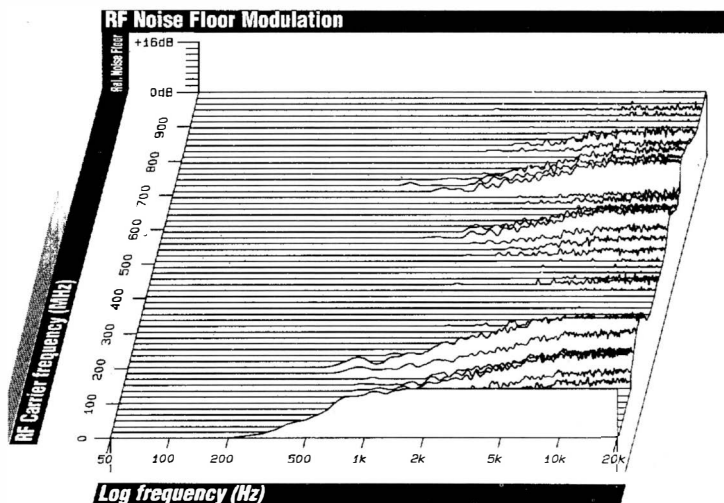
Once connected to the amplifier (via the line or CD-direct input), any subsequent demodulation and intermodulation between the sweeping carrier and its pseudo-random sidebands results in non-correlated noise appearing at audio frequencies at the output of the amplifier.

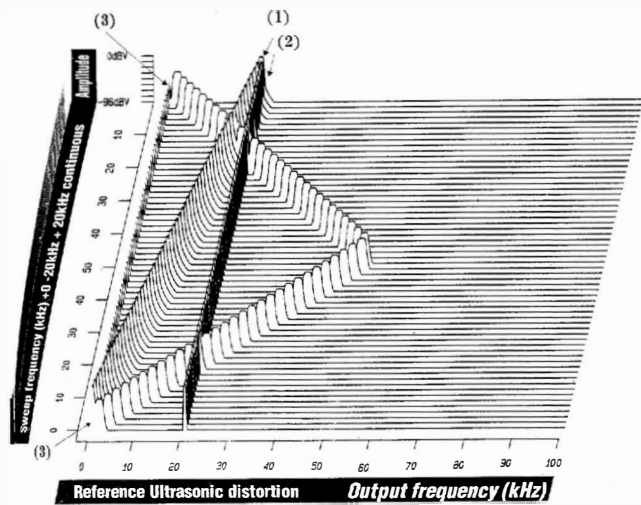
This therefore represents a change in the noise floor of the amplifier over a discrete portion of its frequency range. Such a random fluctuation may not necessarily be heard directly but simply makes it more difficult for the ear/brain to distinguish subtle dynamic inflections in the music signal itself.

By comparing the steady-state noise-floor of the amplifier with its noise floor under the influence of RF IMD, a measure of the difference and therefore the actual effect of RF IMD can be deduced. It is this change or difference in the noise floor that is depicted on the 3D plots.

The depth or z-axis is calibrated in steps of 100MHz and denotes the changing frequency of the RF carrier. By contrast the x-axis is restricted solely to the audio band (in this case 50Hz-20kHz) and is calibrated across a log, rather than linear, scale. The vertical or y-axis gives an indication of relative amplitude and is scaled in steps of 2dB over a maximum range of +16dB.

Clearly, any demodulated RF noise that causes a change in the noise floor greater than 16dB will give rise to a plateau effect on the plot. This situation is clear enough in the example plot (on the left) which demonstrates an amplifier's undue sensitivity to RF noise centred on bands at 140, 200, 575, 730 and 850MHz.





If an amplifier was singularly insensitive to RF noise then this plot of relative change would appear as a series of straight, unper-turbed lines.

Ultrasonic Distortion Test

Revised some 12 months ago, this is a particularly revealing test that highlights the interaction of high and moderate-level signals in the context of harmonic and intermodulation distortions (called 'routes' in the text) caused by such mechanisms as slew-limiting or the progressive reduction of feedback, the latter revealing an increase in open-loop non-linearities. It is not a knitting pattern, as one irreverent member of *Choice* would have you believe!

Three driving signals are employed, the 0-20kHz sweep (1= F0-20k) and continuous 20kHz tone (2 = F20k) raising the amplifier to 2/3 voltage output into a 4ohm load while the 0-50kHz-0Hz reversed sweep (3 = F0-50k-0) tracks at a level some -24dB below this. For integrated amps a pre-equalised composite signal was used for either the moving coil or moving magnet vinyl disc inputs (ref.20mV and 2mV @ 1kHz respectively). Strictly speaking an amplifier should be treated as a voltage source so each plot is individually calibrated in dBV (0dBV = 1V at 4ohms).

These sweeps were chosen to represent the kind of HF and ultrasonic signals likely to be handled by an amplifier in normal use. The ultrasonic spurious generated by CD players is a well-documented example, but it is less widely appreciated that the 20-

50kHz band noise from a vinyl disc or FM tuner can persist at levels only 10-20dB lower than peak signals in the audio band.

This is one reason why I place such store in disc overload margins (which generally fall relative to the excess gain required with increasing frequency) and why such measurements are now taken as high as 50kHz.

That aside, certain of these ultrasonic distortions will introduce IM products within the audio band of the amplifier - a point of particular interest with disc stages whereupon the IM routes will actually increase in level with decreasing frequency as a function of the RIAA characteristic.

The most obvious harmonic products are determined by multiples of the

F0-20k sweep (1) (given by 4,5) and the F20k tone (2) (given by 6,7). The remaining distortions shown on the 3D plot are produced by intermodulation between either or all of (1), (2) and (3), and (1) together with the harmonics of (2), ie (6) and(7).

Directly audible IM distortions include the difference products F20k - yF0-20k [y = 1,2] given by (8) and (9) and 2F20k - 2F0-20k given by (10). Higher-order difference IM distortions associated with multiples of (2) and (1) will also wend their way directly into the audio band.

This example plot shows a variety of basic summation IM routes such as F20k + yF0-20k [y = 1,2,3] given by (11,12 and 13) together with higher-order secondary summation IMD such as 2F20k + yF0-20k [y = 1,2,3] and 3F20k + yF0-20k [y = 1,2,3,4]. These are marked as (14)-(16) and (17)-(20) respectively. Extremely high-order routes such as 4F20k + yF0-20k [y = 1,2,3], (21)-(23) are also visible.

Of course there are the interactions between (3) and (1) and (2) to consider. Three summation IM routes are clearly visible: F0-50k-0 +F0-20k (24), F0-50k-0 + F20k(25) and F0-50k-0 + F0-20k +F20k (26)!

In general the presence of second order in-band IMD products seems to encourage a warmer though softer and richer sound quality, particularly if these distortions arise

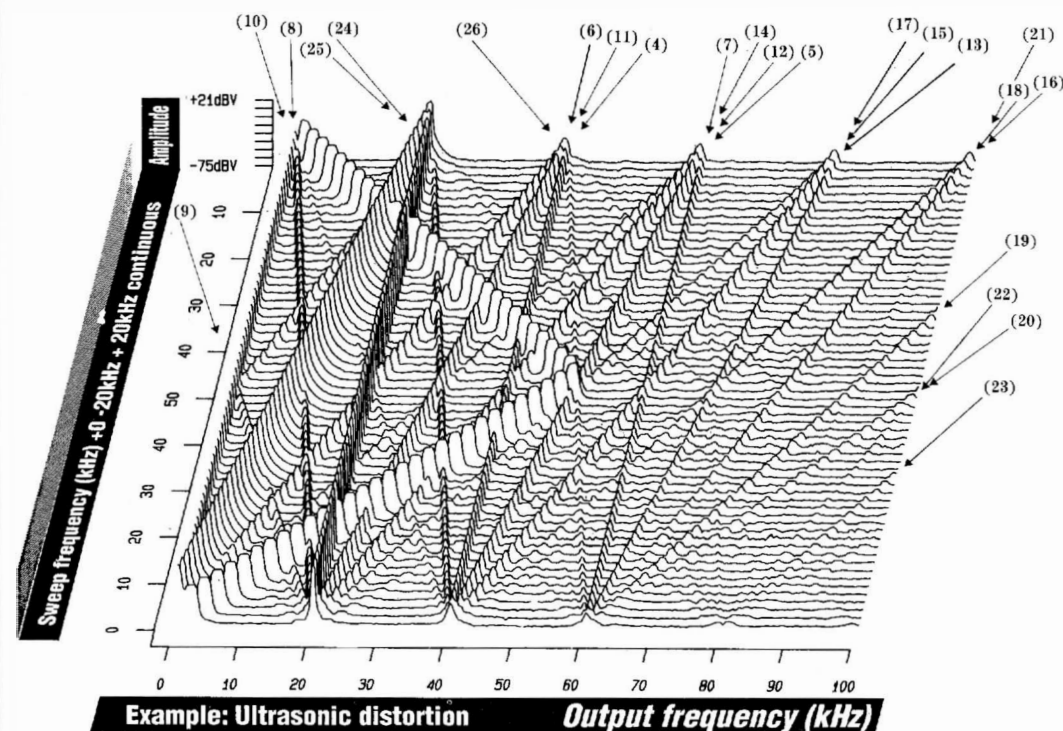
in the disc stage. The equivalent third and higher-order IMD mechanisms introduce a harder and less beguiling character.

A word of warning. Do not use these plots as some sort of guide to the absolute quality of the amplifiers, because this is simply not the case.

Any distortion mechanism represented on the plot will have some subjective consequence. Conversely, just because a peculiar coloration or distortion is heard this does not mean it will necessarily be manifest on the 3D plot. This test remains but one piece in a very complex jigsaw and the results must be viewed in the light of those obtained via the RF IMD test.

The combination of Ultrasonic Distortion and RF IMD plots can provide a valuable indication both of the amplifier's subjective performance and its likely compatibility with other audio equipment, particularly CD players. An amplifier that gives rise to a 'clean' Ultrasonic plot but suffers RF demodulation may well sound coarse or muddled as a result. Conversely, a relatively constant carpet of innocuous closed-loop distortions can effectively mask the fatiguing effects of RF IMD.

Taken together, the two plots give more insight than ever before into the potential sound quality of an amplifier.



Conclusions, Best Buys and Recommendations

Paul Miller reports back from the group listening tests to tell us which amplifiers did the business and which ones failed to inspire.

No bumper crop of recommendations this time around, but then we never guarantee a fixed percentage of winners and losers in this test. The simple truth is we've already caught up with the cream of the crop: amps like the Arcam *Alpha II*, Mission *Cyrus One*, Pioneer *A-400* and Rotel *RA-810A* to name but four.

These are the kind of amplifiers that linger, spanning season after season while much of the competition 'evolves' a generation or two without witnessing any real improvement. In future perhaps we'll drop in on these established favourites occasionally, just to check whether they're maintaining a competitive edge. Could be interesting, don't you think?

Once again, this gathering showed a greater awareness of EMI (Electromagnetic Interference) in line with recent European missives. Yet instead of designing amplifiers that are fundamentally less susceptible to RF IMD we are simply being provided with the 'same' amplifiers equipped with a token RF filter or two.

Low mortality

Consequently you'll find amplifiers like the Goodmans *GSA-600*, Teac *A-X5000*, Carver *CM-1090* and Harman Kardon *HK6600* appear solid enough on paper yet remain uninspiring on audition. There is little backbone to support Carver's amp while HK's *6600* is out on a limb, employing a topology that simply fails to capture the dynamic 'HK sound' of its companions. The cheaper *HK6200* has more going for it with a light, breezy and occasionally rough sound, but there's little to justify the £75 gap between this and the cheaper *HK6100*.

At least all the amplifiers remained conscious through the listening and test proce-

dures. Nothing went pop, but there were a few weird results to pique my interest. Take the Onix *OA-21s*, an amp that seems to loathe the merest whiff of CD, which it handles with complete disinterest. But switch to disc and the music is suddenly full of vibrant detail, subtle yet emphatically convincing.

By contrast Philips' *FA-890* and the Kenwood *KA-4020* were rather more decorous in character, though both won through on MM rather than CD. Unfortunately it was this very affability that was to prove their undoing, for though both were inoffensive, neither was particularly engaging.

And then there were those that came within a hair's breadth of Recommendation. Big and beefy amps like Dual's *CV-5670* and the *AX-550* from Yamaha, both of which offer close on 200W into lower impedances. Not bad for just £250, yet lacking that sparkle, that flair or sense of adventure that might have brought the music to life. Still, these are both rugged and very flexible amplifiers that shouldn't be dismissed out of hand.

I would qualify Audiolab's pre/power combination in similar fashion, for though the matter-of-fact presentation was judged too stark and austere by our panel, I expect they'll go down a treat in systems predisposed to this sort of arrant neutrality.

Hafner's pre/power combination is not quite so powerful but then it's also less taxing, the smooth, open and expressive quality that flooded across via CD sealing its Recommendation. As a line-only combo it represents especially good value.

Back on the integrated front, AR's *A-05* found greater favour with our panellists than any of its companions had in the past. Here at last is the dryness and control we've heard

before but tempered with a richness and detail that has previously been missing.

QED has fared well enough in the past, but the competitiveness of its latest *A270* is taxed by options like the new Premium Analogue disc board. Stick with the improved *A270CD* model and its natural command of dynamics and soundstaging will have you on the edge of your seat.

Powerful but calm and refined

Judging from earlier reviews I fully expected Marantz's *PM-40SE* to have our listeners dancing in the aisle but, alas, this was not to be. The amp is certainly very good, however, with a fresh and hearty balance that makes you sit up and take notice.

With a more substantial budget, there's little to touch the latest *8000A* from Audiolab. Powerful but calm and refined with it, the *8000A* is neither bland nor excitable. At best it seems paradoxical, combining an authoritative grip over music and speaker alike without strangling the delicate, emotive qualities.

£90 more and Audio Innovation's latest *300* sets out to prove that high distortion needn't prompt a flat or mundane sound. Power is not exactly in abundance, so the *300II* gives of its best with relatively simple material; otherwise there's a tendency for its luscious sense of space to become 'filled in' by a busy soundstage.

The *Series 300II* sparked plenty of debate with an ability to create an expectant sound, full of anticipation and tension, drama and vitality. Recommended, but remember it was too 'dramatic' for some of our listeners!

Ok, so there were no out-and-out stonkers in this test but we did have one or two

very pleasant surprises. Like the Kenwood *KA-3020* and Aura *VA-50* for instance, neither of which has attracted much attention - up until now that is!

Kenwood has proved more than capable in the past though its *KA-3020* is something of a dark horse. Nothing special technically, it's just one of those amps where everything seems to fall into place. The result is a remarkably composed sound reinforced by a deep and punchy bass which blends delightfully with a smoother but lighter mid and treble.

The rise of Aura's *VA-50* was also unexpected. It may have been touted as a 'total re-vamp of the *VA-40'* but, in reality, there was little internal evidence of such a transformation. Rather than embark upon a hit-or-miss substitution of components, the mods that propel the *VA-50* to the status of Best Buy are subtle, considered revisions.

Nevertheless they are sufficient to expose hitherto squandered qualities of this established MOSFET amp, drawing out an easy-going almost liquid style of music making that builds towards an expansive and thoroughly enchanting conclusion. I am bound to wonder just how many other amplifiers would benefit from a similar period of re-evaluation, but for now the extremely sleek and stylish Aura *VA-50* can sit back and reap the rewards of its rebirth.

To conclude, I should like to thank those companies who submitted amplifiers for inclusion in this gruelling test, and gratefully acknowledge the help provided by Alan Ainslee (Technics), John Bamford (Pioneer), Eric Kingdon (Sony), Mike Martindale (Arcam), Tony Mills (Rotel), Terry Murphy (Yamaha) and Guy Sargeant (Audio Innovations) during the listening tests.

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DARBYS OF ST. ALBANS, 6 Market Place, near the clock tower, St. Albans, Herts. (0727) 50961. Alphason, A&R Cambridge, Bang & Olufsen, Denon, JBL, Harman Kardon, Musical Fidelity, Quad, Ruark, Sony, Home demonstrations, free delivery and installation. Sales rental service. In house credit. Lombard, Tricity. Mon-Sat 9-6

DYNAMICS, Welwyn, Herts. (0438) 714038. Mark Levinson, Threshold, Oxford Acoustics, Meridian, Infinity, Mirage, Proac, Melos, Air Tangent, Roland. We buy, sell & exchange all high end audio, special offers always. Demo room, available by appointment. Service. Installations. Access & Visa. Mon-Sat 10-7, Sun 10-1, or other times by appt.

HYPERTEC, 6 Bancroft Road, Hitchin, Herts SG5 1JQ. (0462) 452248 B&W, Denon, Marantz, Musical Fidelity, Pioneer Reference Point, Rotel, Tannoy, Wharfedale, Bang & Olufsen, Linn, Alphason. 2 dem rooms without appt. Private dem room + evening dem by appt. Home trial. Free install. Service dept. Access, Visa, Hypertec credit charge. 9.30-5.30. Closed Wed.

STUDIO 99, 82 High Street, Harpenden. (05827) 64246. Linn, Naim, Meridian, Rega, Nakamichi, Mission/Cyrus, Quad, Creek, Kef, Bang & Olufsen, Yamaha etc. Quiet single speaker dem room. Appts nec. Home trial, free install. Service Dept. Visa/c, Access/c & finance terms. 9-5.30pm (Mon/Sat) Closed Weds.

THE AUDIO FILE, 27 Hockerill St, Bishops Stortford, Herts CM23 2DW (0279) 506576. 9.30-5.30 6 days. Dealer Of The Year 1988/89. Linn, Naim, Rega, Quad, Cyrus, Arcam, Musical Fidelity. 0% credit

NORTH HUMBERSIDE

MURRAY HI-FI, Princes Dock Side, Hull. (0482) 227867. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities. No appts nec. Free install & delivery. Service dept. Full 2 year guarantee on all products. Access, Visa, Lombard Tricity, Licensed credit broker. 10-6 Tue-Sat

JUST AUDIO, 2A Foston Lane, North Frodingham, Driffield. Tel 0262 488700, call for details.

KENT

HI-FI CENTRE LTD, 65 King Street, Ramsgate. (0843) 590321. A.R., Aiwa, Ariston, Celestion, Goodmans, Kenwood, Marantz, NAD, Radford, Tannoy etc. + guaranteed recon. equip. Dem room + home dems. Hi-Fi repairs & servicing. Trade in & Cred facs. Mon-Sat (9.30-5.30)

THE HIFI FACTORY, 103 Kirkdale, Sydenham SE26 4QJ. (081) 291 0095 Bose, Tannoy, Mordaunt Short, Cerwin Vega, Celestion, JVC, Kenwood, Philips and many more. Plus cheaper ex-demo systems & separates available. Demonstrations available no appts nec. 7 day home trail, installation available, service and repair dept. Access, Visa, Instant credit available up to £1000 subject to status. Open 10.30-7.00 Monday-Saturday.

JOHN MARLEY HI-FI CENTRES, 2 Station Rd, West Canterbury. (0227) 769329. Also at Dover - (0304) 207562 B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem and home trail fac. Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Credit charge. Service dept.

KIMBERLEY HI-FI, 193 Broadway, Bexleyheath, Kent. (081) 304 3272. Pioneer, Technics, Kenwood, Denon, NAD, Aiwa, Tannoy, Mission, Wharfedale, Castle. Separate dem room, no appt nec. Free installation. Service Dept. Instant credit facilities. 9.30-5.30. No early closing

PHOTOCRAFT HI-FI, 40 High St, Ashford (0233) 624441. No. 1 in Kent for Linn, Naim, Rega, Roksan, Exposure, Onix, Epos, Royd, Creek. But before you choose equipment choose where to buy it. Dem room, appts necessary. Home trial and free installation. Access, Visa, Access, Bada Chargecard. 9-5.30 mon-Fri (Wed & Sat to 5 only). Service Dept.

PROGRESSIVE AUDIO, Rainham, Kent. (0634) 389004. Alphason, Audio Innovation, Conrad Johnson, Proac, Raymond Lumley, Rock Reference, Snell, TDL, Voyd and others. Dem by appt., please phone. Home trial. Free installation. Access, Visa.

STANDENS, 92a High Street, Tonbridge, Kent TN9 1AP. (0732) 353540 Pink Triangle, Kelvin Labs, TDL, Ruark, Marantz, Quad, Musical Fidelity, Micromega, NAD, Arcam, 2 Demo rooms. Home trials. Free installation and Service dept. Access & Visa. HP terms and Bada credit charge. 9.00-5.30 Mon-Sat except Wed 9.00-1.00

TONBRIDGE HI-FI, 96 Woodlands Road, Gillingham, Kent. (0634) 52858. Linn, Naim, Rega, Pink Triangle, Exposure, Creek, JRT, Sony, Ruark, Kef, Arcam etc. If your interest is music pay us a visit & find out what we do.

TONBRIDGE HI-FI, 31 High Street, Tunbridge Wells, Kent. (0892) 24677. Linn, Naim, Rega, Pink Triangle, Exposure, Creek, JRT, Sony, Ruark, Kef, Arcam etc. If your interest is music pay us a visit and find out what we do.

VOLUME ONE, 41 Upper Wickham Lane, Welling, DA16 3AD. 081 304 4622. Arcam, Creek, Dual, Epos, Exposure, Mordaunt Short, Monitor Audio, Nakamichi, Pink Triangle, Rotel. Large demo room, no appt nec, darts & snooker facilities. Evening dems in shop by appt. Home trial & demo, free delivery & installation. Access & Visa, credit up to £1000. 9.30-5.30 Mon-Sat.

V J HI-FI, 29 Guildhall St, Folkestone. (0303) 56860. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad, Dem and home trial facilities, free install, credit to £1000. Amex, Diners, Visa, Access. Service dept.

V J HI-FI, 119 High Street Margate. (0843) 226977. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Pioneer. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

LANCASHIRE

MONITOR SOUND, 54 Chapel St, Chorley, (02572) 71935. A&R, Denon, Dual, Pioneer, Quad, Rogers, Rotel, Spendor, Technics, Thorens, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1000. Access, Visa. Service dept.

NORMAN AUDIO, 216 Church Street, Blackpool FY1 3PT. 0253 295661. For details see Preston branch entry (below). Open 9-5.30, Closed Wed. NORMAN AUDIO, 131 Friargate, Preston PR1 2EE. (0772) 53057. Fax 562731. Sony Hi-Fi News Era Winner. Aiwa, B&W Loudspeakers, Denon, Marantz, Mission, Cyrus, Monitor Audio, Nakamichi, Quad, Roksan, Rotel & many others! 2 lux. dem. lounge. Home trial by arrangement. Free install. Service dept. Inst. cred. facs. with several companies. Most credit cards accepted. 6 days 9-5.30.

LEICESTERSHIRE

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester LE1 5FQ. (0533) 530 330. Allison, AR, Denon, Luxman, Proton, Revox, Teac, Thorens, plus lots more. 3 demo rooms. Jovial, friendly, crazy staff. Relaxed atmosphere. Home trial facilities, free installation, service dept on premises. Credit facilities (sort of interest free) 10-5, closed Thurs afternoons (sometimes)

MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 46977. The Rock, Audio Innovations, Kelvin Labs, Snell, Helius, Sugden, Ruark, Concordant, Valdi, JPW. Dem and home trial facilities. Mon-Sat 9.30-7.00. Free installation and service dept. Visa, Access.

THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. Tel: (0533) 539753. Fax: (0533) 626097. Arcam, Creek, Marantz, Mission/Cyrus, Musical Fidelity, Nakamichi, QED Hi-Fi, Quad, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free install, service dept. Credit facilities. Access, Visa, Diners, Amex. 6 days 9.30-5.30. Leicestershire's only Bada member.

SOUNDS AROUND, 146A Clarendon Park Road, Leicester LE2 3AE. (0533) 702442. (Specialists in used Hi-Fi) A.R. Celestion, TEAC, Mordaunt Short, Tannoy, Marantz, Wharfedale, Philips. No appts necessary, free installation. Service dept. Access, Visa. Tue-Sat 10-5.

LINCOLNSHIRE

BOSTON HI FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 365477. Quad, Nakamichi, Creek, Ariston, NAD, Denon, Marantz, Castle, Rotel, JPW. Separate demo studio. Home trial. Free installation. Service dept. Access, Visa, Hi-Fi Markets Chargecard. Tues-Sat 9-5.30pm

LONDON

ANALOG AUDIO, 849 High Road, London N12. (081) 445 3267. Denon, Dual, JBL, NAD, Marantz, Rotel, Wharfedale, Cerwin Vega, Teac, Mordaunt Short. Free install. Service dept. Instant credit up to £1000. Visa & Access. 9.30-6 6 days.

AUDIO ACOUSTIC, West Ealing. (081) 998 9041. Audio Dimensions, Audio Innovations, Audio Note, ATC, D.C.M, Glastonbury, Goldring, Helius, Infinity & Modulas, JPW, Lynwood, Mana Acoustics, Marantz Audiophile, Michell, Nova, Ongaku, Oracle, Originlive, Ortophon MC3000II + MC5000 + T3000, Pirates, Rata, Revox, Rotel, Rose Industries, Rock Reference, Snell, Supra, Systemdek, Target, Triangle Products, Valdi, Vecture, Voyd & Reference Voyd. Home demos. Free install. Single Spker Demo. Free System Design. Free knowledgeable service. Access, Visa. 9.30-6pm. Till late Mon-Sat. Demo by appt. please

AUDIO VENUE, 24 Church Road, Crystal Palace, London SE19 2ET. (081) 771 7787. Linn, Naim, Nakamichi, Marantz, Dual. Credit available. 2 yr. warranty. 2 demo rooms. Closed Weds.

BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Linn, Rega, Naim, Nakamichi, Quad, etc. 2 dem rooms. Int. free credit. Access, Visa. Closed Thurs

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (071) 631 0472. Mon-Sat 10-7. Rega, Roksan, Naim, Monitor Audio, Koetsu, Marantz, Yamaha, SME, DNM, Epos. Three dem rooms. Delivery and installation service. Credit facilities. Access, Visa.

DOUG BRADY HI-FI, 14-18 Monmouth St. London WC2H 9HB. (071) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 dem rooms.

GALAXY AUDIO VISUAL, 230 Tottenham Court Road, London W1P 9AE. 071 637 2624. Aiwa, Akai, Dual, Hitachi, Philips, Pioneer, Sony, Rotel, Technics, Infinity. Demos available on request. In car audio dept. No appts necessary, no home trial, no free installation, service dept. Switch, Access, Visa, Amex, Diners, Instant credit subject to status. 9.30-6pm.

GRAHAM'S HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500. Winner Sony/HFN Greater London Dealer Award 1986-1989-1990. Linn, Naim, Rega, etc. £400-£3000-£13,000.

THE HI-FI FACTORY, 103 Kirkdale, Sydenham, SE26 4QJ. 081 291 0095. Bose, Tannoy, Mordaunt Short, Cerwin Vega, Celestion, JVC, Kenwood, Philips and many more plus cheaper ex-demo systems & separates available. Demos available. No appts nec, 7 day exchange home trial, installation available, service & repair dept. Access, Visa, instant credit available up to £1000 subject to status. 10.30-7pm Mon-Sat

JUST MUSIC, 52 Upper Tooting Road, London SW17 7PB. (081) 767 1233. Aiwa, Dual, Denon, Marantz, Quad, Rogers, Thorens, Musical Fidelity, Sugden, Heybrook and many more. Dem facilities. Appts can be arranged. Home trial. Free installation available. Access, Visa, Amex, Hi-Fi Markets Chargecard, Creditcharge, finance arranged. 10am-7pm Mon-Thurs, 10-6 Fri & Sat.

KAMLA ELECTRONICS, 251 Tottenham Court Road, London W1. (071) 323 2747. Alchemist, Alphason, Audio Innovations, B&W, Cerwin Vega, Conrad Johnson, Furukawa, Infinity, Jeff Rowland, JPW, Kenwood, Kuzma, Linn, Micromega, Moth, Nakamichi, Oracle, Philips, QED, Revolver, Ruark, SD Acoustics, Systemdek, TEAC, Wharfedale & millions more. Demo facilities and home trial. Major cards and currencies accepted. Mon-Sat 10-6.

KJ WESTONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Research, Acoustic Research, Apogee, Arcam, Audiobal, Creek, Epos, Linn, Meridian, Musical Fidelity, Pink Triangle. Appts nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thur til 7pm).

NICHOLLS HI-FI, 430-434 Lee High Road, Lewisham, London SE12 8RW. (081) 852 5780. Sony, Technics, Harman, JBL, Mordaunt Short, Kenwood, Panasonic, Halfer, Sumo, B&W. Demo facilities, no appt. nec., home trial facilities, free installation, service dept. Credit available, Visa, Access. Open 9.30-6 Mon-Sat, Thurs 9.30-1pm

SOUND ORGANISATION LONDON, 1 Cathedral Street, London SE1 9DE. (071) 403 2255/3088. Linn, Rega, Roksan, Micromega, Radford, Rotel, Nakamichi, Onix, Creek, Naim, Exposure, Royd, Heybrook, Epos. Interesting new equipment always under evaluation. Single speaker listening room. Credit facilities. Appts. preferred, free install. Service dept. Open Tues-Sat 10-6. Late dem. by appt

SOUND SENSE, 350 Edgware Road, London W2 1DX. (071) 402 2100. Alphason, B&W, Nakamichi, Celestion, Cambridge Audio, Dual, Denon, Monitor Audio, Marantz, NVA, Sony, ES. Appts preferred. Installations available. Access, Visa, Standard credit facilities. Mon-Sat 9.30-6.30.

The Choice Dealer Directory

BRITISH AUDIO DEALERS ASSOCIATION



SOUTH LONDON HI-FI & VIDEO, 210 Brixton Hill, Streatham SW2. (081) 674 4433/2033. Denon, Rotel, Yamaha, Kenwood, Tannoy, B&W, INakamichi, Dual, Thorens, Technics, Monitor Audio, Single speaker demo room. Appts. not nec. Installation available. Service Dept. Access, Visa, Amex. Interest Free & Standard credit. 9-6, 6 days
STUDIO 99, 79-81 Fairfax Road, London NW6. (071) 624 8855. Linn, Naim, Meridian, Rega, Quad, Nakamichi, Mission/Cyrus, KEF, Bang & Olufsen, Yamaha, Creek etc. 2 single speaker dem rooms. Appts. nec Home trials, free install. Service dept. Visa/c, Access/c & finance terms. 10-7 Mon-Fri, 10-6 Sat.
TIME AND TUNE, 218/220 Whitechapel Road, London E11BJ. (071) 247 0567/8/9. Akai, Aiwa, Bose, Hitachi, Kenwood, Mitsubishi, Panasonic, Philips, Pioneer, Sony, Technics. Home trial facilities. Free Installation. Service dept. Instant HP. 9.30am-6pm Mon-Fri, 9.30am-2pm Sun, Sat Closed.
TUNE INN, 124-126 St. Mildreds Road, Lee, London SE12 0RG. 081 698 4446. Huge range of fully guaranteed used equipment. Part exchange welcome. Full service facilities. Great after sales. Demos available on all equipment. Best offers for unwanted equipment, collection arranged. Access, Visa, Amex, credit facilities. Mon-Sat 10-6-30

BRIDGE HI-FI, 3 Tudor House, Bridge St, Walsall. (0922) 640456. NAD, Dual, Yamaha, Kenwood, Technics, Pioneer, Mission, Celestion, Denon, Mordaunt Short. Appts required. Home trial & free install. Access, Visa, Diners, Amex. Credit to £1,000. 9.15-5.30 Mon-Sat. Service dept
FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry. (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-Sat 9.30-5.30. Wed til 8pm
GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/ (021) 622 2230. Castle, Creek, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel. Tues-Sat 10-6
HORNTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Acoustic Research, Denon, Marantz, Mordaunt Short, JVC, Mission, Sony, Technics, Wharfedale. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.
MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more. Dem facs. Home trial. Service dept. Credit facs available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.
MUSICAL MATTERS, 351 Hagley Road, Edgbaston, Birmingham B17 8DL. (021) 429 2811. Roksan, Nakamichi, Arcam, Audiolab, Musical Fidelity, Mission/Cyrus, Meridian, KEF, Monitor Audio, Pink Triangle. 2 single speaker luxury demo rooms. Appts nec, home trial facilities, free installation, service dept. Access, Visa, inst. credit up to £1000, interest free credit available. Tue-Thur 10.30-6, Fri 10.30-8, Sat 10-5.30
NAAM HI-FI VISION, 122-123 New Street, Birmingham, (021) 633 4944 Pioneer, Akai, Aiwa, Panasonic, Toshiba, Hitachi, Bose, Wharfedale, Sony. Demo facilities available, appointments preferred. Access, Visa, 10 month interest free credit. Amex, Lombard Tricity Creditcharge. Mon-Sat 9-6-00
SUPERFI, 67 Smallbrook, Queensway, Birmingham B5 4HZ. (021) 631 2675. Specialist Hi-Fi stockists of: Audio Lab, Musical Fidelity, Quad, Pioneer, Yamaha, Rotel, Wharfedale, Tannoy, Celestion and many more. Single spker rooms by appt

WITNEY AUDIO VISUAL, 28 High St, Witney, Oxford. (0993) 702414. Aiwa, Akai, AR, Bose, B&W, Cambridge, Dual, Mordaunt-Short, NAD, Onkyo, Pioneer, Roberts, Sony & Sony ES, Tannoy, Wharfedale, Yamaha, Reference Point Dealer. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

GREATER MANCHESTER

THE AUDIO COUNSEL, 12 Shaw Road, Oldham, Manchester OL1 3LQ. (061) 633 2602. Linn, Naim, Rega, Rotel, Arcam, Micromega, EPOS, Creek, Nakamichi, Denon. 2 dem rooms. Free install. Visa, Access, Licenced credit brokers up to £1000 instant credit. 10.00-5.30 Tues, Weds, Sat: 10.00-7.30 Thurs, Fri. Closed Mon.
CHRIS BROOKS AUDIO, 10-12 Oak Street, Hazel Grove, Stockport SK7 4EJ. (061) 419 9050. Tues-Sat 10-6, 2 dem rooms, credit facilities. All credit cards. Just like the Warrington shop - total absence of bull****
MURRAY HI-FI, 19 Middle Hillgate, Stockport. (061) 429 7666. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities, free installation & delivery, service dept. Full 2yr guarantee on all products. Access, Visa, Lombard Tricity, licensed credit broker. 10-6 Tue-Sat
SWIFT HI-FIDELITY, 12 Chapel Street, Cheadle. (061) 428 7222. Arcam, Denon, Kenwood, Marantz, Nad, Cyrus, Rotel, Pioneer, Mission, Tannoy. Demo room. 9.30-6. Closed Wed.

MIDDLESEX

HARROW AUDIO, 27 Springfield Rd, Harrow. (081) 863 0938. Mon-Sat 9.30-5.30. A&R, Audiolab, Cyrus, Denon, Dual, Heybrook, Linn, Monitor Audio, Musical Fidelity, Quad, Rotel, Tannoy etc
NORTHWOOD AUDIO, 126 Pinner Road, Northwood, Middlesex HA6 1BP. (0927) 420877. Exposure, Musical Fidelity, Pink Triangle, Manticore, Audio Innovations, Rotel, Ruad, Ruark, SD Acoustics, Moth. Dem room. Home trial. Free install. Access, Visa. 9-6 Mon-Sat
RIVERSIDE HI-FI LTD, 422 Richmond Road, East Twickenham, Middlesex TW1 2EB. Tel. (081) 892 7613. Fax (081) 892 7749. A.R., Arcam, Audio Innovations, Castle, Dual, Denon, KEF, Luxman, Michell, Musical Fidelity, Micromega, Marantz, Nakamichi, Rotel, Spenhord, Systemdek, Tannoy, Yamaha. One demo room, in-car demo for car hi-fi systems. Appts not always necessary. Home trial facilities. Free installation, service dept. Lombard Tricity, Access, Visa, Amex, Diners Club. Mon-Sat 9.30-6, Thurs, Fri 9.30-7
UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 30404 (Multi-line). 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

MERSEYSIDE

BETTER HI-FI, 16 Cook St, Liverpool L2 9RF. (051) 227 5007. Linn, Naim, Quad, Arcam, Audio Innovations, Threshold, Creek, Denon, Yamaha, Mordaunt Short. 3 dem rooms. Home trial. Free install. Service Dept. Access, Visa. Instant credit up to £1000. 0% on certain items. 9-5 Mon-Sat.
W.A. BRADY & SON, 401 Smithdown Rd, Liverpool L15 3JJ. (051) 733 6859. 'Largest choice of specialist Hi-Fi in N.W. £100-£20K'. All credit cards. 3 dem rooms. Closed Monday.
IN CONCERT HI-FI, 144 Seaview Road, Wallasey, Wirral, Merseyside. (051) 630 5055. Denon, Kenwood, QED, G-Alexander, Spica, Shan Acoustics, Systemdek, Musical Fidelity, Audio Dimensions, Voyd. Single speaker dem. room. Home trial, free installation. 10-6 - closed Mon. Access, Visa.
PETERS HI-FI, 11 St Werburgh Square, Grange Precinct, Birkenhead. 051 647 5626. 9-5.30. Closed Thurs.
PETERS HI-FI, 8 High St, Bromborough, Wirral. 051 334 1874/2825. 9-5.30 6 days.

WEST MIDLANDS

AUDIO CENTRE MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. /493499. Meridian, Kef Reference, Arcam, Quad, Rogers, Musical Fidelity, TDL, System Dek, Moth, QED Elect, Ariston, Linn, Audio Technica, JPW, Van den hul etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appt. Home trial. Free install. Own service dept. Inst. credit. Chargecard. Interest free. Access, Barclaycard. Mon-Sat 9-5.30

NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spendor, Exposure, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms. Home trial. Free installation. Visa, Access, HP facilities. Tues-Sat 9.30-1, 2-5.30
MARTINS HI-FI, 5 High Street, Kings Lynn. (0553) 761683. Est. 1968.
MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Est. 1968.
SOUND APPROACH, 161a Unithank Road, Norwich. (0603) 622833. Kuzma, Ariston, Castle, Denon, Exposure, Ion, Royd, NVA, Roksan, Ruark, etc. etc. Dem and home trial facilities. Mon-Sat 9-6.30. Free installation. Credit to £1,500. Visa, Access, Diners Club. Service dept.

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Rotel, Musical Fidelity, Wharfedale, Monitor Audio, Yamaha, JBL, Dual, Marantz, Kenwood, Kef, Celestion, and many more. Home trial, free instal., service dept. Access, Visa, credit facs. 9.30-5.30pm
CLASSICAL SOUNDS, 84E Watling St East, Towcaster NN12 7BS. Tel. 0327 359588. Call for details.
THE AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Denon, Goldring, Ariston, Tannoy, Royd, Mordaunt Short, JPW, Ion Systems, Rotel, Creek. Dem room. Home trial and free installation. Mon-Sat 9.30-5.30 (Thurs 9.30-2), Service dept

NOTTINGHAMSHIRE

CHANNY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Royd, JPW, Rotel, S.D Acoustics, NVA, Michell, Art Audio (valve), Kelvin Labs, Sumo and much more. 2 dem rooms, appts preferred. Home trial, free installation. Access, Visa & credit facilities and mail order. Mon-Fri 10am-4.30pm. Sat 9.30-5.30. Sun home dem by appt. Closed Weds.
DEFINITIVE AUDIO, (0602) 813562. For a carefully considered approach to building a true hi-fidelity audio system with components derived from the following manufacturers: Systemdek, Goldring, Revox, Voyd, Audio Innovations, Snell, Audionote, SME, Helius, Impulse, TEAC, Deltac, Wadia, Ortofon Premier edition, Pioneer, Huygens loudspeakers. Demos by appt please. Please phone for further details. Installation free of charge. Mon-Sat 10-7pm. Closed Wed a.m

OXFORDSHIRE

ASTLEY AUDIO LTD, 3 Marketplace, Wallingford. (0491) 39305/34349 Technics, Panasonic, Pioneer, Kenwood, Sony, Yamaha, Denon, Dual, Mission, Tannoy. Home trial, free installation. Service dept. Access, Visa, Amex, Diners. Instant credit. Tue-Fri 9-5.30, Sat 9-5. Records & CDs stocked
OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics Audio Research, Krell, Magnephanar, Apogee, Aragon, Stax, Marantz, Wharfedale, Cambridge Audio. Home trial and free installation. Instant credit, Access, Amex, Visa. 10-6 Tues-Sat. Service dept.

SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Celestion, Nakamichi, Revolver. Dem room. Home trial. Free install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat 9-5.30
CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Linn, Naim, Roksan, Mission, Arcam, Rogers, Denon, Marantz, Rotel, Celestion, etc. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.
SHROPSHIRE HI-FI, St. Michael's St., Shrewsbury, Shropshire. (0743) 232065. Ariston, Audio Technica, Cambridge Audio, Deltac, Denon, Dual, Infinity, Kenwood, Mordaunt Short, Musical Fidelity, Etc. Demo room, free parking, free installation, repairs.

SOMERSET

PAUL ROBERTS HI-FI, 32 North St., Taunton. (0823) 270000. For facilities see entry under Avon.
WATTS RADIO - the engineers, Jim Badman, 1 West Street, Somerton. (0458) 72440. Aiwa, Castle, Dual, Denon, KEF, Ortofon, Quad, Rogers, Tannoy, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1.2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.

STAFFORDSHIRE

ACTIVE AUDIO, 29 Market Street, Tamworth, Staffordshire. (0827) 53355. Arcam, Ariston, Celestion, Denon, Heybrook, Kef, Cyrus, Musical Fidelity, Marantz, Revox, Rotel, Rogers, etc. etc. The only BADA Member in Staffordshire. Full dem & home trial facs. Account and credit cards. Ring for opening times and free Fact Pack.
ACTIVE AUDIO, 95 Stafford Street, Hanley, Stoke-on-Trent. (0782) 214994. Arcam, Ariston, Celestion, Cyrus, Denon, Kef, Kef Reference, Marantz, Rogers, Rotel, etc. etc. The only BADA Member in Staffordshire. Full dem & home trial facs. Account and credit cards. Ring for opening times and free Fact Pack.
GRANGE HI-FI LTD, 153 Branson Road, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Castle, Denon, Pink Triangle, Rotel, Rogers, Systemdek, SME, Quad, Voyd. Demonstrations facilities available, appointments necessary on Saturdays. Free installation. Service department. Access, Visa. 9.00-5.30pm. Closed Wednesday Closed for lunch 12.00-12.30.
INTERSOUNDS, 62 Bennett Precinct, Longton, Stoke-on-Trent. (0782) 336233. Arcam, Denon, Dual, Mission, Musical Fidelity, NAD, Nakamichi, Revolver, Rotel, Systemdek, etc. G 000 8 different speaker manufacturers. 2 dem rooms. Free install. In-house service dept. Access, Visa. £1000 credit subject to status. 9.30-5.30 Mon-Sat. Closed Thurs
MUSICAL APPROACH, Unit 7, Waddings Yard, Baileys Str., Stafford. (0785) 55154. Linn Products, Arcam, Creek, NVA, Revolver, Audiotec, Onix, Epos, Marantz, Rotel and more. Home trial. Free installation. Service dept. Credit facilities available. Access, Visa. 9.30-5.30 Mon-Sat.

SUFFOLK

EASTERN AUDIO, 41 Bramford Rd, Ipswich. (0473) 217217. Quad Audio Lab, Denon, Dual, Marantz, Mission, NAD, Nakamichi, Technics, Arcam. Mon-Sat 9.30-6.
THE STEREO SHOP, 94 Norwich Road, Ipswich, Suffolk. (0473) 233832. Linn, Exposure, Musical Fidelity, Creek, Epos, Monitor Audio, Mordaunt Short, Marantz, Rotel, Philips, NAD, 2 single speaker listening rooms. Multi rooms specialists. Free installations. Service dept. Plus 3 year guarantee. Access & Visa. Licensed credit broker. 10.00-6.00 Tue-Sat. Thurs 10.00-8.00 (by appointment).

SURREY

AUDIO INC, 44 Walton Road, East Molesey, Surrey KT8 0DQ. (081) 941 4234. Acoustic Energy, Conrad, Johnson, JA Michell, Proac, Croft, VPI, Thorens, Pink Triangle, Rotel, Luxman. Single speaker demo room. Home trial facilities. Free installation. Access, Visa. Interest Free Credit on some items, standard credit terms. 10-6 Mon-Sat. 10-8 Thurs. 10-4 Sun.
AUDIO SOUTH, 5 Mead Lane, Farnham, Surrey GU9 7DY. (0293) 619295. Audio Innovations, JPW, Luxman, Marantz, Ortofon, Rotel, Snell, Sugden, Teac, Voyd. Dem room and evening appointments available. Home trial facilities. Free installation. Access, Visa. 10.30-6 Mon-Sat. Closed Tuesday.
DATASOUND, 23 South Street, Dorking, Surrey RH4 2JZ. (0306) 882897. Arcam, Celestion, Denon, Dual, Marantz, Mission, Musical Fidelity, NAD, Rotel, Tannoy. Dedicated listening room. Free install. Service dept. Up to £1000 instant credit subject to status. 9.30-5.30 6 days

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PJ HI-FI - the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **BADA**

RIVERSIDE HI-FI, 422 Richmond Road, East Twickenham. TW1 2EB. Tel: (081) 892 7613. Fax: (081) 892 7749. See main entry under Middlesex.

ROGERS HI-FI, 13 Bridge Street, Guildford, Surrey. (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Systemdek, Tannoy Demonstration facilities available, no appointment necessary. Free installation. Service department. Access/Visa. Instant credit up to £,000 subject to status. Monday-Saturday 9.30-6pm, later by appointment.

SOUNDS EXCLUSIVE, 1 Kent House, High Street, Cranleigh, Surrey GU6 8AU. (0483) 268185. Marantz, Sumo, QED, Michell, Alphason, SME, Ortofon, Finestra, Proac, Bose. Home trial. Demos a pleasure. Appts. preferred. Service dept. Free install. Access, Barclaycard.

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey. (081) 654 1231/2040. 3 dem rooms and home dem. Free installation, credit. Mon-Sat 9-6, Tues to 8. Closed Wed. Service dept. **BADA**

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey (081) 546 5549. Quad, Dual, Denon, Kenwood, Nakamichi, Rotel, Pioneer, QED, B&W, Tannoy. Dem and home trial facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept.

SURREY HI-FI, 45 High Street, Godstone, Surrey RH9 8LS. (0883) 744755. Parking, easy access - just 2 mins off junction 6, M25. Marantz, Musical Fidelity, QED, Radford, Tannoy, TDL, Kelvin Labs, Gyrodec, Reference Imports, Acoustat. Single speaker demo room. Appts not necessary, home trial facilities, free installation, service dept. Access, Visa. Mastercard. 9-6 6 days a week.

TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.

TRU-FI SOUND & VISION, 10 Church Street, Leatherhead, Surrey. (0372) 378780. Sony, Technics, Panasonic, Mitsubishi, Ferguson, Aiwa, Pioneer, Sanyo, B&W, Mission. Free installation. Credit facilities. Access, Visa. 9.15-5.30 Mon-Sat. Closed Wed. Service dept.

UNILET HI-FI, 35 High Street, New Malden, Surrey KT3 4BY. (081) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakomichi, Quad, Rotel, Tannoy. Demos. Amex, Access, Visa, etc.

SUSSEX (EAST)

DEFINITIVE AUDIO BRIGHTON, 8 Dyke Road Mews, 74-76 Dyke Road, Brighton BN1 3JD. (0273) 208649. Voyd, Systemdek, Audio Innovations, Helius, Audionote, JPW, Snell, Pirate Stands, Goldring etc. Home dems throughout Sussex. Credit facilities. Visa.

HASTINGS HI-FI, 33-35 Western Road, St. Leonards, E. Sussex TN37 6DJ. (0424) 442975. Linn, Musical Fidelity, Quad, Nakamichi, Arcam, Celestion, NAD, Denon, Yamaha, Tannoy. 2 listening rooms. Home trial. Free installation. Service dept. All credit cards welcome. Instant credit up to £1,000, written details on request. 9-6pm Mon-Sat.

JEFFRIES HI-FI, 69 London Road, Brighton, East Sussex. (0273) 609431 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities. **BADA**

JEFFRIES HI-FI, 4 Albert parade, Green St, Eastbourne, East Sussex (0323) 31336. 2 dem rooms, closed Mon. Late night Wed. Parking, bus route. Credit facs. **BADA**

LASER SOUND & VISION, 72 Terminus Road, Eastbourne, East Sussex BN21 3LX. (0323) 640911. Pioneer, Kenwood, Marantz, Yamaha, Carver, Dual, JBL, Tannoy, Rogers, Sugden, etc. Dem room. No appts nec., no home trial. Free installation. Service dept. Visa, Access, credit up to £1000 subject to status. 9.30am-6pm Mon-Sat

THE POWERPLANT, 66 Upper North Street, Brighton BN1 3FL. (0273) 775978. Roksan, Musical Fidelity, Onix, Marantz, Rotel, Yamaha, Bryston, Tannoy, Monitor Audio, JPW, etc. Comfortable single speaker demonstration rooms. No appts. nec. Home trial facilities, free install. Service dept. Credit facilities available

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CHICHESTER HI-FI, 7 St. Pancras, Chichester, W. Sussex PO191SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakomichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon). **BADA**

MALCOLM AUDIO, 12 South Street, Chichester, W. Sussex. (0243) 787562. Sony, Technics, Denon, Yamaha, Sherwood, Mordaunt Short, Wharfedale, Allison, Dual, NAD. Appointments necessary. Home trial facilities. Free installation. Service Dept. Access, Visa. 9.15-5, Mon-Sat.

TYNE & WEAR

BILL HUTCHINSON LTD, 87A Clayton Street, Newcastle-Upon-Tyne. Tel: (091) 230 3600. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt Short, Omar, Technics, Yamaha, etc. Demonstration facilities. Free installation, service department. Instant credit, Access, Visa. Mon-Sat 10-6.

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WARWICKSHIRE

NAAM HI-FI VISION, 78 Lower Precinct, Coventry CV1 1DX. (0203) 632086. Technics, Pioneer, Kenwood, AR, Akai, Aiwa, Panasonic, Toshiba, Wharfedale, KEF. Demo facilities. Access, Visa, Amex, Lombard Tricity credit charge. 9.00-6.00 Mon-Sat

WORCESTERSHIRE

WEST MIDLANDS AUDIO, 158 Ombersley Road, Worcester WR3 7HA. (0905) 58046. Linn, Naim, Rega, Absolute Sounds, Meridian, Mission, Arcam, Ion Systems, Roksan. 3 dem rooms for budget. High end & Audio Visual appointment necessary. Home trials. Free installation. Service Dept. Access, Visa, Amex, Diners, Lombard/Hitachi. Mon-Fri 9.30-8.30 by appt Sat 9-5.30.

YORKSHIRE (NORTH)

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough, N. Yorks YO12 7SN. (0723) 374547. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service dept. Access/Visa/Creditcharge/£1,000 instant credit/Amex/Diners. 10-6 Tues to Sat

HARROGATE HI-FI CENTRE, 15 Commercial Street, Harrogate, N. Yorks HG1 1UB. (0423) 504274. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service Department Access/Visa/Creditcharge/£1,000 instant credit/Amex/Diners. 10-6 Tuesday to Saturday.

SOUND ORGANISATION YORK, 16 Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Naim, Rega, Roksan, Sony, Arcam, Mission, Denon, Ion, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Access, Visa. Instant free credit available. 10am-6pm Tues-Sat. Sony dealer. Award nominated '86,' 87,' 88

TRC HI-FI, 3 Kings Cross St, Halifax HX1 2SH. 0422 366832. Full demonstration facilities at any time, no appts nec, free install, service dept. Access, Visa, Lombards credit charge available. 9-5.30 Mon-Fri, Closed Thur, 9-5 Sat 10-4.

YORKSHIRE (SOUTH)

HI-FI STUDIO, 5 Norman Cres., Sunnyfields, Doncaster. (0302) 781387. Heybrook, Monitor audio, Art Audio, TDL, Michell, Sugden, Acoustic Energy, Alphason, Teac, Dual. Listening room demos. Home trial. Free installation. Licensed credit broker, 2 yr guarantee on all equipment. Service available. Access, Visa. 10-8pm 6 days. Phone for further info. & FREE fact pack.

MOORGATE ACOUSTICS, 184 Fitzwilliam St, Sheffield. (0742) 756048. Roksan, Linn, Musical Fidelity, Denon, Meridian, Krell, Quad, Audio Research, Exposure, Nakamichi, 2 demo rooms. Free installation. Service Dept. Access, Visa, Credit. 9.30-5.30 Closed Mon

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ERRICKS, Rawson Square, Bradford, (Near John St Market). (0274) 309266. A&R, Linn, Quad, Exposure, Nakamichi, Mission, Denon, Kenwood. Private demo rooms, no appt nec, home trial facilities, free installation, service dept. Access, Visa, licenced credit broker. Mon-Sat 9-5.30 (Tue 10-5.30). **BADA**

HUDDERSFIELD HI-FI CENTRE, 4 Cross Church St, Huddersfield. (0484) 544668. B&W, Kenwood, Denon, Dual, Arcam, Musical Fidelity, Quad, NVA, Audio Lab, Philips, Mission, etc. Dem facilities - appointment reqd. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa.

IMAGE HI-FI Ltd, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. **BADA**

IMAGE HI-FI, 17 The Springs, Wakefield, WF1 1QE. (0924) 200272. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. **BADA**

SELECTIVE AUDIO, The Forge Cottage, 19 Crossgate, Otley. (0943) 467689. Exclusively handles Alphason, Roksan, NVA, ProAc, TDL, JDI, in the area and other minimalist British designer products for the discerning listener. Dem facility. Member of the Cognoscenti. Mon-Sat 10-6. T.R.C. HI-FI, 3 Kings Cross St, Halifax. (0422) 366832. Alphason, Castle, Denon, Harmon/Kardon, Kenwood, Quad, Rotel, Technics, Wharfedale. Free installation. Service dept, No Appt nec. 9.00-5.30, closed Thur.

NORTHERN IRELAND

ARMAGH

LYRIC HI-FI, 84 Bridge Street, Portadown, Armagh, N. Ireland. (0762) 358059. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission, Akai, Panasonic, etc. Mon-Sat 10am-6pm. **BADA**

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LYRIC HI-FI, 163 Stranmills Road, Belfast. (0232) 381 296. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission etc. Mon-Sat 10-6, Late night Thurs **BADA**

ZEUS AUDIO, 6 Hope Street, Belfast. (0232) 332522. Audio Innovations, Pink Tri, Ortofon, Roksan, Marantz, Celestion, Linn, Meridian, Mission Cyrus, Ortofon, etc. Mon-Sat 10.00-5.30, Late night Thurs. **BADA**

COUNTY DOWN

ASTON AUDIO, 17 Hillhead Road, Dundonald, Belfast. 0247 872431. Akai, Technics, JVC, Pioneer, Mitsubishi, Panasonic, Toshiba, Sharp, Sanyo. Demos available. No appts nec, service dept. Please phone for directions. Mon-Fri 2-8, Sat 10-4.

LONDONDERRY

ZEUS AUDIO, 23a Kingsgate Str, Colrairie, BT52 4LB. (0265) 56634. Marantz, Mission Cyrus, Aiwa, Akia, Alphason, Sony, Pink Tri, Celestion, Rotel. Open Mon-Sat 10-5.30, Closed Thurs. **BADA**

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BILL HUTCHINSON Ltd. 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.

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RUSS ANDREWS HI-FI, 34 Northumberland St, Edinburgh. (031) 557 1672. Linn, Naim, Rega, Arcam, Rotel, Marantz, Nakamichi, Quad, MS, MA, Yamaha. Demos. 10-5.30 Mon-Fri, 10-5 Sat. **BADA**

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STEREO STEREO, 278 St. Vincent St, Glasgow G2 5RL. (041) 248 4079. Linn, Naim, Rega, Arcam, Creek, Epos, Exposure, Revox, PT, etc. Mon-Sat 10-6. Interest free credit. **BADA**

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HOLBURN HI FI Ltd, 441 Holburn St. Aberdeen (0224) 585713. Linn, Rega, Quad, Audiolab, Mission Cyrus, Rotel, QED, NAD, Krell, Nakamichi, Denon, Sony, KEF, Wharfedale, Monitor Audio, Kenwood, etc. 9.30-5.30 Mon-Sat. **BADA**

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HIGHLAND ANALOGUE, 'Lismore', Avoch, Ross-shire IV9 8RF. (0381) 20655. Acoustat, Basis, Cary, CAT, Cogan-Hall, Diamond-Acoustics, Ensemble, MFA, NRG, SOLEN. 1 demo room, appts nec, home trial facilities, free installations, owner is trained electronics technician. UK's most northerly high-end dealer. Open 7 days.

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ROBERT RITCHIE HI-FI, 102 Murray Street, Montrose Angus, Tayside DD10 8JG. (0674) 73765. Linn, Naim, Rega, Quad, A&R, Cambridge, Creek/Epos, Pioneer, Kenwood, Sony, Technics. 2 dem room, 1 single speaker dem room. Appts necessary, home trial facilities, free installation, service dept. Access, Visa, credit facilities. 9-5.30, except Wed 9-1pm

WALES

CLWYD

ACTON GATE AUDIO, 4 Ruabon Road, Wrexham, Clwyd. (0978) 364500. Arcam, Cambridge, Celestion, NAD, Quad, Radford, Rotel. Semilink, Tannoy, Yamaha etc. Dem room, appts. nec. Free install. Service Dept. Access, Visa, Amex. 9-5.30 Mon-Sat. Closed Weds.

ELECTRO TRADER, 19 Colwyn Crescent, Rhos On Sea, Colwyn Bay, Clwyd. (0492) 48932. Ariston, Arcam, B&W, Heco, Infinity, Onkyo, Rotel, Tannoy, TDL, Yamaha etc. Dem room. Appts preferred. Home trial. Free installation. Access, Visa, American Express, Diners. 9.30-1.00, 2.00-5.30 Mon-Sat.

THE HI-FI ROOM, Apple Sound, Unit 3, Cambrian Business Park, Queens Lane, Mold, CH7 1NJ. (0352) 700433. AR, Aura, Denon (including DAT), DCM, Dual, Harman Kardon, JWP, Ruark, Thorens and more. Single system demos. Appointments necc., Home trial facilities, Free installation, Service dept, Credit facilities. Mon-Sat.

DYFED

LEWIS AUDIO, 2 Queen Street, Carmarthen, Dyfed. (0267) 236463. NAD, Dual, Kenwood, Harman-Kardon, Rotel, Marantz, Denon, JWP, Wharfedale, JBL, Dem. room. Home trial facilities, free installation, Service dept. Access, Visa, Amex, £1000 instant credit. Phone for details. Mon-Sat 9.30-5.15.

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AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 228565. Audio Research, Krell, Linn, Naim, NAD, Yamaha, Quad, Arcam, Mission + lots more. Closed Mon. **BADA**

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AUDIO EXCELLENCE, 9 High St, Swansea. (0792) 474608. Audio Research, Linn, Arcam, Mission, Quad, Naim, NAD, Yamaha, etc. Closed Mon **BADA**

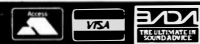
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I&H GRIFFITHS & SONS, 313 High St, Bangor LL57 1YA. (0248) 370655. Yamaha, Tannoy, Teac, Goodmans, Dual, Sherwood, Wharfedale. Demos available, no appts nec, home trial facilities, free installation, service dept. Access, Visa, Lombard credit charge. Mon-Sat 9-5.30, Wed 9-1. PETERS HI-FI Victoria Buildings, Mostyn Avenue, Craig-y-don, Llandudno. (0492) 876788. 1 Single Speaker Demo Room. Open 9-5.30, Closed Wed

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Static Elimination Spray And Lubricant £7.99

200ml of specially formulated record cleaning and lubricating fluid, contained in a pump action fine spray bottle which affords a protection from static electricity. The fluid forms a fine, harmless, lubricating layer in the grooves of the disc which results in lower stylus drag, a cleaner, smoother high frequency sound delivery and prolonged record life when applied regularly.

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Damps vinyl resonance by clamping the record to the turntable's platter thus increasing the ability of the stylus to retrieve information from the disc's grooves without the disc's own inherent resonant frequencies interfering with the groove to stylus interface.

Will work with most popular turntables.

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Everything necessary for prolonging the life of LPs and cleaning stylus all in one handy kit.

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An entire record cleaning kit consisting of 75ml of isopropyl based record cleaning fluid, four applicator pads and a stylus cleaner and brush.

Manual CD Cleaning Kit £5.99

45ml of CD cleaning fluid together with an applicator, jig and a cleaning pad for the removal of harmful dirt from Compact Discs.

Carbon Fibre Record Groove Cleaning Brush £4.99

A record cleaning brush for the removal of dirt and dust from deep in the grooves of records. Should be used before every play of a record in order to remove dirt and dust which otherwise interferes with sound and becomes deeply imbedded in the record.

The carbon fibres are single strand as opposed to two joined strands and as such are less likely to fall out. A copper conductor contacts the strands and removes static electricity through a metal handle.

Mk 10 Carbon Fibre Brush With Velvet Pad £9.99

The carbon fibres efficiently remove dirt from the record grooves, which is then collected by an integral felt pad. This can be easily cleaned with the supplied cleaner after use.

System Cleaning Kit 1 £15.99

Everything needed for maintaining a hi-fi system, all contained in one handsome wallet pack. Stylus cleaner, auto reverse wet tape head cleaner and cleaning fluid, manual Compact Disc cleaner and cleaning fluid and a carbon fibre record cleaning brush.

System Cleaning Kit 2 £11.99

As above but for those of you who don't have a turntable to contend with. Contains auto reverse wet tape head cleaner and cleaning fluid, a manual CD cleaner and cleaning fluid.

Tape Head Cleaner £1.49

Dry type cassette head cleaner to remove the build up of oxides from the tape heads.



Monotrak Support Cones £8.00

Supplied in packs of four, these turned steel support cones are ideal for supporting just about any item of hi-fi, from subwoofers through to amplifiers. Effective isolation and decoupling at a bargain price.

Interconnects

We have a variety of interconnects on offer, all sourced from the respected Japanese specialist Furakawa.

The FV11 Series unbalanced digital interconnect cables

The FV11 Series comprises a range of unbalanced digital interconnects designed to carry a high frequency square wave pulse signal such as that transmitted from a CD transport to a separate DAC, or a video to a TV set.

The FD11 Series unbalanced digital interconnect cables

The FD11 Series of digital interconnects, which is supplied in matched pairs, differ from the FV Series insofar as they are designed for the interface following conversion from digital to an analogue signal of 75ohms impedance such as that from a CD player or a tuner to preamp or an integrated amplifier.

The outer sleeve consists of soft PVC and Furakawa hermetically sealed all PCOCC plugs are employed for termination.

The FA21 Series balanced analogue interconnect cables

The FA21 Series of analogue interconnects is supplied in matched pairs employing the Furakawa all PCOCC RCA plug with a flying earth or ground lead which is designed to be terminated to the ground tag of the source component for the purpose of transmitting a balanced signal with a totally separate ground path.

These interconnect cables are recommended for the connection of analogue devices where RCA sockets are provided, such as power amplifier to preamp and tape deck, turntable, step-up transformer etc. to a preamp or integrated amplifier. They can introduce a wide stereo image with good depth and height.



Furakawa FA11S Series balanced analogue interconnect cables

The FA11S Series of analogue interconnects is supplied in matched pairs employing the Furakawa hermetically sealed all PCOCC RCA phono plug with a flying earth or ground lead.

Choice Offers Order Form

The FA11S super cast PCOCC series of balanced cables represents the ultimate in cable design utilising extremely high quality cast PCOCC.

These interconnect cables are recommended for the connection of high quality analogue devices. The cable's ability to transmit a vast amount of information has the effect of creating an awe inspiring bass, transparent mid range and simply superb unfettered treble.

Speaker Cables

Furukawa FS-2T14 PCOCC speaker cable

FS-2T14 PCOCC speaker cable is Furukawa's entry level speaker cable consisting of two 1.4mm square drawn PCOCC concentric strands.

Furukawa FS-2F09 PCOCC speaker cable

Two 0.09mm square drawn PCOCC strands are contained in a neat, flat, flexible PVC insulation. The FS-2F09 is highly regarded by audiophiles around the world.



Furukawa FS-2T30F Evencap speaker cable

PCOCC speaker cable consisting of two 3mm square drawn PCOCC rope lay strands.

FS-2T30F speaker cable, by virtue of its low resistance and 3mm section, increases the audible bandwidth, most particularly in the low frequencies.

FS-2T20P PCOCC speaker cable

PCOCC cable consisting of two twisted 2mm² drawn PCOCC strands laid in a concentric pattern. The two conductors are insulated in polypropylene and contained in a circular outer sleeve of soft PVC.

Furukawa FS-2T35P PCOCC speaker cable

Produced from six concentric laid conductors in a rope lay this large cable has a low DC resistance and an appropriately larger occupation area for the skin effect, therefore bass is larger and treble is even sweeter.

Furukawa FS2T55F Evencap speaker cable

FS2T55F is a 5.5mm 2 rope lay cable of similar construction to the FS2T30F.

Furukawa Price Table

Please circle the cables you require.

Interconnects

	0.5m	1.0m	1.5m	2.0m
FV11 (each) RCA-RCA	42.50	45.50	52.50	57.50
FD11 (pair) RCA - RCA	75.00	85.00	95.00	NA
FA21 (pair) RCA-RCA	NA	95.00	105.00	NA
FD11S (pair) RCA-RCA	NA	220.00	NA	NA

Fibre optics

	0.5m	1.0m	1.5m	2.0m
FO11 (each) TOSLINK	NA	37.50	42.50	NA
FO12 (each) TOSLINK	NA	90.00	100.00	NA
FO13 (each) TOSLINK	NA	105.00	120.00	NA

Speaker cables

Please state termination required, solderless, gold plated banana plugs, spades or pins or any combination. All prices are per pair.

	FS2T14	FS2F09	FS2T20P	FS2T30F	FS2T35P	FS2T55P	FS2T15
1.0m	38.00	37.00	44.00	53.00	56.00	74.00	129.00
1.5m	42.50	41.00	51.50	65.00	69.50	96.50	179.00
2.0m	47.00	45.00	59.00	77.00	83.00	119.00	229.00
2.5m	51.50	49.00	66.50	89.00	96.50	141.50	279.00
3.0m	56.00	53.00	74.00	101.00	110.00	164.00	329.00
3.5m	60.50	57.00	81.50	113.00	123.50	186.50	379.00
4.0m	65.00	61.00	89.00	125.00	137.00	209.00	429.00
4.5m	69.50	65.00	96.50	137.00	150.50	231.50	479.00
5.0m	74.00	69.00	104.00	149.00	164.00	254.00	529.00
6.0m	83.00	77.00	119.00	173.00	191.00	299.00	629.00
7.0m	92.00	85.00	134.00	197.00	218.00	344.00	729.00
8.0m	101.00	93.00	149.00	221.00	245.00	389.00	829.00
9.0m	110.00	101.00	164.00	245.00	272.00	434.00	929.00
10.0m	119.00	109.00	179.00	269.00	299.00	479.00	1029.00

Cleaning Accessories

Please indicate which items you require by ticking the appropriate box.

- | | | | |
|--|--------|---|--------|
| <input type="checkbox"/> A1 Static Elim. Spray & Lubricant | £7.99 | <input type="checkbox"/> A7 Carbon Fibre Record Groove Cleaning Brush | £4.99 |
| <input type="checkbox"/> A2 Static Elim. Spray & Lubricant & Cleaning Pads | £10.99 | <input type="checkbox"/> A8 Mk10 Carbon Fibre Brush with Velvet Pad | £9.99 |
| <input type="checkbox"/> A3 Record Clamp | £11.99 | <input type="checkbox"/> A9 System Hi-Fi Cleaning Kit 1 | £15.99 |
| <input type="checkbox"/> A4 Record Cleaning Pad & Stylus Cleaning Kit 1 | £12.99 | <input type="checkbox"/> A10 System Hi-Fi Cleaning Kit 2 | £11.99 |
| <input type="checkbox"/> A5 Record Cleaning Pad & Stylus Cleaning Kit 2 | £4.99 | <input type="checkbox"/> A11 Tape Head Cleaner | £1.49 |
| <input type="checkbox"/> A6 Manual CD Cleaning Kit | £5.99 | <input type="checkbox"/> A12 Monotrac Support Cones | £8.00 |

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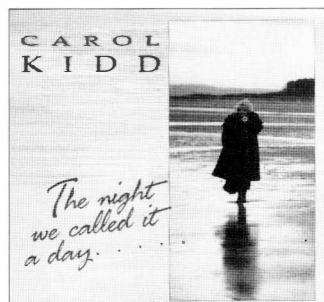
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This month we've re-introduced Reference Recordings to our offers pages, having managed to sort out the problems we had over the last couple of months and obtain a guaranteed source

Although the name Linn Products will need no further introduction, the associated record label, Linn Records, is perhaps less well known. The company's involvement with the recording side of the process began when the LP12 was being developed and test pressings were required for evaluating the turntable.

This led Linn to Castlesound studios in Edinburgh and



Carol Kidd: *Nice Work*
Carol's third album for Linn
Recorded at Castlesound Studios
in 1987.

of supply for the recordings. After last month a lot of you have written in asking for further details of the records detailed on the offers page, so each month we will be taking a look at one of

Linn Records

engineer Calum Malcolm. Linn began work on its own cutting lath, a modified Scully, and one of the masters it borrowed to check out the lath was from a then unknown band by the name of The Blue Nile. The band became the first signing to Linn Records and the label has never looked back.

Although Linn no longer uses the modified Scully, (the company's output is now being

cut at the Exchange in London),

it is still very much involved in the cutting and mastering processes. Linn records are still cut on lacquer and are cut as close to constant pitch as possible. When cutting from digital sources, the material is loaded into a hard disc editor, clocked off with an oscillator and then converted to analogue by means of the Linn Numerik convertor.

Linn Albums

Carol Kidd: *The Night We Called It A Day*

Recorded at Castlesound using the Linn Numerik recording system in February 1990 and awarded *Pick of the Week* in *Music Week* December 1990.

David Newton: *Victim Of Circumstance*

A piano trio album from Carol Kidd's pianist and musical director. Recorded by Linn in 1989.

Carol Kidd: *Carol Kidd*

Carol's first album for Linn. Recorded at Castlesound Studio near Edinburgh in 1984. Cut by Linn at the Exchange. Described by Ronnie Scott as "one of the best singers I have heard".

Carol Kidd: *All My Tomorrows*

Recorded by Calum Malcolm at Castlesound in 1985 and cut by Linn at the exchange. Features Martin Taylor on one of Carol's most beautiful interpretations, *When I Dream*.

Martin Taylor: *Don't Fret*

Hailed as Britain's best jazz guitarist, Taylor's album got rave reviews in the press, *Jazz FM* magazine going so far as to comment "Taylor has produced an album which I shall be surprised to hear bettered". Taylor has been voted Top Guitarist in the British Jazz awards for five years running from 1987 to 1991. Recorded by Linn in 1989.



Classical Releases

English Classical Players.
Conducted by Jonathon Brett
Mozart 40th Symphony & Schubert 5th Symphony.

William Conway & Peter Evans
Poulenc Sonata, Debussy Sonata, Frank Martin Ballade.

Polish Chamber Orchestra
conducted by Jonathon Brett
Mozart Divertimento in D, Vivaldi Concerto in Bm for four violins, Bach Violin Concerto in A Minor, Bartok Divertimento, Elgar Introduction and Allegro.

All of the above were recorded using the Linn Numerik as the mastering recorder and the best microphones and electronics that Linn were able to find. Linn took particular care in the choice of artists and repertoire, and in the generous amount of rehearsal and recording time taken for each record so that in its words "these records are as good musically as they are technically."

Choice Offers Order Form

Records and Compact Disks

Carol Kidd: *Carol Kidd*

- Ref LP39 (£9.99)
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Carol Kidd: *All my Tomorrows*

- Ref LP40 (£9.99)
 Ref CD40 (12.99)

Carol Kidd: *Nice Work*

- Ref LP41 (£9.99)
 Ref CD41 (12.99)

Carol Kidd: *The Night We Called It A Day*

- Ref LP42 (£9.99)
 Ref CD42 (12.99)

David Newton: *Victim Of Circumstance*

- Ref LP43 (£9.99)
 Ref CD43 (12.99)

Martin Taylor: *Don't Fret*

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Chico Freeman: *Brainstorm*

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Don Grusin: *Mountain Dance*

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NYC: *Steps Ahead*

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Ravel: *Daphnis et Chloe*: Boston Symphony Orchestra

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Reference Recordings

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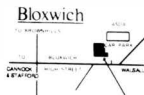
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The Directory

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance, the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *Superior* heads the Motor Units section as it is solid 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 - for example 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 we would advise you to refer to the original review for this, of which more later.

The next column 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 in the case of arm matching, figures are given with the cartridges, which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment

(especially the electromagnetical elements - that is to say the cartridge and the speakers), system building is unfortunately 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 *Hi-Fi Choice Directory* is constantly updated with the latest reviews and price changes as well as having any 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, together with an asterisk in order 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 to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

Yet those who choose the separates route still have lingering doubts - usually completely unjustified - over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different prerecorded music media competing for the attention of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality - particularly for those prepared to spend a substantial sum on a good quality turntable system.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere'

flexibility, a uniquely useful recording capability, plus a broad catalogue of prerecorded music cassette material. As a hi-fi medium cassette suffers from prerecorded 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 plays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain - by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that

no subsequent component can make up for the inadequacies of its predecessors - all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support - from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and

structure, and a similar distance from each listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrates some likely alternatives.

The *Directory* has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that 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.

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 compatible cartridges.

INTEGRATED TURNTABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Acoustic Research EB-101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Solo/Xenon MCS £440/£320	Average Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible	Suspended motor unit, optional quartz PSU, 13g		67
Alphason Sonata/HR-100S MCS/Atlas £760/£500/£360	Very Good Very Good	Good sound in all areas - bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Alphason Super Nova £300	Good Good	Informative, easy to listen to and quite lively deck with good detail and occasionally uneven bass. Build quality of review sample not perfect	Subchassis, manual, belt drive, detachable arm, 12g	R	91
Ariston Forte £350	Average - Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Pro £180	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive, 12g	BB	91
Ariston Q-Deck £165	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	67
Dual CS430 £100	Average Average -	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS5000 £230	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Dual CS503-2 £145	Good - Average	Not wholly inspiring; generally coarse and woolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
Dual CS505-4 £170	Good - Good -	The old-time favourite which never gives up. Sound is enjoyable if not perfectly clear, all-round value is excellent	Semi-auto, belt drive	BB	91
Goldmund ST4 £4589	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 h/shell	R	60
Heybrook TT2 turntable & arm £424/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, R belt drive, 14g		67
JVC AL-FQ555 £170	Average - Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kuzma Stabi/Stogi Reference £900/£699	Very Good Very Good	Beautifully made in a solid oak plinth, the Stabi also sounds very clear, detailed and extended. Stogi Reference is also most capable.	Manual, belt drive, subchassis, 12g	R	91
Linn Axis/Akito £443	Good - Average +	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn LP12-Lingo/Ekos/Troika £1149/£1097/£798	Good + Good +	The classic reference is improved (at a price) by the Lingo but character remains the same - not as detailed or neutral as the best. Ekos arm, though pricey, is well made and suited to many decks	Manual, subchassis, belt drive, 9g	-R/-	91
Manticore Mantra/Musician £340/£170	Good + Good +	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
Marantz TT400 £150	Average - Poor	Everything one hopes a budget deck won't be; coarse, confused, muddled and woolly. Construction isn't wonderful, either	Manual, belt drive 16g		91
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable arm/tube/weight, 9g	BB	67
Omega Point Silver/Black £895/£295	Good Good +	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (Revise £599/£99)	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rational Audio Aura 01 £189	Poor Good	Poor lab results reflect bad rumble, but midrange and treble are very pure and clean; idiosyncratic sound and styling should be tried!	Manual, belt drive, linear tracking arm 10g	R	91
Rega Planar 2 £155	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	Good Good	A long time leader in its price category, the '3' (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £185	Average Good -	Quite lively and detailed but not the strongest on subtlety, with slightly lumpy bass. Motor breakthrough audible, and watch for bent motor shaft on delivery!	Manual, belt drive, semi-suspended 12g	R	91
Revox B291* £892	Average - Average -	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Rotel RP-855 £160	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek IIX £248	Good Average +	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67

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INTEGRATED TURNTABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
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
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
Thorens TD 166 Mk V £200	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £180	Good - Good -	Legendary Thorens build quality on the cheap - slightly unsubtle sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £220	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD2001 £630	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD320 Mk II £350	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £1995/£695	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping trough improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helius Cyalene £5299/£1066	n/a Excellent	Voyd's flagship is equipped with three of the biggest motors in the business, a Lexan platter and a real brute of a power supply (it dwarfs most power amps!). A strong contender for best turntable in the known universe	Belt drive, 3 motors, subchassis, outboard PSU, 12/14g	R	Coll. '90
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g		R 67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Ariston Superior £598	Good + Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
CEC ST930 £599	Good Very Good	A rarity - a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £90	Good - Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell 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
Michell Syncro £265	Good Good	A 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	67
NVA Senior £450	Good - Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Alexandria Mk III £1195	Very Good Very Good	One of the most beautifully presented players made, and fully supported by superb separation, dynamics and a euphonious style of delivery.	Manual 2-speed belt drive	R	67
Oracle Paris £595	Good - Average	Looks good but sounds coarse, confused and uneven, with bass liable to thump	Belt drive, semi-suspended, electronic		91
Origin Live Oasis A £495	Good - Average	Rather coarse sound with lack of detail resolution - but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33rpm only, suspended		79
Origin Live Oasis B £199	Average Average +	Aesthetics are not its strong point, but its lively and articulate - if idiosyncratic - sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33Gy1/3Gyrpm only, solid plinth/subchassis		79
Oxford Acoustics Crystal Reference £2495	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery. Recently updated to mk.II form	Manual, belt drive, subchassis, stand	R	60
Pink Triangle Anniversary £1175	Excellent Excellent	Possibly the most detailed, clear, neutral and therefore accurate deck around. Likeness to master tape is almost uncanny	Suspended, belt drive, electronic, motor on subchassis	R	91
Pink Triangle Export £676	Very Good Excellent	Basically a PT T00 with built-in power supply. Retains features of great transparency and neutrality. Review sample had highish motor noise - presumed untypical	Suspended, belt drive, electronic	R	91
Pink Triangle Little Pink Thing £392	Good + Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IIXE £248	Good Very Good	Fine, honestly specified and well built player which easily betters its closest stablemate, the IIX. Frankly, at the price it's a sonic bargain	Manual 2-speed, external PSU	R	67
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
Voyd "The Voyd Plus" £2777	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference, so we've dubbed it The Voyd Plus. Superb build and finish; colourful, dramatic performance. A thoroughbred	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £699	Good - Very Good	Recent power supply upgrade has resulted in alround improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19Mk3 £1500	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79

TONEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60

The Directory

TONEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Alphason Delta £190	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason HR100S £440	Very Good Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	Coll. '86
Alphason Opal £130	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Xenon £260	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
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summ
Eminent Technology £1000	Good + Very Good	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	Coll. '86
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll. '87
Helius Orion 2 £490	Very Good Very Good	Excellent engineering with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £1097	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Moth Arm £78	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural - performance improves in line with the rest of the system	12g	BB	60
Naim Aro £699	Good Good -	Designed for use on the Linn LP12, the Aro is a little bright and congested.	10.5g		91
Rega RB300 £115	Very Good Very Good	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £669	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out.	8g		67
Roksan Tabriz £165	Good Good +	Though obviously targetted at Roksan's own Xerxes, it is also a good alternative to the Rega arms in many applications. A trifle bright.	9g	R	91
SME 3009 Series III £253	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009 Series IIIS £182	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009R £335	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1247	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

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.

MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average - Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8gN Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Very Good	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients	5-11g Low, MC	R	85
Audio Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Audio Technica AT-420E £35	Average Average	Better suited to pop recordings, this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67

The Directory

CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
Audio Technica AT95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audionote I02VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audioquest AQ 404i-L £400	Very Good Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audioquest AQ 7000 £1200	Good Good +	Stunning stereo imaging and good detail at low levels are spoiled by less-than-perfect tracking and high sensitivity to arms.	6-20g Low, MC		91
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL 103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110, its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent.	6-18g L ow, MC	R	91
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC	R	48
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g N Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Very Good Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Very Good Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire Benz-Micro MC-2 £699	Average Good +	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g L Low, MC		67
Glanz GMC-20E £129	Good + Good +	Very good tracking, smooth sound and good detail. Very slight surface noise enhancement	5-10g Low, MC	R	91
Glanz MFG-110EX £25	Average Average	A little bright but giving detailed bass and clear treble, this was competitive at the price	6-16g Normal, MM	R	43
Glanz MFG-310LX £50	Good + Very Good	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance	6-10g Normal, MF	BB	85
Glanz MFG-610LX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £40	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £60	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar! ~	5-11g Normal, MM	R	85
Goldring 1042 £85	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £16	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Epic II £26	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica £100	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £115	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £500	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Grado ZF3E + * £47.50	Average - Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Grado ZTE +1 £26.50	Average - Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Blue Goldspot £450	Very Good Good +	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Kiseki Purpleheart Sapphire £799	Good + Good +	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		48
Koetsu Black S £612	Average Good +	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn Asaka £373	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	Coll. '86
Linn K5 £39	Average Average +	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £89	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	Coll. '86

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MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
Linn Karma £564	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	Coll. '86
Linn Troika £798	Very Good Good +	Good all-rounder, but still some hint of unhappiness at very high levels. Good imaging and bass.	6-18g Low, MC		91
London Maroon £149	Average Average +	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damp) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g, damp Normal, fixed stylus MM		84
Milltek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Milltek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g, (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average - Average -	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka Stilton TS10 £50	Good - Good	Stilton-designed solid body (with three-point mounting) certainly gives remarkably resonance-free sound, but tip and generator are less good - a little rough at times.	5-10g Normal, MM	R	85
Nagaoka Stilton TS11 £70	Good - Good	Differs from TS10 in having Vital stylus with better tracing but still some high frequency harshness.	5-10g Normal, MM		85
Ortofon 510 £30	Good Good +	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average +	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good + Good +	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon 540 £100	Average - Average	Graced with an advanced FGII stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon MC20 Super £200	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	Coll. '86
Ortofon MC30 Super £270	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll. '87
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere; one of the very best	9-16g Low, MC	R	84
Ortofon MC5000 £1500	Good + Good	Review sample could not be fully run-in, which might explain limited tracking ability and bright and forward sound, though imaging is excellent. Fussy about s.	12-20g Low, MC		91
Ortofon Quartz £120	Good + Good	Lively, quite detailed, and a touch bright, the Quartz has many qualities of the much dearer Quasar	3-12g Low, MC	R	91
Ortofon Quasar £300	Very Good Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average + Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in comparison. A firm budget buy	8-16g Normal, MM	BB	67
Roksan Corus Black £110	Good + Good	Recognisably related to Corus Blue, but distinctly more civilised and smoother.	7-12g Normal, MM	R	91
Roksan Corus Blue £65	Good + Good	Roksan-specified modified Goldring 1012; slight harshness detracts from otherwise good sound.	7-11g Normal, MM		91
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 Summ
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 Summ
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 Summ
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 Summ
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure ME97HE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48

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MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
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 Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £173	Very Good Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
Stilton/AT-F3 £110	Good + Good +	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72
van den Hul MC1 Super £800	Very Good Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC10 £499	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60

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.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research A-05 £200	Good + Good +	Capitalises on the strengths of the A-03 and A-07 but escapes the ignominy of their deficiencies. The amp for all AR-based systems	67W, 2 tape, 3 line and both MM/MC inputs. Tone defeat	R	97
Acoustic Research A03 £170	Average + Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
Acoustic Research A07 £300	Very Good Average +	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/MC inputs		68
Aiwa XA-005 £130	Good + Average -	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
Aiwa XA-006 £130	Good Average	Competent enough performer with plenty of facilities. A gutsy sound though one that's rougher via CD than MM.	67W, MM and 5 line i/p's plus independent rec out.		92
Akai AM-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/MC disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/A convertors were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs. MM/MC		68
Alphason Apollo £300	Average- Average+	Our early production sample was beset with a variety of niggling problems. Laid-back though not unmusical sound.	54W, 5 line, tape and MM/MC inputs. Solid wood fascia		92
Amadeus Gold £360	Average - Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD	56W, MM/MC plug-in cards, 3 line R inputs		74
Amadeus Silver £270	Average - Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/MC, 3 line inputs	R	80
Aragon 4004 £1795	Good Good	Despite its imposing bulk, the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha 2 £195	Good Good +	Very confident, convincingly musical and punchy sound that sets the standard for other budget amps	41W, 4 line and MM inputs	BB	68
Arcam Delta 110/120 £720/£520	Good+ Good	Overall performance is limited by the power amp - in isolation the PDM-preamp offers a remarkably open and detailed sound, particularly in 'digital' mode.	112W power amp, MM/MC +4 line R/- inputs + coax/opt digital input.		92
Arcam Delta 60 £300	Good Good +	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/MC inputs, no tone controls	R	68
Arcam Delta 90.2 £410	Average + Average +	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/MC, 4 line inputs, tone bypass, bi-wire	R	74
Ariston Amp £219	Average Average +	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Innovations Series 1000/2nd Audio Amplifier £1499/£2950	Poor Excellent	This valve combination offers awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monoblocks	R	63
Audio Innovations Series 200 £449	Poor Very Good	Like most 'Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
Audio Innovations Series 300 £499	Poor Very Good	Something of an anomaly, the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system - now in mk II guise	10W, MM, 6 inputs	BB	63
Audio Innovations Series 300II £500	Poor Good +	Under-powered and over-distorted yet capable of realising an open and captivatingly expressive sound. Sensitive speakers are a must	9W(!) integrated valve amp with tape, 3 line and MM disc inputs	R	97
Audio Innovations Series 400 £669	Poor Very Good	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin' and lacking in welly with inefficient speakers	12W, MM and 4 line inputs	R	77
Audio Note Ongaku £29,950	n/a Excellent	An out and out audiophile product, a single ended, zero negative feedback, triode, line level integrated amp. Probably the best amplifier in the world!	6 line inputs, 27W	R	Coll '90
Audiolab 8000A £350	Very Good Good +	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/MC, 4 line and full record out selection	R	74
Audiolab 8000A £410	Very Good Very Good	Recent mods have cured the slightly glassy treble, replacing it with a smoother but richer and more solid style of music making	81W, 3 tape, 4 line and both MM/MC inputs. Tone defeat	R	97
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, hdhp, tone controls	R	62
Audiolab 8000C/8000P £375/£545	Very Good Good	Audiolab has revamped its pre/power combo though the very distinctive almost stark neutrality that results will not appeal to all listeners. Good value engineering, nevertheless	157W pow amp + bi-wire outputs. 3 Tape, 4 line + MM/MC on preamp		97
Audiolab 8000P £495	Excellent Good +	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Audion CD-1 £399	Average + Very Good	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great - if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-40 £190	Average Average +	Based on ITL's earlier MA80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
Aura VA-50 £200	Good Very Good	Superficially similar to the cheaper VA-40 but with much more of the old MA-80's magic! Great sound from a slimline package	65W, one tape, 4 line and MM only. New tape monitor switch	BB	97
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 Audio CA35/P35mkII £695/£895	Average + 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 M70 £1995 pair	Good Good +	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool, confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good + Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	a 272W, bridgeable to 800W. 6 line, 2 disc inputs, subsonic filter		68
Cambridge P25 £180	Good+ Average	Despite clocking-up a solid set of measurements the sound of the P25 proved to be as grey as its appearance.	37W, 4 line and MM/MC inputs + tone defeat.		92
Cambridge P50 £200	Good Average +	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense of 'naturalness'	56W, 4 line inputs + MM/MC + tone		85
Carver CM-1090 £495	Average Average +	Looks very professional with its meters and handles but suffers from a loose and dirty sound that shies away from busy tracks	141W, 2 tape, 4 line and MM disc. Sonic Holography feature		97
Cello Audio Suite £1200	Excellent Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Chord SPM-900 £1725	Average + Good +	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
Concordant Excelsior £856	Very Good Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs, External power supply	R	77
Conrad-Johnson Motif MC-8 £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
Conrad-Johnson Premier 7A £8995	n/a Excellent	Price has increased since we tested it - but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy. Absolutely gorgeous!	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	Coll '90
Conrad-Johnson PV-10 £1100	Excellent Excellent	Pricey, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage - classy build quality too.	MM plus 4 line inputs	R	78
Creek CAS 4040s3 £200	Good Good	Now in mk3 guise the '4040 offers a dry but tidy sound via disc and one that's slightly leaner and better focussed on CD.	41W, 3 line and one MM disc i/p. Tone controls.	R	92
Creek CAS 4140s2 £230	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/MC, 3 line inputs, mono R and mute		80
Croft Series 4S £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series 4SA £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
Croft Super Micro A £549	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs. Now in mk.II form	4 inputs, MM, straight line	R	57
Cyclone Catalyst £1995	Good + Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 R line inputs	R	80
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
Deltec DSP-50S DPA-50S £725/£925	Excellent Excellent	Remarkable pre/power combo based around the highly linear DH-OA32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring. 3 line, MM/MC no tone controls	R	68
Denon DAP-2500/POA-4400A £550/£600 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs		68
Denon PMA-250II £130	Good Good +	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon PMA-350 £160	Average+ Good	Bold claims were made at its launch but the sweet and inoffensive sound, though very pleasant, is not mould-breaking at the price	88W, 5 line and MM disc inputs + source direct.	R	92
Denon POA-6600 £1000 pr.	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles - now in revised A form	250W monoblok, remote power	R	60
DNM 3A From £1000	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Dual CV-5670 £250	Very Good	Magnificent build and prodigious output to its credit, the CV-5670 still fails to capture the delicacy and enthusiasm of its cheaper companion	128W, 5 line, 2 tape and MM/MC inputs + loudness and CD Direct		97
Dual CV5600 £160	Good+	Made by Rotel and possessing the highly articulate vocal/string quality of their best budget amps. Very communicative, especially with a good CD player.	57W, 3 line, 2 tape and one MM input. CD direct	BB	92
E.A.R. 549 £3628 pr	Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but Very Good exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
Entire Sound EX50 £500	Average- Average+	A new and fairly costly Mosfet power amp of limited output. Resolution of detail is pretty good but sound is cold-hearted.	40W Power amp. Internal P/S included for ES preamp.		92
Exposure VI/VII*/VIII £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R	68
Exposure VII/VIII £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Exposure XI/XII/VIII Super £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/MC less transparent than CD	61W, MM/MC, 5 line inputs	R	80
Goodmans GSA-600 £140	Good Poor	Designed to form the heart of a Goodmans separates system, the wishy-washy and faceless sound of this amp fails to stack up	76W, tape, 3 line and MM inputs. Remote control		97
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 8ohms	R	57
Hafner DH120 assembled £360	Very Good Average	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Hafner DH120 kit form £295	n/a Average	Er, we didn't build one; see assembled version below	60W		44
Hafner SE-100/SE-120 £365-375/£375	Good + Good +	The smallest of Hafner's pre/power range but still imbued with the open, sparkling quality of their bigger models. Preamp sounds significantly better via CD than MM or MC	96W, bridging option. 2 Tape, 3 line + Aux or MM/MC	R	97
Hafner XL-600 £1145	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
Harman Kardon Citation 25/22 £699/£899	Good Average +	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/MC full range of input and record out		74
Harman Kardon HK6100 £170	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
Harman Kardon HK6200 £250	Good Good	Supposedly a beefier version of the HK6100 but in practice there's little to distinguish the two amps	50W, 5 line inputs + MM, tone controls		97
Harman Kardon HK6500 £380	Good+ Good+	The best of HK's current range. A firm sound that enjoys an impressive grip on the most complex music. Great bass!	74W, 3 line, 2 tape and MM/MC Tone controls + loudness	R	92
Harman Kardon HK6600 £500	Good + Average +	This amp comes as a real disappointment after the HK6500. Differences in design yield a flat and uninspiring sound	87W, 2 tape, 4 line and MM/MC inputs. Tone defeat		97
Harman Kardon HK6800 £700	Good + Good	Smother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R	85
Heybrook C3/P3 £400/£500	Average + Average -	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole - glassy and uncouth	138W with plenty of current. Passive line inputs		85
Jadis JP30/JA30 £4145/£4200	Average Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
Jeff Rowland Coherence One/Model £3950/ £9900	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/MC with loading options. Balanced topology	R	72
JVC AX-A3TN £140	Very Good Good	A true minimalist amp from the masters of mass-production! Offers a very comfortable, accessible sound yet with some loss of deep bass and extreme treble.	50W, 3 line, 1 tape and MM i/ps. CD DiRt and 'Bass Compensator'	R	92
Kelvin Digital Integrated £550	Good + Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R	85
Kelvin Integrated £449	Good Good	Recent mods have reversed the Integrated's previous good fortune, this unit was just too syrupy.	21W with 10-12W in Class A. Four line + MM/MC.		92
Kelvin Labs Absolute Zero/M30 £395 + £295/£595pr.	Good + Average +	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/R balance	R	74
Kenwood KA-3020 £140	Good + Good +	An unassuming little amplifier that turns in a remarkably balanced and entertaining sound. Lively, detailed and engaging	66W, 2 tape, 3 line + MM disc. Source direct	BB	97
Kenwood KA-4020 £170	Good + Average +	On paper this is a beefier version of the '3020 yet our listeners thought it sounded weaker, lacking richness and detail	103W, 2 tape, 3 line + MM/MC. Source direct		97
Kenwood KA-5020 £220	Very Good Good+	Something of a powerhouse on the cheap this amp can keep pace with the most challenging of dynamics. Its sound is vibrant but some fine detail is lost.	115W, 3 line, 3 tape and MM/MC. Source direct.	R	92
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented, this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
Lecson Quattra £350	Average+ Good	Underpowered but with the flexibility of four independent power amps. Very deep, captivating sound with 3D soundstaging.	19W via all 4 channels. 5 line and MM/MC inputs.	R	92
Lectron JH50 £2300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive - but very desirable!	50W		78
Linn Intek £398	Good Good -	Linn have slashed a huge sum off this very load-tolerant amp yet the flat, two-channel sound via CD still compromises its value	49W, 2 tape, 3 line + MM/MC Pre-out facility		97
Linn LK1/LK280 £598/£763	Good Good -	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/MC. xlr sockets.		68
Linx Nebula £500	Average + Average +	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching		85
Magnum MP150/MF150 £320/£320	Average + Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R	85
Marantz PM-30SE £180	Very Good Good+	The breathed-on version of Marantz' PM-30 offers an engagingly detailed and spacious sound though one that's warmer via MM disc than CD.	50W, 3 line, 2 tape and MM disc. Source direct	R	92
Marantz PM-40SE £240	Very Good Good +	The improved version of their basic PM-40 model has itself been updated to provide a bigger and more exciting sound. A good 'un	61W, tape, 3 line + MM/MC disc. Source Direct	R	97
Marantz PM-50 £250	Good + Average +	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/MC, 4 line inputs, source- direct		80
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/MC		68
Marantz PM-80	Very Good	Technically robust with an equally beefy and tactile sound. Great sense of power and control	133W, 3 tape, 4 line + MM/MC.	R	85

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
£400	Good +	but spatially a little flat	Class A option		
Marantz PM-95 £2000	Very Good	Beautifully constructed, this amp was less convincing via its digital input than via line.	151W with 30W available in Class A. Opt + coax inputs		74
Meridian 201/205 £695/£500 each	Very 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 remoteR/-capable straight line		62
Mission Cyrus One II £200	Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol.	R	85
Mission Cyrus PSX £230	Very Good	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 II £330	Very Good	Recently updated this popular favourite captured our attention, once again, with its robust and very convincing sound.	60W, 4 line and both MM/MC disc. R No tone controls		92
Musical Fidelity A1 £299	Average +	Just scraping a recommendation, this current A1 sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R	85
Musical Fidelity A100 £499	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 B1 £200	Average +	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/MC, 5 line inputs, tape monitor	R	80
Musical Fidelity B200 £349	Very 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 MA50 £875 pair	Good	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
NAD 3020i £140	Very Good	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	BB	85
NAD 3225PE £160	Average +	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
Naim Separates £750 plus	Very 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
NVA P70MC/A60 £830	Average	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs		80
Onix DA-21s/SDAP £350/£180	Average +	Via MM disc this amp comes alive with a fresh and vibrant sound though its CD input sounds utterly dead by comparison.	60W, 1 tape, 3 line and either MM or MC. Outboard PSU option		97
Orell SA-040 £359	Good	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Orell SA-040SE £400	Average	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W, 5 line + MM/MC i/p's. Tweaky compmts.		71
Philips DFA-888 £300	Good	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
Philips FA-880 £200	Good	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/MC source-direct tone		74
Philips FA890 £230	Good +	Based on their FA880 model but tarted-up with a remote control facility. Inoffensive, civilised but unexciting sound is retained	120W, 6 line + MM/MC logic-controlled input switching		97
Philips FA960 MkII £300	Good +	The MkII '960 still failed to grasp our listeners' attention, but it remains a competent amp nonetheless	122W, 6 line & 2 disc inputs + tone controls		68
Pioneer A-300 £180	Very Good	The cheapest of Pioneer's dynamic duo gives off its best with CD rather than MM disc which failed to shine quite so brightly.	55W, 3 line, 2 tape and MM. Independent rec out facility.	R	92
Pioneer A-400 £230	Very Good	Pioneer's design concept snaps into focus with the A-400, an amp that seems to bubble with musical detail. A bench-mark that other manufacturers should strive for.	71W, 3 line, 2 tape, MM/MC Independent R-out switching.	BB	92
Proton 520 £115	Average	Very well equipped budget amp with a slightly flat and undynamic sound - acceptable at the price though	31W, MM/MC with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good +	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/MC, adjustable MC gain, 5 line inputs		80
QED A240 CD II £199	Good +	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £259	Very Good	Redesigned 240SA has significant improvements over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	62
QED A270 £299	Good -	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W, 5 line and 2 disc inputs, pre-out	R	68
QED A270CD/PA £300/£400	Good	Recent updates have bolstered the output of the A270 without adding to its colourations. The PA option is now looking a touch expensive	61W, 2 tape, 3 line + MM or MM/MC from PA board	R/-	97
QED C300/P300 £300/£300	Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt.	R	85
Quad 34 £366	Very Good	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
Rational Audio £175	Average-	This wacky newcomer from Czechoslovakia offers a very open and fluid sound via CD but its performance via MM depends very much on the cartridge's load impedance.	129W, caters for line and MM disc sources but has no i/p selector.		92
Ray Lumley Model 75 £1995 pr	Average	Monstrous valve monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
Revox B150 £1047	Very Good	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1467	Very Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote, tone controls		56
Rose RV-23 £395	Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound - but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA-810A £120	Very Good	As a cut price RA820All this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdpd, tone controls	BB	62
Rotel RA-820AX £150	Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
Rotel RA-820BX4 £190	Good +	Very authoritative but creamy-smooth and delightfully musical. Spatially convincing too, yet not as open as RA-820AX	39W, 4 line + MM/MC, dual-conc. volume.	R	85
Rotel RA-840BX4 £250	Good	Very sedate and controlled in presentation but check phasing for optimum stereo effect	63W, MM/MC, 4 line inputs, tone controls		80
Rotel RA-870BX £300	Very 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

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Rotel RC/RB-850 £140/£160	Very Good Good +	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
Rotel RC/RB-870BX £220/£230	Excellent Good +	Reduced price makes the 870 combo better value but, despite mods to the preamp, it is the power amp that must take the lion's share of credit	128W or 208W bridged CD direct, 4 line, 2 tape and MM/MC	R	68
SAE P102/A202 £499/£599	Average + Average +	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/MC + CD tuner and 2 tape tone memory, spk switching		74
Sansui AU-X111 £110	Good Average	Sansui has engineered an amp that's both solid and flexible for the price, but its sound is rather bland compared to competition in the £110 sector	5 line inputs, MM, 52W		92
Sansui AU-X911DG £700	Very Good Good +	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W, 4 dig, 3 line and MM/MC i/p's. Rec-out	R	85
Sony TA-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/A convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/MC, 3 tape, 2 line, full rec-out		80
Sugden A21a £395	Average+ Good	The modern-day relative of Sugden's original Class A amp and one that offers a smooth, easy-going sound. Best partnered with sensitive speakers.	25W power amp with a good 16W in Pure Class A.		92
Teac A-X400 £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W, 4 line + MM + tone + mic i/p level control		85
TEAC A-X5000 £229	Good Average -	This amplifier is compromised by a grey and muddled sound that taxed the concentration of our listeners. Better via MM disc	107W, 3 tape, 3 line + MM/MC. Source Direct		97
Technics SE-M100 £550	Very Good Good +	An unusual disc-less poweramp with volume control. Standard line input sounds very open and clean. Digital input is harsher and less convincing	123W, coax and opt digital inputs, var and direct CD no disc	R	74
Technics SU-810 £130	Average + Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W, 2 tape + 3 line + MM. Tone + loudness		85
Technics SU-V660 £250	Good Average	Chunky build but integrated output stage infers a weak, insubstantial and rather monophonic sound	107W, MM/MC, cd aux, tape + tuner + power amp-direct		74
Technics SU-V900 £500	Very Good Good+	Massively built but with a light, fresh and essentially very neutral sound. Bulk notwithstanding it's not particularly suited to life with a difficult speaker.	125W, 5 line and both MM/MC inputs. Tone controls + power amp.		92
Threshold FET 10e system/Stasis SA-4 £5700/£5900	n/a Very Good	Almost valve-like limpidity and excellent soundstaging are star qualities of the Threshold amps. Line input resistive loading is too low	Component FET phono stage, line pre, FET power amp 100w		Coll. '90
Yamaha AX-330e £100	Average + Average +	An improvement on earlier efforts but still a little bland or lack-lustre. Very compatible though	48W, MM, 3 line inputs, source-direct option		80
Yamaha AX-550 £240	Very Good Good	Beautifully built and offering the flexibility of remote control, the AX-550 sounds tidy and neutral yet lacks the ability to involve on an emotional level	131W, 5 line + MM/MC. Pure Direct + remote control		97
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
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 2 pre & pwr £1395/£1695	Very Good Very Good	Superbly finished French 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 Model 3 £995/£995	Good Good	Suited to highish sens. Loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72

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 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	ISSUE
Acoustic Energy AE1 £748	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/w 60Hz	R	59
Acoustic Energy AE2 £897	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work	39 x 23.5 x 29.5cm heavy stands, free	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz		66
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz		68
Acoustic Research AR-132 £200	Average + Average -	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear	87dB/w 50Hz		66
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this econobox succeeds partly because of its simplicity, and works well with some rear wall assistance	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/V applications, the SE5 can give any miniature a run for its money on bass performance; hardness and coloration	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Allison AL100 £109	Average- Average	Loud and lively budget wall-mount is bigger and beefier than most of the competition, if lacking some subtlety and refinement	33.5 x 24 x 21.5cm stands against wall	87dB/W 30Hz (in room)	BB	94
Allison AL105 £150	Average Average -	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Artemis £299	Average Average+	Pretty little miniature sounds nicely unboxy but is also a bit short of punch and balanced rather too bright.	27 x 17.5 x 22cm stands 1ft from wall	86dB/W 50Hz (in room)		94
Alphason Orpheus £1000	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Alpha £200	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wall	87dB/W 40Hz (in room)	R	94
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but a rather laid back, ponderous and over-rich overall sound	35 x 16.5-25 x 20-27cm high stands in free	85dB/w 30Hz (in room)		86
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation can be uncomfortable	44 x 24 x 31cm stands close to rear wall	82dB/w 84dB/w (in room)		86
Audio Electronics TC10 II £599	Good - Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stands	83dB/w 48Hz (in room)	R	86
B&W 620 £299	Good Good	Good value floorstander has well balanced, laid back and slightly lazy sound that is pleasantly easy on the ears; could do with its own spikes and firmer	74 x 23.5 x 30cm floor, free space	89dB/W 25Hz (in room)	BB	94
B&W CM1 £400	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £199	Average + Average -	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine	77/99 x 56 x 43cm floor or stands, free	86dB/w <20Hz (in room)	R	81
B&W Vision DS1 £120	Average Average -	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 45Hz (in room)	R	82
B&W Vision DS2 £180	Average Average -	Although the box is generous for the price, the DS2 is a rather uneven performer, both on the measurement and listening. Careful stand selection and	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
Bose 305 £350	Average Good -	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness with a modest	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
Bose Interaudio 3000XL £150	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Boston A120 £349	Average + Good -	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz	R	86
Boston A40II £120	Average Average -	Competent performance for size and price but below average relative to the UK competition	34 X 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from walls	87dB/w 30Hz (in room)	R	82
Cambridge SoundWorks Ambiance £179 (mail order only)	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB/W 45Hz (in room)		94
Castle Clyde £159	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/w 64Hz	R	46
Castle Durham £209	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w	R	46
Castle Pembroke £229	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Castle Warwick £179	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB/w 50Hz		66
Castle Winchester £1250	Very Good Very Good	This unconventional and beautifully crafted model is physically large for its bass extension but is engagingly agile and sounds attractively open and airy	114 x 24 x 47cm in free space	87dB/w 25Hz	R	90
Celef CF2 Nimbus £230	Good - Good -	Nicely balanced overall but a little uneven with it, this lively and dynamic largebookshelf model came close recommendation	46 x 25.5 x 24cm stands in free space	88dB/w 55Hz		71
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion 5 £149	Good Average	Cunningly conceived and balanced, the 5 may be a little slow for some tastes, but is well suited to CD-oriented budget systems	35 x 20.5 x 26cm heavy stands close to wall	89dB/w 30Hz		90
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Celestion DL6 Series II £179	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion DL8 Series II £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £599	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear	85dB/w 50Hz		66

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Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching	27 x 20 x 23cm free air on tall stands	82dB/w 52Hz		68
Celestion SL6Si £399	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wall	86dB/W 30Hz (in room)		94
Creek CLS20 £200	Good Average -	Looks good material value, but sound is distinctly over-rich and thick in the mid-bass region; maybe the box is a little too large.	49 x 24.5 x 24cm open frame stands, free	88dB/W 30Hz		90
Dahlquist DQ8 £850	Good Good	Large floorstander uses out-of-box tweeter to give delightfully out-of-box presence and treble; bass is much less impressive	100.5 x 36 x 28cm floor, free space	88dB/W 30Hz (in room)	R	94
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB/w 20Hz		90
DCM Timeframe TF250 £350	Average + Average	Neat and unusual floorstanding presentation, marred by indifferent build and cuddly but rather coloured sound, especially on spoken word	86 x 32 x 16cm close to rear wall	88dB/w 45Hz		90
Doxa 5 - 2 £900	Good Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
Duntech PCL1000 Crown Prince £6120	n/a Excellent	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised	180 x 30.5 x 43.5 free standing away from	90dB/w 42Hz	R	72
Duntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'slam' but a little less refined in the higher registers	147.5 x 27 x 40cm free standing away from	92dB/w 48Hz	R	65
Epos ES11 £300	Good Good+	Pretty luxury compact uses integral baffle/driver to give a remarkable combination of low coloration, transparency and speed; bass is a bit shy	37.5 x 20 x 25cm stands 1ft from wall	86dB/W 45Hz (in room)	BB	94
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wall	85dB/w 45Hz	R	90
Faraday Siren £330 (direct sale)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
Goodmans B-Max/Maxim 2 £100/£90	Poor Average -	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 see above, suck and see	89dB/w 55Hz (in room)		78
Goodmans HIM 440 £350	Good Average -	Amazing perceived value, sensitivity and good bass extension, marred by serious cabinet coloration, a nasty tweeter and a difficult amplifier load	87 x 38 x 40cm low stands clear of walls	94dB/w 24Hz		90
Goodmans M100 £80	Average + Average -	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
Goodmans M300 £100	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB/w 50Hz (in room)	R	82
Goodmans M500 £130	Average Average-	Large 'bookshelf' size means plenty of speaker for the money plus good sensitivity, let down by unruly mid/bass performance and indifferent build	47 x 24.5 x 21.5cm stands, free space	89dB/W 50Hz (in room)		94
Goodmans Maxim 2 £90	Average + Average	More wham-bam-thank-you-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
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high	87.5dB/w 65Hz		59
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430 £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Interior 90 £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
Heco Interior Plus 404 £400	Average+ Average+	Odd shape and size; twin main driver arrangement creates a slight 'boom'n'tizz' effect, but mid focuses well and bass extension is impressive	58 x 26 x 31cm low stands free space	88dB/W 25Hz (in room)		94
Heco Superior 740 £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
Heco Superior 940 £999	Good Good	This large and beautifully finished floorstander has an impressively smooth and attractively transparent midband. Bass is well extended but follows rather	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
Heybrook HB1 £199	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/w 61Hz	R	46
Heybrook HB100 £279	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £369	Average Good	Convincingly communicative but a bit coloured and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear	89dB/w 42Hz (in room)		82
Heybrook HB200 £429	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable.	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/w 60Hz		68
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/w 28Hz	R	90
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a Very Good	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open	89dB/w 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature is carefully conceived and beautifully executed Undeniably attractive in the midrange and treble, the Modulus failed to handle	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Jamo Concert II £250	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
Jamo Concert VII £650	Average+ Average	Beautifully built large floorstander uses unusual double reflex bass system, unsuccessfully as far as low frequency resolution is concerned	96 x 28 x 31.5cm floor, free standing	87dB/W 25Hz (in room)		94
Jamo Cornet 40 £100	Good Average	Prettily styled Danish miniature is good perceived value and delivers solid bass and midrange performance but is let down by an indifferent tweeter	31.5 x 19.5 x 21.5cm about 1ft from wall	87dB/w 48Hz		90
JBL Control 1 Plus £229	Average Average	Sub-miniature with forward midrange and no real bass; highish price partly justified by cute, near-indestructible Pro styling and build	23 x 15.5 x 14cm close to rear wall	89dB/w 50Hz		90

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JBL L20T3 £249	Average- Average-	Compact bookshelf model delivers bouncy miniature-type sound when free space mounted; pleasant enough but uneven and undistinguished	39 x 23 x 20.5cm stands free space	87dB/W 48Hz (in room)		94
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £339	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
JBL TLX12 £149	Good - Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners that it could deliver a	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
JPW AP2 £175	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm	89dB/w 65Hz	R	53
JPW AP3 £225	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
JPW Minim £85	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82
JPW P1 £145	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	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
JPW Sonata £115	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
JPW Sonata Plus £135	Average Average -	This luxury variation on the redoubtable Sonata theme features a metal dome tweeter, and is not the better for it	32 x 23 x 21cm about 1ft from wall	87dB/w 30Hz		90
JRT AD1 £500 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB/w 28Hz (in room)	R	86
JRT AD1 Micro £389	Average Good	Beautiful bijou miniature has delightful life and coherence and gives surprising impression of scale; some aggressive tendencies but very	28 x 17 x 21cm stands against wall	87dB/W 50Hz (in room)	R	94
Kammerzell Reference Mini Monitor £545	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	stands 1-2ft from wall	85dB/W 50Hz (in room)		94
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
KEF C15 £129	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
KEF C25 £159	Average + Average -	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
KEF C45 £239	Good Average -	Conventional and competitively priced, C45 delivers an impressively consistent and competent sound. As one listener commented: "Offensively inoffensive"	47.5 x 28 x 24cm uncritical	87dB/w 30Hz (in room)		86
KEF C55 £269	Good Average +	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82
KEF C75 £429	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
KEF C85 £599	Good Good	Essentially a simplified vinyl finish version of C95, the 85 delivers a similarly coherent, neutral, rich and slightly lazy sound	88 x 25 x 22cm well clear of walls	89dB/w 27Hz	R	90
KEF C95 £699	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB/w 25Hz		90
Linn Index II/KuStone £235/£109	Good Good	Combination of stand and speaker looks and sounds very good for the price, with good bass extension and control, and fine dynamic range. Clean, clear if	44 x 21 x 23.5cm (box only) close to rear	86dB/w 28Hz	BB	90
Linn Kaber LS500 £1098	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic	93 x 19 x 28cm floor against rear wall	86dB/w 40Hz (in room)	R	82
Linn Kan II £439	Average + Average +	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against	82dB/w 35Hz (in room)		78
Linn Nexus LS250 £458	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	89dB/w 60Hz		59
Magneplanar MG1.4 £1190	Good + Good +	Replaces the stalwart MGic with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB/w 40Hz	R	72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
Magneplanar MG11la £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
Magneplanar SMGa £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)	R	71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room)		94
Meridian M30 £895	Average + Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 760 £100	Good Average +	Smart presentation and an engaging sound, this sensitive budget miniature sounds notably more lively and less boxy than most of its peers	29 x 18 x 20cm stands close to wall	88dB/w 50Hz	BB	90
Mission 761 £130	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement - should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/w 60Hz	BB	66
Mission 762 £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission 763 £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB/w 40Hz	BB	68
Mission 764i £450	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	1ft from wall, freestanding	87dB/W < 20Hz (in room)		94
Mission 767 £2300	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus)	138 x 29 x 43cm floor, flexible	91dB/w < 20Hz (in room)	R	81
Mission Cyrus 780 £170	Good Average +	Pricy but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB/w 50Hz	R	90

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Mission Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price. Take care to adjust	43 x 22.5 x 28cm matching stands 1ft	88dB/w 28Hz (in room)	R	86
Mission Cyrus 782 £350 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness'	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	stands free space	87dB/W 48Hz (in room)	R	94
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz		78
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoiled by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of walls	87dB/w 45Hz		90
Mordaunt-Short MS 3.10 £110	Average Average +	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi'	28.5 x 17.5 x 20cm	88.5dB/w 48Hz	BB	78
Mordaunt-Short MS 3.20 £140	Average Average +	All the charm of its BB-rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5 x 18 x 20cm open stands against wall	85dB/w 50Hz (in room)	R	82
Mordaunt-Short MS 3.30 £200	Average Average +	A little too mid-forward for neutrality or formal recommendation, this attractive, good-sized model nevertheless has more than enough appealing	46 x 23.5 x 27cm high stands 1-2ft from wall	87dB/w 38Hz (in room)		78
Mordaunt-Short MS 3.40 £260	Average + Average	It looks pretty and sounds civilised, but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. Low frequency stand and room matching is	57 x 23.5 x 27.5cm stands in free space	87dB/w 30Hz (in room)		86
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
Naim NA IBL £798	Average+ Good	This tiny and elaborately engineered floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid	wall, freestanding	30Hz (in room) 84dB/W		94
NVA Cube 1 £600 (stands £200)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cubix £1100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise and has some aggressive	60 x 32.5 x 32.5cm	84dB/w 28Hz (in room)		78
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in	86.5dB/w 45Hz		66
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary – and to many very attractive – 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic and	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £250	Average Average	An impressively – indeed imposing – physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
Philips FB825 £650	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plasticky box	110 x 29 x 41cm on cones clear of walls	88dB/w 25Hz	R	90
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar	85dB/w 28Hz (in room)		82
QLN Signature £1100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £2072	Good + Very 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	84dB/w 34Hz	R	60
RAM Hermes £425	Average- Average+	Slim small floorstander is a bit tall for its footprint. Good sensitivity is combined with an attractively lively sound, but it's uneven and not truly	70 x 21.5 x 23cm floor, freestanding	91dB/W 45Hz (in room)		94
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £193	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
Rogers LS4a £255	Good Good -	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft from wall	87dB/w 32Hz (in room)	R	78
Rogers LS6a £316	Good Good	Stereotypically a Rogers model with impressively even balance, prospective purchasers will have to weigh the fine midband naturalness against slightly	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
Rogers LS7t £449	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
Rogers Studio 1a £612	Very Good Good -	The classic BBC monitor style sound sensitively updated – transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1569 (£389 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz	R	86
Royd A14 II £199	Average Good	Not the smoothest or prettiest around, this is still an informative if sometimes aggressive large bookshelf model, with plenty of welly for the price	40 x 26 x 23cm stands 1ft from wall	87dB/W 30Hz (in room)	R	94
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near	86dB/w 75Hz	R	53
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to wall	87dB/w 85Hz	R	66
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB/w 50Hz	R	90
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
Ruark Talisman £629	Average Good	Clever and beautifully finished compact floorstander has some coloration but is impressively informative and communicative, with fine pace and timing	83.5 x 21.5 x 31 (max) cm close to rear wall	86dB/w 30Hz	R	90
SO Acoustics OBS £845	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from	92dB/w 30Hz (in room)	R	82
SD Acoustics Ribbon £2150	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations; some like it,	152 x 30 x (15-30)cm floor, angled, away	91dB/w 30Hz (in room)		81

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY	VALUE	ISSUE
SD Acoustics SD1 £1350	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SD Acoustics SD3 £379	Average Good	Neither cheap nor perfect, this near miniature (using OBS' mid driver down into the bass) sounds unusually lively and dynamic within inevitable physical	38 x 19 x 29cm stands 10cm from wall	83dB/w	R	86
Seventh Veil System IV £1290 (£340 integral stand)	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder', this oddball design has	72 x 44 x 21 x 29cm own-stands close to	84dB/w 28Hz (in room)	R	86
Shan Shimna £280 (stands £75)	Average + Good	Pretty little miniature in cast mineral/plastics has limited dynamic range and could sound smoother, but integration is good and box effects slight	31 x 16 x 17cm stands near rear wall	84dB/w 65Hz	R	71
Snell Type C £2350	n/a Very Good	Pricy, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension which improves with the addition of a Pirate plinth	112 x 38 x 33cm free standing, free space	90dB/w 35Hz	R	65
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, free space	86dB/w 52Hz	R	71
Sony APM-121ES £150	Average Average -	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass and too strong in the treble	43 x 25 x 28cm stands, free space	86dB/w 25Hz (in room)		86
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm stands in plenty of	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £300	Very Good Average	Big and beefy but equally fat and bass heavy, this well engineered 3-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm low stands, free space	87dB/w 40Hz		71
Sony APM-66ES £700	Average + Average +	Powerful heavyweight sound with a brilliant midband - clear articulate and transparent. But bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm low stands, free space	89dB/w 60Hz		59
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands, free space	87dB/w 41Hz	R	60
Spendor SP2/2* £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm stands, free space	87dB/w 45Hz	R	59
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good - Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
Tannoy DC1000 £210	Average Average -	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
Tannoy DC2000 £340	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz	R	66
Tannoy DC3000 £670	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring. But spare a thought	94 x 26 x 31cm Floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
Tannoy E11 £140	Average Average -	Fundamentally turgid and slow, thanks to leaden upper bass and 'shut in' treble, though stereo images are convincing, as are the reasonably uncoloured	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
Tannoy J95 £520	Good Good	Substantial cabinet engineering explains the unusually authoritative bass delivered by this big, good value floorstander, though the upper range is a	93 x 26 x 32cm floor, freestanding	90dB/W 30Hz (in room)	R	94
Tannoy M15 £190	Good Average +	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands	88dB/w 40Hz (in room)	R	78
Tannoy M20 £260	Good Good	Alongside fine build and presentation, the M20 provides an unusually clever combination of the 'traditional' virtues of transparency and low coloration	50 x 25 x 22cm stands in free space	87dB/w 25Hz (in room)	R	86
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from	96dB/w (manuf.)	R	Coll '87
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
TDL Studio 0.5 £399	Average Good	This tiny floorstanding transmission line has good agility but doesn't provide the coherence or even balance of the slightly bigger Studio 1	55 x 20 x 30cm own stand, free space	85dB/W 40Hz (in room)		94
TDL Studio 1 £599	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm	84dB/W 25Hz (in room)	R	78
Technics SB-CS5 £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage, the quest for size for its own sake compromising the	42.5 x 25 x 24cm Stands in free space	86dB/w 40Hz	R	86
Technics SB-RX50 £500	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
Technics SBC 250 £140	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Toshiba SS33-M £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz	R	65
Townshend Glastonbury Tor £1495	Average - Very Good	Prodigious bass extension, stunning stereo focus and low cabinet coloration, but limited loudness from low sensitivity and power handling, and some	99 x 26.5 x 33cm well clear of walls	82dB/w below 20Hz	R	90
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Videotone Minimax 2 £80	Poor Average -	Cheap in build and QC as well as price, but cheerful (if coarse) with it - if a little too cheerful after extended listening	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average - Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolving	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale Coleridge £499	Average Good	Compact, beautifully finished and extravagantly engineered box sacrifices bass extension in the cause of high midband sensitivity; communicative, but can be	48 x 26 x 26.5cm stands 1ft from wall	91dB/w 48Hz (in room)	R	82
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
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

The Directory

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

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

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research RD-06 £280	Average Average	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C/HX Pro, fine bias, counter memory, repeat		69
Aiwa AD-F270 £90	Average Average	An excellent budget machine, adequately equipped and satisfactorily built. Sound quality is in severe danger of transcending the price category	Dolby B/C, fine bias adjust	BB	75
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
Aiwa AD-F500 £150	Average Good	Noise levels are a little higher than usual, but sound quality is otherwise very good - open, explicit and very neutral tonally.	Dolby B/C/HX Pro, cue/review, fine bias, record sensitivity adjust	R	93
Aiwa AD-F700 £199	Good Average	Somewhat less than the sum of the (most fine) individual parts, this deck has an artificial quality which spoiled the efforts of a fine transport	Dolby B/C/HX Pro, fine bias, CD Direct input		75
Aiwa AD-F800 £249	Good Very Good	Close to first class performance – and superb value. The Aiwa is purposeful and finely engineered. It provides a near irresistible blend of good mechanics and electronics	3 head, dual capstan, Dolby B/C/HX Pro, tape calibration	BB	75
Aiwa AD-R470 £150	Average Good	For once, an auto-reverse deck with the performance of a decent uni-directional one at a similar price. The Aiwa is modern in concept, and has good, transparent electronics	Dolby B/C/HX Pro, auto reverse, cue & review, bias adjust	BB	69
Aiwa AD-WX616 £150	Poor Poor	Sonically sub-standard twin transport deck which has sensible range of well implemented features, yet which sounds compressed and uneven.	Twin full logic, 1 records, Dolby B/C track search		93
Aiwa AD-WX777 £179	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound – though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-WX888 £249	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa 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-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 XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-32 £170	Average Poor	Constrained and smeared sum up this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use, this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average	Fine ungimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile – especially switchable Dolby HX Pro and switchable panel display. The calibration system is simple and effective, and the deck sounds great	Dolby B/C/HX Pro, 3 head, manual tape set-up	R	69
Denon DRM 700A £150	Very Good Very Good	Simple but adequate features, lacks only timer standby. Musically this deck equals the best at this price level despite some clouding of transients with Dolby B.	Dolby B/C/HX Pro, fine bias, 3 heads, record return	BB	93
Denon DRM-400 £140	Poor Poor	Messy, confused sound terminally lacking in detail and space under all conditions of use due to high mechanical flutter levels	Dolby B/C, memory stop, track search		81
Denon DRM-500 £180	Good Very Good	Powerful, refined and detailed sound, and an excellent transport are keys to the success of this cleanly styled addition to the range – but why no timer standby?	Dolby B/C/HX Pro, variable bias	BB	75
Denon DRM-700 £250	Good Very Good	Sloppily executed (though attractive) user interface contrasts with a high standard of music making belying its modest price	3 head, Dolby B/C/HX Pro, record return	R	81
Denon DRM-800 £330	Good Very Good	There are some niggling faults and limitations (no timer standby is particularly annoying), but as a means of recording music it sets a very high standard	Dolby B/C/HX Pro, off tape monitoring, dual capstan	R	75
Denon DRW-650 £200	Average Average	This simply equipped model is a little fiddly to operate at time, partly because of the way the single set of transport keys is assigned. But sound quality is generally workmanlike - good value	Twin transport, Dolby B/C/HX Pro	R	93
Denon DRW-750 £250	Good Good	Polished and articulate, the only significant shortcoming is poor performance with prerecorded material	Dolby B/C/HX Pro, twin unidirectional, one records	R	69
Dual 5850RC £269	Poor Average	Average-to-middling deck which does most things well and skates over the more subtle things. Control system is uninspired but easy to master. Overpriced	Dolby C/HX Pro, bias adjust		87
Goodmans GSW-5200 £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69
JVC TD-V621 £300	Very Good Good +	Sharp, stable sound with rock solid transport. Features count is extensive and useful. Only raw sounding electronics detract from the scoring.	3 head. Dolby B/C/HX Pro, 3 inputs, fine bias	R	93
JVC TD-X321 £130	Average Average	Typical modern budget deck with acceptable sound quality, especially when making and playing it's own tapes. The transport is a little rough, but recommended on the basis of good value	Dolby B, C & HX Pro	R	93
Marantz CP230 £330	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz CP430 £400	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, charger/adaptor	R	87
Marantz SD-40 £170	Average Very poor	Obstructive aesthetics are offset by apparently good build and sensible features, but sound quality is uneven or worse.	Dolby B/C/HX Pro, fine bias	R	93
Marantz SD-50 £220	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Marantz SD315 £180	Average Average	Sound quality is promising, but somewhat offset by 'shut in' top end. Pitch integrity suspect Dolby C sound quality and dubbing performance poor	Dolby B/C/HX Pro, twin transports, one rec/play, one play only. Mic input		93
Marantz SD515 £350	Poor Poor +	Good electronic design is let down by mediocre alignment and poor transport stability. Disappointing at the price.	Twin auto-reverse, both transports record, Dolby HX Pro, parallel record capable	R	93
Memorex SCT-5 £150	Poor Poor	Poor example of a twin cassette deck where everything has been sacrificed on the altar of flexibility	1 rec/play, 1 play only transport, Dolby B/C		87
Memorex SCT-84 £200	Average Average	The playback only transport is a little disappointing, but the record one is a quality item and the deck works well. Ergonomics are good, but styling and control feel are decidedly tacky.	Dolby B/C, fine bias, twin deck with auto-reverse record, unidirectional play	R	69
NAD 6300 £550	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi Cassette Deck Two £300	Very Good Very Good	Not completely neutral, this deck is assured, dynamic and quick, with abundant detail and some coarseness. Stable transport but only rudimentary features accompany fine engineering	Dolby B/C, manual tape type selection, bias adjust	R	93
Nakamichi RX-202E £545	Good Very Good	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control	Auto reverse, Dolby B, C, 2 head	R	63
Philips FC566 £179	Average Average	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/C/HX Pro, 3-heads, track/intro search etc		81
Pioneer CT-225 £99	Poor Poor +	Budget deck with a strictly budget sound - but surprisingly strong range of features. An opportunity lost.	Dolby B/C, logic controls, track search		93
Pioneer CT-337 £130	Average Average +	Simple but well made machine with a slightly soft but consistent standard of reproduction	Dolby C/HX Pro, CD synchro, mic inputs	R	87
Pioneer CT-447 £170	Good Good	An excellent and affordable package, decidedly OTT in the display area but capable of genuinely fine musical reproduction	Dolby C/HX Pro, auto tape alignment, track search	BB	87
Pioneer CT-656 Mk II £250	Average + Average +	Reworking of original 656 has led perhaps unintentionally to a somewhat ill-conceived set of compromises. Excellent with prerecorded material, the deck is otherwise unbalanced.	Dolby B/C/HX Pro, 3 heads, track search, fine bias		93
Pioneer CT-757 £350	Very Good Poor	Ostensibly fine deck is let down by inability to drive tape hard without loss of focus and consistency. Even prerecorded material, which didn't suffer these shortcomings, lacked detail.	Dolby B/C/HX Pro, 3 head, assisted tape calibration		93
Pioneer CT-91a £500	Very Good Very Good	Superb, near state of the art recorder with an excellent dual capstan transport and very capable electronics. At the price, this one is a mould breaker	3-head, tape calibration, Dolby B/C/HX Pro	R	75
Pioneer CT-959 £450	Very Good Very Good	Near state of the art for £450. Engineering is of a high order. An open window sound quality, but playback response is very bright (being corrected by manufacturer)	3-head, var bias & eq, multi-mode meters. Dolby HX Pro	R	87
Revox B215 £1727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features — but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87
Revox B215-S £1826	Very Good Very Good	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Rotel RD-845 £130	Average - Average +	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes.	Dolby B/C, manual tape selector	R	81
Rotel RD-855 £180	Average Good	The transport is OK and the various frequency responses are erratic, but good basic electronics help the Rotel deliver. Coherent, enjoyable and informative	Dolby C memory stop & repeat, track search	R	87
Rotel RD-865 £200	Good Very Good	Fine, architecturally solid sound quality in a package with a low gimmick count and strong audiophile appeal	Dolby B/C/HX Pro, fine bias	BB	75
SAE C102 £549	Average Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sansui D-X211HX £170	Good Good+	Clean, stable and open sounding recording quality distinguishes this player, - and auto-reverse too. A great improvement on earlier mid price Sansui models, and excellent value.	Auto reverse, Dolby B/C/HX Pro, bias adjust	R	93
Sansui D-X301i £180	Average Good	Lively, informative and well equipped basic deck, if rather obscure operationally	Dolby B/C/HX Pro, variable bias, track search	R	69
Sansui D-X501 £230	Poor Poor	Unhappy mixture of good looks, excellent ergonomics and mediocre, sometimes poor sound	Dolby B/C, random track search		81
Sansui D-X701 £340	Average Average	A little flat and smeared under some conditions, this design is at its best with metal and prerecorded tapes	Dolby B/C, 3-head, variable bias & output, track search		81
Sherwood DS-1135C £100	Average Average	Excellent value. There is a low level constant background drone, and Dolby C recordings sound flat and coloured. Elsewhere sound quality exceeds expectations	Dolby B/C/HX Pro	R	87
Sherwood DS-7000R £230	Average Poor	Rough and ready cassette deck in which sound engineering has been sacrificed on the altar of extra selling features, namely three heads for real time off-tape monitoring	3-head Dolby B/C/HX Pro		87
Sony (WMD6C) Pro Walkman £249	Good Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket	Dolby B, & C	BB	60
Sony TC-FX120 £90	Poor Poor	Neat and very simply equipped model has decent electronics but poor, unstable transport with predictable consequences.	Dolby B & C, variable bias		93
Sony TC-K520 £170	Average Good	Fine, assured and detailed performer with a very well designed and straightforward user interface	Dolby C/HX Pro, variable bias, display on/off	BB	87
Sony TC-K650ES £250	Average Average	Facilities are utilitarian but nicely presented, but sound quality, which is basically good, is slightly marred by some coarseness of tone.	3 head, Dolby B/C/HX Pro, fine bias	R	93
Sony TC-K730ES £500	Very Good Very Good	First rate cassette deck that scarcely betrays it is a cassette deck on audition. Features and control wise, it feels a little dated	Dolby B, C, bias and equalisation adjust	R	81
Sony TC-K850ES £400	Very Good Very Good	Near state of the art recorder with excellent recording quality, and even better playback performance. Sounds — and looks — best with the display turned off	3-head, Dolby HX Pro, bias/level adjust, dual capstans	R	87
Sony TC-RX110B £90	Poor Poor	Woolly bass and scrappy treble combine to make a meal of many music types, despite accurate response shapes with most types of tape. Prerecorded material sounds dull	Dolby B/C		75
Sony TC-TX55 £150	Average Average	The sound quality ranking is a good one for an auto reverse machine at this price level. Clean, sharp sound, only slightly let down in the deep bass.	Auto reverse, Dolby B, C & HX Pro	R	75
Teac V-270C £89	Average Average	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
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-B965 £350	Very Good Very Good	Messy control layout, but ultra capable deck with clear electronics and excellent headroom, low noise, an ultra-stable transport - and first rate sound quality.	3 head, dual capstan, Dolby B/C/HX Pro, dbx, assisted tape alignment.	R	93

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Technics RS-TR355 £200	Average	Serviceable middle market dual deck without serious fault but with some annoying inadequacies, notably an inability to play side A and B and then stop	Twin auto-reverse, one records, Dolby B/C/HX Pro		75
Yamaha KX-1200 £500	Excellent	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
Yamaha KX-250 £150	Good	Excellent if somewhat fiddly deck with all mod cons. Play trim helps bring recalcitrant tapes back into line. Refined, expressive sound quality and stable transport	Dolby B/C/HX Pro, Intro Scan, Play Trim	BB	93
Yamaha KX-330 £170	Average	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
Yamaha KX-530 £230	Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
Yamaha KX-930 £400	Good	Worthy but ultimately slightly disappointing mixture of fussy ergonomics and tidy but cluttered sonics	3 heads, dual capstans, Dolby C/HX Pro, remote control		87

DAT RECORDERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa Excelia XD-001 £1300	Very Good	Clear and very listenable recorder, roughly comparable to, but slightly sweeter sounding than Sony DCT-1000ES - but with an inferior front panel design	Track ID and search, remote	R	63
Aiwa HD-S1 £600	n/a	The first portable DAT recorder, and already looking expensive and a little under endowed. Nevertheless, good build, controls and display help, and sound quality is adequate.	DAT recorder with separate A/D converter/battery unit. SP only, mic/line i/p		94 Supp.
Denon DTR-2000 £800	Good	Not cheap, but first rate DAT recorder, good to excellent fidelity in all modes, with a slightly cool detached quality when differences are detectable.	Digital LP/digital & analogue SP record/play, LP analogue play only, digital fade, fine cueing, remote	R	93
Grundig Fine Arts DAT-9000 N/a	Good	Conventional DAT recorder offering standard facilities. The deck is well made and equipped, and is engineered to a satisfactory quality standard. It performs to an acceptable standard, though it is not state of the art.	2/4 hour recording, mic inputs, digital in/out		69
Kenwood DX-7 £450/£150	n/a	Sound quality is pretty fair, but a little rougher than the best of the breed. Controls are good, the display however is poor - and most users will require the accessory pack	AC powered recorder, no analogue LP mode. Optional accessory packs adds battery/ADC & case		94 Supp.
Luxman KD-117 £1499	Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Sony DTC-1000ES £1299	Very Good	Only available from professional outlets. Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63
Sony DTC-55ES £550	Very Good	Broadly comparable to a middle ranking CD player sonically, the Sony is particularly well equipped and well priced.	DAT with all record modes, inc LP (analogue) record	R	93
Sony DTC-M100 £799	Very Good	Only available from professional outlets. Clean clear sounding second generation model with most of the features and sound of the DTC-1000ES	Midi-width, alpha-numeric display, remote, optical interfaces	R	63
Sony TCD-D3 £500	n/a	Compact, well equipped, easy to use and excellent sound, it undercuts rivals by a clear £100	DAT recorder, detachable rechargeable power pack, LP/SP record modes	BB	94 Supp.

CD PLAYERS

Now entering its second decade, this all digital music source is well established despite high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise, ease of use, and more robust software. Remote control is just about standard on all new players.

However, many vinyl enthusiasts find CDs

sound less involving than top quality vinyl.

Prices average out at a little over £200, although entry level models are now available for little more than £100. Even the most basic models can sound very good indeed and employ state of the art decoding chips and the most useful play features. Extra money can buy remote volume control, audio 'tweaks', plus improved build and component quality control.

Digital outputs facilitate an easy upgrade path.

Machines can be split into bitstream and multi-bit with each school having its adherents. Bitstream is the newer technology and will probably win in the end, although the development time spent on multi-bit systems means that excellent results can still be obtained.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research CD-06SE £450	Average-	Basic Philips machine with beefed-up chassis and a revised analogue board. Distortion is higher than normal while the sound lacks both immediacy and clarity.	Remote control, programming but no direct track access, 16bit 4x		95
Aiwa XC-333 £149	Average -	Looks costly, well featured, well balanced technical performance and sound for money	multi bit, keypad remote, hdph (fixed)	R	88
Aiwa XC-700 £170	Good+	Generously equipped player that harbours a top Philips' Bit Stream DAC. Offers a characteristically smooth and effortless 'bitstream sound'. Exceptional value	Remote control plus index skip, midship transport and 7350 PDM DAC	BB	95
Akai CD-52 £249	Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-55 £230	Good	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-62 £330	Average	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if the indifferent lab performance could be improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD-93 £700	Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation - though that's not to dissuade lovers of black lacquer wood finish	Track entry remote, menu display etc.		58
Arcam Alpha £420	Very Good	Arcam's new star, its best CD player yet and great value	Remote, etc, coax dig. out	BB	83
Arcam Black Box 1 £210	n/a	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Black Box 2 £260	Very Good Very Good	An addition to the BB I, it also offers improved sound and more inputs	Optical and wired input digital decoder	BB	76
Arcam Black Box 3 £360	Good + Very Good	Top of a series of three decoders it can offer a high sonic standard with top class transports	Bitsream, auto input switching, optical & coax	R	88
Arcam Delta 170.2 transport £620	Very Good Good	An upgraded Delta transport, it sounds different but not really better. More research is required here	Transport only, display off, usual programming		88
Arcam Delta 70.2 £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
Arcam Delta 70.3 £699	Good Good+	Latest in a line of Delta 70 CD players and one that offers a distinctly rugged, beefy sound. Plenty of power behind individual instruments but lacks a feeling of involvement	Remote control, display dimmer, variable and digital outputs.		95
Ariston CD1 £345	Good Good	Easy on the ear compact disc for those who like their music Radio 2 flavoured. And it looks good	digital output, remote control	R	87
Ariston Maxim £500	Good+ Good+	Yet another re-worked Philips player with chunky alloy casework and sophisticated analogue stage. Narrowly escaped a recommendation with its dynamic and purposeful sound. Still a hint of graininess through the treble	Remote control, coax digital output. 16bit 4x chipset.		95
Cambridge Audio CD3 £649	Poor Good +	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control		87
Carver TL-3100 £340	Average Average -	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
Carver TL-3220 £495	Good Average	A lightweight player with primitive display. We thought it sounded rather sparse and dry, and though Carver's DTL feature certainly fleshed-out the bass it also softened the stereo focus	Remote control with volume keys, 'Digital Time Lens', 18bit 8x		95
Carver TL-3300 £695	Good + Poor	Carver needs to listen critically to CD sounds; in our opinion. DTL does not improve the recipe	DTL, remote, programming, digital output		83
Deltec PDM-One £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Denon DCD 960 £300	Good + Average	A fine feature package with good lab results, but unfortunately an unexceptional sound quality	Remote inc vol, hdph, keypad, well featured		88
Denon DCD-2560 £550	Very Good Good	Beautifully built and, once again, generously equipped yet with a sound that's decidedly sluggish or reserved, particularly through the bass. Vocals are more forward but can sound a little glassy	Remote, pitch and tape edit features, opt/coax digital output, 20bit 16x.		95
Denon DCD-860 £250	Average+ Good+	This is a well designed and generously equipped budget player that offers a very spacious and appealing sound. There's a hint of treble emphasis but it still sounds great at high volumes!	Remote, pitch and full tape edit facilities. 18bit 8x.	R	95
Dual CD5150 £300	Very Good Good +	In a real sense cloned from the rave Rotel RCD-855, this is also a great value all rounder: multi bit rules OK!	keypad remote, hdph (fixed), Philips based	BB	88
Ferguson CD007 £130	Good Average	The cheapest recommendation in the test group, don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Average Average	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x O/s, timeshare 16 bit		64
Goodmans GCD-435 £140	Poor Average -	Goodmans has the power to source with more care than this, music centre quality!	multibit, remote, basic facilities		88
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence, in most departments it is expensive	Remote, programme, hdph socket, calendar display etc		70
Harman Kardon HD7450 £300	Good Average	A very stylish machine but one that is let down by its aggressive and 'dirty' treble quality which pierces through most types of music. Weak bass resolution undermines the 'roots' of the player	Remote control but no headphone socket. MASH/PWM bitstream DAC.		95
Harman Kardon HD7500II £350	Good+ Good+	An update of the original HD7500 but featuring superior analogue electronics to the HD7450. Tonal integration is much improved, packed with detail that's expressed with youthful enthusiasm.	Remote, variable, digital and headphone outputs. MASH/PWM DAC	R	95
Harman Kardon HK7300 £200	Average Average -	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
Harman Kardon HK7500 £330	Average + Average	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdph + vol, good programming		83
JVC XL-V231 £149	Excellent Average -	Text book lab result but below par sound, nice and boring. Must be some potential here	Remote, hdph (fixed), JVC 1-bit PFM		88
JVC XL-Z1010 £499	Good Average -	Despite some high tech design and a good lab result, this model did not deliver good sound quality	32 track prog., disp. off, auto fade, 2 digital op		76
JVC XL-Z431 £200	Very Good Average-	This is a player that started life off the back of the successful XL-V231 but whose performance fails to come up to scratch. The sound is weak and uninspiring - poor use of	Remote operation, motorised volume + tape edit. PEM bitstream DAC	JVC's PEM DAC.	95
Kenwood DP-4030 £180	Good+ Good+	Kenwood's first and cheapest bitstream player enjoys a deceptively detailed and refined sound but one that is mildly veiled right across the spectrum. Excellent value nonetheless.	Remote, variable and opt digital outputs. NPC bitstream DAC	R	95
Kenwood DP-7030 £300	Good+ Good+	By adapting established Sony bitstream technology Kenwood has moulded its own exceptionally smooth and polite sound. Very nicely built machine with midship transport mechanism.	Remote, index scan, variable and optical outputs. Sony PLM bitstream DAC	R	95
Kenwood DP-X9010 £500	Average Average +	Compromised by jitter, RF noise and poor clock selection this transport generally encourages a dynamic but bright and edgy sound with most DACs	CD transport, optical + coax outputs, Class 2		96
Luxman D105u £699	Average Average	Visible valves are essentially for show in this rather ordinary player - both sound and lab	"valves", remote inc vol, hdph, well equipped		88
Marantz CD-40 £200	Very Good Good +	Like the Philips CD620 equivalent, this is the Philips/Marantz performance/value equation at its best	Multi bit, remote, hdph (fixed)	BB	88
Marantz CD-41 £230	Good Average	Based on Philips' CD624/634 but stashed in the older CD-40 case, this player suffered from a loose, boomy bass quality together with an impure treble. Not a good advert for PDM Bit Stream.	Remote, index scan but no digital output. SAA7321 PDM DAC		95
Marantz CD-50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power volume. Hdph (fixed). FTS. Good programming	BB	83
Marantz CD-60 £330	Very Good Very Good	Lacking the SE flair, the 0 remains a fine player by market standards. Second best is more than good enough	Multi bit, remote inc. vol., hdph, FTS etc	BB	88
Marantz CD-60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket; a fine performance all round	Optical digital output, full remote, power vol. FTS, hdph	BB	83
Marantz CD-80 £550	Very Good Good	A dynamic and bold sound from a machine that is equally bold in appearance. It betrays no fear of the most thundering crescendos yet can sound a little hard or glassy with pop CD's.	Remote, motorised volume + FTS programming, 16bit 4x.		95
Marantz CD-95DR £1500	Very Good Good	At its best with Philips-based DACs, this transport sounds confident if not totally pure, sparkling or fresh	CD transport, optical + coax digital, Class 1		96
Memorex CD1650 £200	Poor Poor	An overpriced music entre player. Surely the giant Tandy corp. can get a better standard than this?	remote, keypad, multi bit, midi		88
Meridian 200 £750	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unfatiguing	CD transport, optical + coax outputs, Class 1	R	96

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Meridian 203 £495	Very Good Excellent	Exceptionally lucid, transparent and solid sound 'bitstream' converter. Always tidy and easy on the ear, but doesn't bulldoze the craggy bits	Stand alone converter, 32-48kHz, optical/electrical i/p	BB	87
Meridian 206B £950	Excellent Excellent	What a stunner! Audiophile quality from the reference one box CD player, and at a most realistic price	Differential bitstream, keypad remote, prgming	R	88
Meridian 208 £1575	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Hdph + remote level. Programming, R phase invert, various outputs		83
Meridian 602 £1500	Very Good Good	This dedicated CD transport teams-up most successfully with the 606 DAC. Otherwise it lacks the life and pizzaz of the 200	CD transport, optical + coax outputs, Class 1		96
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Micromega Duo BS £499	Good Excellent	With a good transport it delivers a sweet musical sound at a high quality level	Bitsream D/A convertor, auto input switching	R	88
Micromega Optic BS £695	Average Good +	A bitstream rebuild of a Philips chassis, this player shows promise for the future	Bitstream, remote, hdph (fixed)		88
Mission Cyrus PCM II £400	Very Good Good +	Improvements in price and performance keep this classic remote player in the running	Remote vol, phase inv, dig op. PSX option	R	83
NAD 5425 £200	Very Good Very Good	Not much in the way of facilities on offer but a sound that is both wonderfully open, detailed and appealing. This is a very communicative player that sounds positive without being brash	Worthless remote control, track skip/scan. MASH/PWM bitstream DAC	BB	95
NAD 5440 £290	Very Good Good+	The 'no compromise' version of NAD's 5425 but still rather lacking in facilities. Its sound is smoother and richer than the 5425, preferring to seduce with subtlety rather than have you perch on the edge of your seat	Remote with direct track access, variable output, MASH/PWM DAC	R	95
Nakamichi CD Player 4 £300	Average+ Good-	Attractively styled but suffers high-ish distortion for a modern CD player. Best suited to up-beat pop tracks rather than classical works which seem to lack focus and secure soundstaging	Remote with track access, headphone, coax dig. output. 18bit 8x		95
Nakamichi OMS-5EII £1500	Good + Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, I		51
Nakamichi OMS-7EII £2000	Good + Good	The only serious criticism here is of the price. And in our opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry programming, hdph		51
Philips CD 850 £400	Very Good Very Good	An upgrade of the 840, Philips has got bitstream to work well here. A fine allrounder	Bitstream, keypad remote, FTS etc, etc	BB	88
Philips CD624 £200	Good Good-	Philips' cheapest Bit Stream machine is still equipped with a vast array of features. Sounds pretty civilised too but lacks the crispness and freedom necessary to set it apart.	Remote, FTS programming, digital output. SAA7321 Bit Stream DAC		95
Philips CD634 £250	Good Good-	The all-singing all-dancing version of Philips' budget Bit Stream player and one that seems better able to cope with the pizzaz and dynamics of a decent recording. Nevertheless it still lacks the lucidity and conviction of the best at this price.	Remote, FTS + Title + personal programming. SAA7321 Bit Stream		95
Philips CDD882 £500	Good Good	A butchered CD880 CD player-cum-CD transport that pairs up well with most Philips-based DACs. Dynamic and lively but can also sound a little mechanical	CD transport, optical + coax outputs, Class		96
Philips CDV185 £350	Average + Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD-7500 £280	Very Good Average	Has potential but has not brought it off on sound. Good aspects of earlier models have been lost with the new technology	Low bit dual DAC, full remote, hdph		88
Pioneer PD-8500 £400	Very Good Good+	One of a number of genuine 20bit CD players now available, the PD-8500 enjoys a thoroughly unrestrained and full-bodied sound. It rarely sounds hard or abrupt but prefers civilised classical CD's over pop, it has to be said.	Remote with tape edit and fader controls. Variable o/p. 20bit 8x	R	95
Pioneer PD-91 £899	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	R	64
Pioneer PD-93 £1400	Very Good Good+	The extremely civil, understated feel of its music contrasts markedly with the over-engineered construction of this player. It will not offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x		95
Pioneer PD-9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound - interesting though	Remote, 24 track programming, 2 dig. op		76
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Radford DAC1 £895	Good Good	Fine but slightly dated and costly package in performance terms — but flexible, musical and well built	DAC with 2 electrical + optical i/p, tape out		87
Radford WS2 £1095	Good Good+	Prompted a mixed reaction on audition, responding well to our jazz and classical selection but sounding bright and grainy with the pop CD's. RF emission is very high	Remote control, display defeat, variable and digital outputs, 16bit 4x chipset		95
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high, but then so is the price and the sound quality is only good	Programming, Revox system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-855 £250	Good Good +	Stripped for action, this well built Philips technology player delivers fine performance and sound. First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76
Rotel RCD-865 £300	Average Good	Curious mixture of bold musical presentation and foreshortened imagery. Grows on you though. One to audition with care	'bitstream', remote control	R	87
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual	Remote (inc volume), skip, scan etc.		58
Sansui CD-X211 £200	Good+ Good+	A new cheapie based on Philips' successful CD582 technology with a bold orange display and an equally bold, invigorating sound that is mercifully free of brightness or grittiness	Simple remote, programming and shuffle play. 16bit 4x	BB	95
Sansui CD-X711 £600	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Hdph + vol, remote full programming	R	83
Sharp DX150 £129	Average Average	This is one oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Average Average	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	Coll. '87
Sony CDP-228ES £400	Very Good Average +	Good value, this is Sony's best mid price design and comes superbly equipped	Hdph, remote, rem vol, custom file	R	76
Sony CDP-338ESD £600	Excellent Good	Only a bit better than the 228, the 338 is a good machine, but not quite good enough for formal recommendation at the price	Custom file, remote, rem vol, hdph, shuffle etc		76
Sony CDP-790 £200	Good Average	Great on the test bench but new tech sounds worse than its predecessor. Who does the listening?	Low bit, full remote, comprehensive facilities		88
Sony CDP-990 £300	Very Good Good+	Every feature under the sun is available on this busy-looking machine though its sense of pace and drive at bass frequencies is less hectic. Treble detail is crisp and sparkling by contrast.	Remote, Custom File program on scrolling display. PLM bitstream.	R	95

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony CDP-X77ES £1000	Excellent Good+	Rather like Pioneer's PD-93 this flagship player is beautifully put together but simply lacks the thrill or conviction of cheaper and perhaps more ragged-sounding machines. Still, this sample was well-used from demonstration stock...	Remote, everything but Custom File titling. Complementary PLM DAC		95
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
Teac CD-P3000 £169	Good+ Average	A new budget bitstreamer though one that fails to match the success of recent NAD and Kenwood players. Pleasantly open and airy sounding but lacks guts and solidity.	Most facilities moved to remote. Midship drive. MASH/PWM DAC		95
Teac CD-P4000 £299	Good+ Average-	An updated version of the CD-P400 but one that seems less successful with its rather thin and scratchy sound. Very poor bass resolution dilutes the impact of all recordings.	Most features on remote, two parallel outputs on player. MASH/PWM		95
Teac CDP-400 £249	Good Average	Fine in the lab, but good build quality is not reflected in the rather average sound	Low bit, keypad remote, hdph, versatile prgm'ing		88
TEAC P-10 £1400	Good Very Good	A chunkier and altogether more successful transport than the P-500 with an especially beefy and compelling sound. TEAC's best	CD transport, coax + optical outputs, Class	R	96
TEAC P-2 £2750	Very Good Good	TEAC's flagship CD transport is beautifully styled and constructed but its sound is bleached and generally less inspiring than that of the P-10	CD transport, coax + optical outputs, Class		96
TEAC P-500 £600	Good Good +	Provides a smooth and very sympathetic sound with most DACs yet is also rather vague, lacking the crispness and resolution of its peers	CD transport, coaxial and optical outputs, Class 2	R	96
Technics SL-P277A £160	Very Good Average +	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No d.op.	BB	83
Technics SL-P550 £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Hdph, rem. prog., edit/fade, dig. optical		83
Technics SL-PA10 £450	Good + Good	Built to partner the SU-MA10 upmarket integrated amp/DAC, this transport has the unusual limitation of only optical output. Reassuringly solid and more immune to vibration than most	CD transport, optical output only, remote		88
Wadia WT-2000/Digimaster 2000 £5495/£6500	n/a Very Good	Very high grade player which provides state of the art in believable music making from CD, and promises a degree of upgradeability	Transport/multi bit DAC - 32, 44.1, 48kHz o/s		Coll. '90
Wadia WT2000 £5495	Very Good Good +	Based on TEAC's P-2 with outboard mains transformers, active digital output and solid alloy casework. Its dynamic and crisp sound is best realised with Wadia DACs.	CD transport, AT&T opt + direct coupled coax outputs, Class 1		96
Wadia WT3200 £1995	Excellent Very Good	Based on Marantz's CD-95DR with new casework, active digital output and revised grounding. Very clean, clear and authoritative sound with Wadia and Philips-based DACs	CD transport, AT&T opt +direct coupled coax outputs, Class 1	R	96
Yamaha CDX-530E £180	Average + Average	A well balanced example using established DAC technology - worthy of consideration if not recommendation	Multi bit, keypad remote, hdph (fixed)		88

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 considerably bigger than 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, and double 'dubbing' cassette decks. The top end of the market is developing with surround sound audio/video-ready packages.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa NSX-800 £550	Average Poor	Undetailed, undynamic and largely unmusical system which throws it all away for an excessive range of tape related features	One box miniature plus remote and speakers dual auto reverse tape etc		89
Akai FX-800CD £700	Very Good Very Good	Well thought through as a functioning system. Lacks the usual surfeit of controls, and sound quality is of an unusually high order. An excellent buy even at this price	Twin record & auto reverse cassette etc with 'intelligent' remote	BB	89
Ferguson HFD28 £300	Poor Poor	Similar to Goodmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
Grundig Studio Line 1 £330	Poor Average +	Intriguing package with warm, woolly but attractive sound let down by poor attention to detail and suspect cassette deck. Amplifier appears to be inadequately protected	CD/cassette tuner plus preset equaliser		77
Hinari DK200 Disc Deck £300	Poor Poor	Confused user interface is matched to inadequate electronics. Poor - and poor value	Single unit, two cassettes, CD, tuner, remote		77
JVC Midi-W53 £500	Average Average	A potentially excellent middle price system spoiled by the loudspeakers and - to a lesser extent - the record player	Midi system with SEA equaliser		89
Kenwood M-54CD/CDS £600	Average + Average +	The M-54CD is the version without speakers and is the one to buy. The control system is A1 and the range of facilities offered is dazzling, but the amp and CD player are crude	Dual auto-reverse cassette, tuner/timer, CD, turntable with or without speakers	R	89
Memorex System-550 £500	Average Average +	Above average electronics let down by very poor loudspeakers. Worth considering if the latter are replaced	Dual CD & cassette deck, tuner/timer, semi-auto turntable		89
Pioneer S-11 £510	Average - Average -	Fine lower middle market system, with one useful extra - the built in timer. Only the record deck is disappointing	Twin auto reverse cassette, built in timers, one piece amp/cassette		77
Pioneer S-330D £1080	Very Good Very Good	High standard of reproduction on all sources, though mistracking with Dolby C was a limitation. There are few gimmicks and plenty of fine engineering	Dolby C/hx pro, multi-disc, amp with DAC etc	R	77
Pioneer S-555 £800	Good Good	Confusingly well equipped, in some respects rather gimmicky system, weak on record performance (surprise!) but quite or very good elsewhere	Full feature midi system with graphic, dual disc CD player	R	89
Proton AI-3000II £650 w/o spkrs	Average Very Good	Simple facilities and good, no-nonsense engineering combine to produce a system with genuine class. It's as easy to listen to as it is on the eye	Single box amp/tuner/CD/cassette with remote control; no loudspeakers	R	89
Sanyo 39CD £260	Poor Average -	Acceptably compromised basic low end system, offers broadly respectable if unambitious music making for those on a tight budget	One piece + CD, non-remote, manual tuner		77
Sanyo 49CD £300	Poor Average -	Similar to 39CD, but with Dolby B, preset tuning, remote control and more power. Audio wise, it's more of the same, but there's greater stature when loud and cassettes are helped by	One piece + CD, partial remote control, digital tuner Dolby B	R	77
Sanyo 59CD £380	Average - Average -	Adequate performance overall, though endemic lack of pitch integrity takes edge from tape and records. Some inconsistencies in control system too	As 49CD, + full remote, auto source select, separate turntable		89
Sanyo SYS-801CD £360	Poor Poor	Typical low end midi system: simple controls, adequate CD and tuner, poor turntable and cassette, awful loudspeakers	Remote control midi system		89
Sharp 320E £500	Poor Poor	Poor quality system featuring tacky styling, a lack of sophistication - and overpriced	One box midi & turntable with surround matrix		89

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony Compact 302CD £400	Average Average+	Fine low to middle price system whose only significant weaknesses are the poor tuner behaviour with weak signals and the turntable	Auto-reverse record, unidirectional play cassette, graphic equaliser etc.	R	89
Sony Compact 702CD £700	Average + Good	Creditable up-market system with reasonable speakers and excellent cassette deck, amplifier, and a relative absence of superfluous gadgetry	Twin auto-reverse cassette deck, tuner/timer, video in/out circuitry	R	89
Technics CDC30 £600	Good Good	A fine record player-less system whose electronics are well made and of moderately good performance, it's rescued from anonymity by excellent loudspeakers	5 disc multiplay top loading CD player, twin auto-reverse cassette, tuner	R	89
Technics CDX50 £750	Very Good Very Good	Conventional, well built but button bound sound system with a nearly adequate turntable and excellent loudspeakers etc.	Dual auto-reverse cassette system (tested with optional equaliser)	R	89
Yamaha AST-C10 £530	Average + Very Good	Brilliant if flawed luggable with weighty, powerful bass, and a rare combination of expressiveness and clarity unprecedented from such a small package. Good features.	Mains portable twin cassette/CD/radio system detachable speakers, remote	R	77
Yamaha YST-C11 £600	Average + Good	The cassette deck is a little wobbly in tone, but CD and FM are excellent, and bass depth is unusually prodigious from such small loudspeakers, though paid by with some loss of subtlety	'Astarte', dual auto reverse cassette, luggable, with remote control		89

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 certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

acrossthe bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £100	Average Average-	Economically designed and built in the UK, but trade-offs have a marked influence on FM and AM sound quality.	FM/AM digital, 30 presets, no signal strength meters.		93 Supp.
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha 2 £185	Good Average+	Re-styled to blend in with the Alpha system, Arcam's cheapest tuner makes up for its lack of features with a sensitive front-end and mellow sound.	FM/AM analogue, no presets, manual tuning + AFC	R	93 Supp.
Arcam Delta 80 £340	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 T40s3 £220	Average+ Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Our sample had an obvious bass 'hump' though production units are said to be cured	FM-only analogue, no presets, manual tuning + AFC		93 Supp.
Denon TU-260L £100	Very Good Good+	A new cheapie from Denon with the bare minimum of features. Careful designwork promises a surprisingly open and vivacious sound, so don't overlook it!	FM/AM digital, 20 presets, manual and auto tuning.	BB	93 Supp.
Harman Kardon Citation 23 £600	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forté, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Harman Kardon TU9400 £250	Good Very Good	Striking in appearance and with a sound to match, this new digital tuner comfortably exceeded our expectations. On stereo FM it's HK's best yet.	FM/AM digital, 24 presets, auto-tuning + hi-blend + signal	R	93 Supp.
Linx Theta £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good Very Good	Although expensive for its fairly minimum set of facilities, its excellent sound makes up for what it lacks elsewhere	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST-40L £130	Average + Good	A little slow to tune but once accomplished it provides a meaty and dynamic sound on FM. AM too has a little extra bite to its performance	FM/AM digital, 30 presets, manual/auto tuning	R	93 Supp.
Meridian 204 £595	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, timer		55
Naim NAT 01 £1294	Very Good Excellent	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, auto time digital		55
Pioneer F-447L £130	Average+ Average+	Equipped with a various IC-controlled servo and tuning aids, great fun to play with but of little practical benefit. Sounds OK but, on past form, we would expect more from Pioneer.	FM/AM digital, 36 presets, CCTS + R SS + manual/auto seek tuning	R	93 Supp.
Pioneer F91 £350	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/MW only	R	65
Quad FM4 £399	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £55	Good + £110	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	
Rotel RT-850AL £180	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
Rotel RT-870L £230	Very Good Very Good	Rotel's top tuner is ruggedly built and includes plenty of sophisticated electronics. It's a very slick machine to use with a sound that's equally confident and refined.	FM/AM digital, 16 presets, selectable IF/RF + RF attenuation + signal readout.	R	93Supp.
SAE T-102 £449	Good + Good +	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/MW only	R	65
Sony ST-S530ES £200	Good+ Good	The cheaper version of Sony's revered '730 certainly looks and feels the part but its sound is, well, less startling. Civilised, yes, but lacks much enthusiasm.	FM/AM digital, 30 presets, hi-blend + Cal tone + manual/auto tuning.		93 Supp.
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too...	FM/AM digital, 39 presets, selectable RF/IF + fine tuning	R	93 Supp.

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HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models.

The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit

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, as well as irritating the hell out of 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.

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.

MODEL PRICE	LAB SOUND	COMMENTS	TYPE	VALUE	ISSUE
Aiwa HP-V99 £50	Good - Average +	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
Aiwa HP-X30 £30	Good Good -	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Aiwa HP-X80 £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished, the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £33	Poor Average	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K145/S £60	Good + Good +	Electrostatic tweeters combine with a dynamic mid/bass unit to create very confident sounds in a comfortable headphone. Balance is on the bright side	Supra-aural, semi-open, electrostatic/ dynamic	R	75
AKG K240 Monitor £60	Very Good Good	Something of a classic, these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £90	Good Very Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
AKG K340 £140	Good Excellent	Heavyweight cans in most respects, the K340 with its electrostatic tweeter is a very revealing headphone. Gives the total electrostatics a good run for their money	Circumaural, closed-back, electrostatic/dynamic	R	75
Audio Technica ATH909 £60	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH910 £70	Average Good	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio Technica ATH911 £80	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £30	Very Good Average	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £45	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £100	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Beyer IRS690 £200	Good + Very Good	High quality infra-red headphones with soft comfy earpads and mellow but informative sound quality which is hard to dislike	Circumaural, open-back, dynamic	R	75
Jecklin Float Electrostatic £399	Good Excellent	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Jecklin Float Model One £79	Good Very Good	Whilst very unusual in appearance, the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
JVC HA-D990 £65	Good + Good +	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss K/6X Plus £30	Average Poor	'Sixties-style' 'phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Pioneer SE-72 £30	Good + Average -	Neat, very nicely made personal stereo phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back dynamic		75
Quart Phone 30 £40	Good Average	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 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 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 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	Average Very Good	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
Realistic Pro-X £25	Poor Average -	Robust, unanimously uncomfortable and heavily veiled in sonic terms - not a great success	Supra-aural, closed-back, dynamic		75
Ross RE-2760 £35	Poor Average	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
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75

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HEADPHONES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Ross RE2560 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Sennheiser HD40 £20	Very Good Good -	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
Sennheiser HD450 £35	Good Average	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
Sennheiser HD480 £45	Good Average	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
Sennheiser HD520 £65	Good + Good +	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good +	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony A21EX £30	Good - Good -	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste	Intra-aural, semi-open, dynamic	BB	75
Sony MDR V3 £30	Average Good	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
Sony MDR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
Sony MDR-CD999 £120	Good + Very Good	A very nice headphone in all respects, the 999s are worthy of the best headphone outputs and high quality sources	Supra-aural, semi-open, dynamic	R	75
Sony MDR-R10 £2500	Excellent Excellent	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
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/SRD-7SB Mk2 Adaptor £360/£185	Very Good Very Good	A bit of an industry reference, the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro/SRM-1 Energiser £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax SR34 £140	Average Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

PERSONAL STEREOS

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or even graphic equalisers.

CD players are still relatively expensive, although prices have come down a lot, and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased.

Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control although this is more applicable to CD players.

Sound quality on the cassette front seems to

have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software.

Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS-PL300 £110	n/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
Aiwa HS-PX303 £150	n/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby BC, chrome/metal EQ, remote	R	78
Panasonic RQ-P505 £100	n/a Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost, but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
Panasonic RQ-P525 £120	n/a Average +	Fitted with what is effectively a bass only tone control and harbouring all the necessary features, the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/fm, recorder		56
Sharp JC-270E £130	n/a Average -	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78

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PERSONAL CASSETTES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony Walkman Pro £249	Good + Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Sony WM-701C £200	n/a Good -	Beautiful little machine with all the necessary buttons/switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony WM-BF65 £90	n/a Average +	Regular size radio/clock/cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
Toshiba KT-4549 £80	n/a Poor	Fully equipped with 10 preset radio and alarm clock, the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

PERSONAL CDS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa DX-P50 £150	n/a Average -	A tad aggressive both through earphones and domestic systems, not very walkable but it has got two stage bass enhancement	Digital output, mains adaptor, remote		94 Supp
Denon DCP-100 £250	n/a Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable batts		94 Supp
Denon DCP-50 £180	n/a Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp.
Goodmans GCD-10 £120	Average - Poor	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-41 £150	n/a Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable batts		94 Supp.
Kenwood DPC-77 £270	Good + Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output - a suitable domestic alternative adaptors	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car	R	66
Kenwood DPC-81 £200	n/a Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains adaptor/charger and batts, digital output		94 Supp.
Philips AZ6897 £150	n/a Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock	BB	94 Supp
Sanyo CP-12 £260	Average Good +	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66
Sony D-350 £300	n/a Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, comprehensive facilities		94 Supp.
Sony D-66 £180	n/a Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp
Technics SL-XP1 £130	n/a Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable batts, mains adaptor/charger	BB	94 Supp.

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m terminated

lengths and therefore the results and prices relate to that length - some cables may well perform differently when used in longer lengths. What's more, most cables are significantly cheaper if you are prepared to fit the plugs yourself.

The features column contains information on the material makeup of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote defines HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Technica AT6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audionote Copper ANA £44	Average Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £99	Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened	Silver signal & Copper screen	R	59
Audionote Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
Audioquest Livewire Ruby £49	Average 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
Audioquest Livewire Topaz £35	Good Average	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end	Gold-plated plugs, OFHC copper		59
Budget OFC Circa £7	Average Average	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Budget Patch Cords (see text)	Average Poor	As thrown in gratis with cassette decks and the like - frequency extremes were restricted and performances were veiled	Thin coaxial		59
Chord Mono-t £27/1.2m	Average + Average +	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable	R	83 Supp.

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INTERCONNECT CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Deltec Black Slink £152	Excellent	Inherently neutral, the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of facility	8 silver plated OFC strands PTFE dielectric	R	59
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange	4 silver plated OFC strands PTFE dielectric	BB	59
Denon LC-OFC N/A separately	Very Good Average	Supplied with Denon's dearer CD players, this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £23	Average Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £2.30 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Isoda Electric HC-05-PSR £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 Supp.
Kimber Kable KC-1 £65.55	Very Good Average	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy	Multi-gauge PTFE dielectric		59
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open	OFC, PTFE dielectric	BB	59
Monster Interlink 300 £24	Average + Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 Supp.
Monster Interlink 400 £34	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Average	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains	Solid-core gold-plated AT plugs		59
QED Incon Graphite GP1 Gold £18.95	Average Average	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
QED Incon P1-Gold £15.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Sterling £250	Average Good	Possessing a neutral if faintly rich overall balance, it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screeded, symmetrical dir. cable		83 Supp.
Thorens SAC 100 £50	Good Average	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused - and fine detail lacks resolution	Silver-plated OFC, coaxial		59
van den Hul MC-D300II £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF	Silver plated single strand VdH plugs	R	59
van den Hul MC-Gold £250	Average Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
van den Hul MCD-1021II £69	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £150	Good Average	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
Yfere LC-OFC Quad £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 Supp.

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Absolute Wire Force 4 £4.75 per metre	Good Average +	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big, friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Average + Average +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audio Technica AT6120 £10 per metre	Average + Average	Compared to earlier LC-OFC cables, this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Audionote AN-SP £100 per metre	Average - Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent	15 silver strands, polyethylene dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only - foam core construction	R	64
Audiospec Latitude L4 £3 per metre	Average + Average +	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Fig.-of-eight multi-strand, PVC diel.	R	83 Supp.
Bellwire 12p per metre	Poor Average -	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 - 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Gortex Black 16 £528 - 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 Supp.
DNM Solid core £3 per metre	Average Average	A good general-purpose solid-core, though too bandwidth limited for high-end applications. Sounds great in some systems	0.65mm single strand, webbed PVC dielectric		64
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £3.50 per metre	Good Average +	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 Supp.
Furukawa FS-2T15S £50 per metre	Good + Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC	R	83 Supp.
Kimber 4VS £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multistrand, PVC ins.		83 Supp.
Kimber Kable 4PR £54 - 5m pair	Average Average +	This directionally marked cable benefited 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 diel.		64
Kimber Kable 4TC £17.65 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Linn K20 £2.95 per metre	Good Average	Subjectively, it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Marantz ML-55S £30 - 10m	Average Average	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 diel.		64
Mission Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically, it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Original £3.49 per metre	Good Average +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
Monster SCI 16-4 £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OFC strands		83 Supp.
NVA LS1 £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefited from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
Origin Live Soli-Core Ordinary £1.80 per metre	Good Average +	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
QED 79-Strand £1 per metre	Good Average	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Fiat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
QED Incon Graphite £2 per metre	Average + Average +	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	OFHC, polymeric screen		64
Rotel Supra 10 £8.95 per metre	Good + Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R	64
Rotel Supra 4 £3 per metre	Good + Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R	64
Solid core lighting cable 36p per metre	Average + Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £99 per metre	Average Average	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 - 5m pair	Average + Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor - very thick	R	64
van den Hul CS-122 £5.95 per metre	Average + Good - treble	Characterised by a driving and powerful bass, CS-122 is 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	R	64
van den Hul CS-352 £12.95 per metre	Good Average +	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 diel.		64
van den Hul SCS-12 £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £5.40 per metre	Average Good	Subjectively the better of Vecteur's cable line-up offering a neutral overall perspective but slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OFc PTFE insulated BB strands	BB	64

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 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	LAB SOUND	COMMENTS	TOP PLATE SIZE, HEIGHT	VALUE	ISSUE
Appolo A10 £52.50	4 leg Average	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
Appolo A820 £44	4 leg Average	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 Supp.
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159 to order	Plinth Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/5	R	58

LOUDSPEAKER STANDS

MODEL PRICE	LAB SOUND	COMMENTS	TOP PLATE SIZE, HEIGHT	VALUE	ISSUE
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x46.5cm		83 Supp.
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 46cm	R	83 Supp.
Heybrook HBS1 £109	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
Heybrook P5S £69	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
Linn Kan II £101	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £112	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 44cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker	18 x 16.5cm 48cm		83 Supp.
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Standesign Z20 £75	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 50cm	R	83 Supp.
Target HJ15/3 £107	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
Target HS20 £64	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the speakers sound accordingly	19 x 16.5cm 53cm		58
Target T-40 £51	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 40cm		83 Supp.

EQUIPMENT SUPPORTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Alphason R444 £120	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		83 Supp.
Foundation Stable Table £100 (with Supe	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		58
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		58
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Sound Organisation Z022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		58
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT2 £64	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'. Design was updated in 1990	52 x 46.5 x 35.5cm	BB	57

**TO ORDER BACK ISSUES
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Personal Messages

Paul Messenger gets a sneak preview of Naim Audio's brand new CD player. Will our vinyl junkie become addicted to the digital disc?

I have just managed to get my hands on the first Naim Audio CD player to escape from Salisbury. I've talked it into joining me in the listening room and stuck a little DIN plug up its backside. Copy dates are already but a fond memory, and I'm told it takes three days to get properly warmed up...

The formal review will have to wait 'til next month's *Statements*, but I can't resist a scoop 'first impressions', nor some of the background to my own very peripheral involvement in this machine's gestation.

The NACDS has already done more than enough to force my reassessment of the CD medium. Just how good it really is I probably won't know for a month or three, but there's no question that this is a landmark product in the development of the digital disc.

In fact, by the time this appears in print, I wouldn't be at all surprised to find myself standing in the record shop seriously contemplating buying CDs as a valid alternative to LPs. I've bought a dozen or two CDs over the years, mostly quite recently during my in-car peregrinations (*Driving Ambition* supplement, issue 96), and find them a useful cross-reference point during loudspeaker reviewing. But they're not often voluntarily put on for relaxation and leisure, my subconscious always opting for vinyl instead.

It all comes down to something which could be called a pleasure index, which is best assessed by the way it conditions my behaviour over the next month or two. Will the hand reach out automatically towards phono, or will it find itself poised above aux? Will I still indulge in the tactile pleasures of handling black vinyl, or confront the dreaded jewel case? (No, I'll leave the silver

beer mats scudding around gathering dust, which is stupid, but better for the blood pressure than tackling a jewel case.)

A couple of years back, my attitude to CD (and that of the people down at Naim Audio, for that matter) was very much: 'why pay nearly twice the price for something so obviously inferior?' It wasn't getting any easier to buy vinyl, leading to a certain amount of general pessimism about the Nineties, but there certainly wasn't any other incentive to switch sides.

Are friends digital?

I've kept a close eye on CD's steady improvement over the years, trying a number of decent machines, priced for the most part under a grand. However, the first real glimmer of light cut through the curtain of digital obscurity about eighteen months ago. A technically (and musically) highly skilled friend came down for a day of listening tests, bringing with him a home-brewed special, based on Philips components but with a damped and spring-decoupled transport mounted out on a board, and with a very serious prototype outboard DAC.

This 'CD player' was a real ear-opener, delivering bandwidth, speed and timing information that had previously seemed well beyond the medium's capability, and was especially effective in sorting out the rhythmic detail on his particularly mean collection of modern mix CD singles. I wrote the experience up in that month's *Personal Messages*, and thereafter felt a lot easier about buying the odd CD - even though I hadn't yet got the player to do them justice.

I don't have anything like the confidence, knowhow or time to get involved in building my own machine, so

how could I get hold of something as good as the one I'd just heard? Whilst soaking in the bath one night, a cunning plan came to mind. If this lash-up had opened up my sceptical ears, it might have the same effect on one or another equally sceptical specialist hi-fi manufacturer.

I got on the 'phone, organised a couple of meetings and made the necessary introductions, and was very gratified that said friend got on really well with Naim down in Salisbury. Eighteen months and half a dozen engineer years down the road, I have the CD player I was hoping for, more or less. Or more rather than less. The razor-sharp speed and timing are both there with a vengeance, but the NACDS bears virtually no physical resemblance to its home-brewed inspiration, and goes a long way further still down the road to sonic nirvana.

There's nothing romantic, gentle or soft-focused in the way it goes about things. Just an assertive confidence that this is a lot closer to what the engineer was listening to back in the studio. You know it must be right, because people sound more like people and less like recordings.

Expletive deleted

I wouldn't say I've got fully to grips with the sound quality yet, but I have been playing through all manner of promotional and magazine covermount discs that have been piling up in a cardboard box these past few years, and rather enjoying the results. I've also been out buying new CDs too; expletive deleted, they're expensive.

The first couple of hours after switch on were spent going through some of the discs the Naim man had brought. And a more pusillanimous collection of hi-fi show fodder would be difficult to imagine (outside

of a Salisbury record shop one recent Saturday afternoon). The sound was certainly pleasant, detailed and informative, with lots of sit-up-and-notice qualities, but I didn't think voices quite matched my vinyl expectations, and I wasn't getting too over excited.

The penny dropped very soon after he left. I slipped the Hammer onto the spindle, pumped up the volume a bit, and couldn't really believe what I was hearing. The soup of previous low frequency confusion was suddenly clarified and attention was certainly enraptured, but I was far from rooted to the spot, the feet taking on an independent and considerably younger life of their own.

Above all the NACDS is a dance machine, dramatically more capable even than that original prototype at sorting out the complex synthesised polyrhythms that dominate pop music today. Monster Cable's splendid Michael Jackson *Bad Mix* promotional CD was even more astonishing. The DBLs were playing their part to be sure, but a disc that had previously always sounded aggressive and splashy was now full of extra detail and information instead, with awesome scale, energy and coherence, and uncanny realism and insight.

The bottom line for the present is that the NACDS performs much the same trick for a collection of CDs as Linn's *Sondek* does for vinyl: it simply makes more sense out of the music, so that even 'difficult', previously ignored discs become much more listenable and enjoyable. Whether it actually brings Compact Disc within spitting distance of vinyl is a question I shall save until next month, after I've got over the initial excitement of a brand new toy and allowed the subconscious to do its work. But I have to admit things are looking up for the silver disc.

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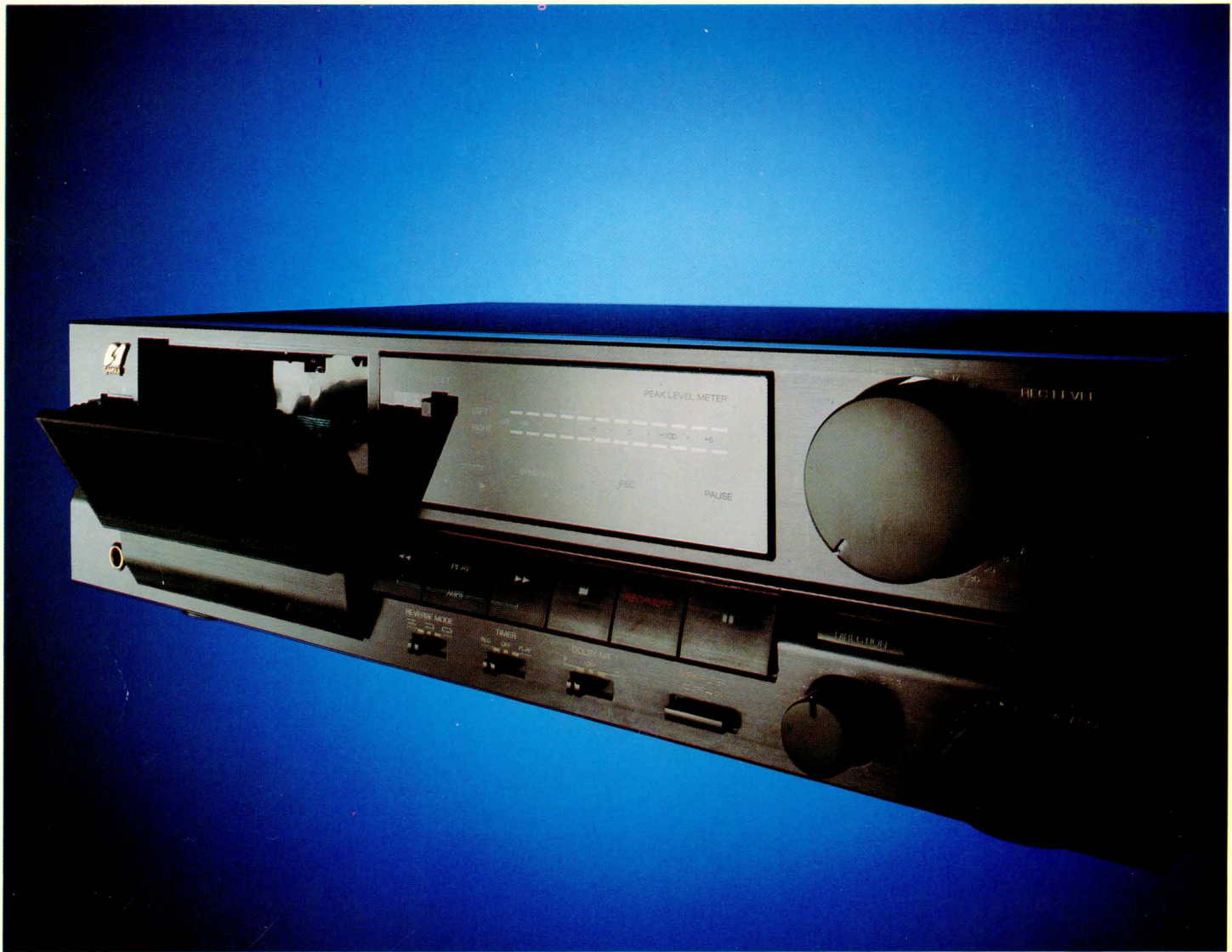
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