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SEPTEMBER 1988 No. 62

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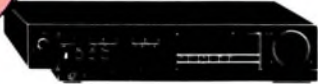


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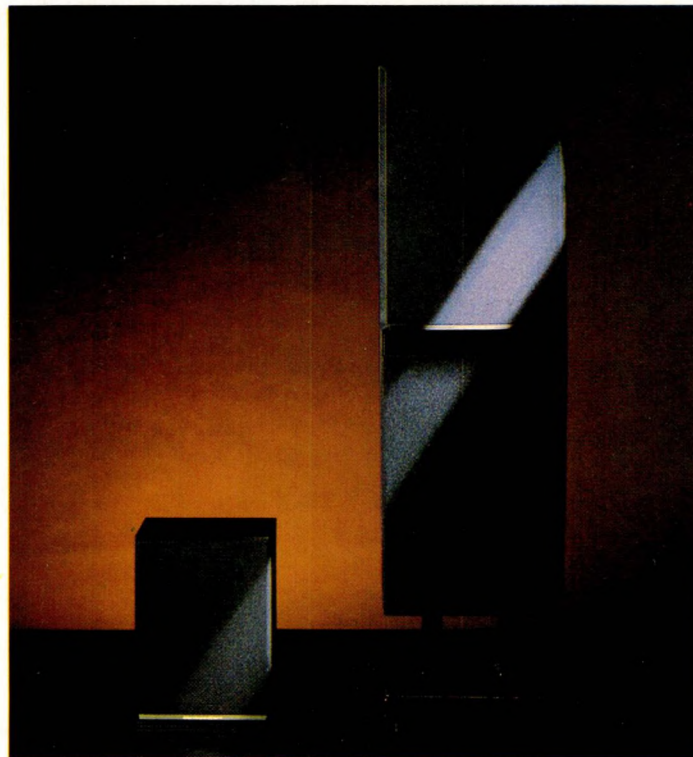
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ISSUE NUMBER 62: SEPTEMBER 1988



Cover photograph of the Nakamichi CA-5E11/PA-5E by Chris Richardson - see page 76.

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COMING UP

In next month's issue of *Choice* Alvin Gold puts five DAT machines on test along with 25 cassette decks. Plus headphones and valve amplifiers are under review and much much more.

MENU

Choosing an amplifier has never been an easy task. As we discussed in our *Perspectives* feature on amplifier design last month, there are several factors you have to weigh up when deciding which model to buy.

We would hope that as a *Hi-Fi Choice* reader your prime requirement is for good sound quality. But if your amplifier is to be the heart of a complex audio-visual system, for example, you may have to trade off the leading edge in high fidelity sound for comprehensive source switching. Alternatively, you may have a large living room and be on a tight budget – in which case you'll be looking for an inexpensive amplifier with a healthy power output.

In fact, I would argue that choosing an amplifier is as much a matter of personal requirement and 'taste' as is choosing a pair of loudspeakers. No manufacturer has yet designed the 'perfect' amplifier suitable for all applications. Consequently we would urge you to use our reviews and *Directory* as a general guide and let your ears be the final arbiter.

A word on our revised amplifier listings in the *Directory*. In reviewing this latest batch of amplifiers Martin Colloms found an embarrassment of riches, and felt that in deciding which models to award Recommended and Best Buy status he would have to be more mercenary. But you can't have one rule for some and another for others; consequently he has looked back to his reviews published in our March issue and regraded models to keep them in line with the latest additions.

This month sees the conclusion of our survey on affordable in-car radio/cassette players – and, as promised last month, we've tested five more compact disc players. Meanwhile we've really got our work cut out for next month's issue. The focus is on cassette decks, but we've also managed to get our hands on five DAT recorders, and JK is listening to 20 pairs of headphones.

We're also testing a handful of valve amplifiers, many of them with names new to *Choice*. I've already been listening to some of these and can tell you that they really do sound fabulous.

John Bamford

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PRODUCTS

NOW WE ARE FIVE (OR SIX)

The story of Celestion's *SL6* evolution is turning into one of hi-fi's great sagas. In the beginning was *SL6*, founder of the modern metal dome tweeter and small-is-beautiful trends – but also decidedly insensitive. *SL6* begat *SL600*, which weighed much less and cost much more, courtesy some fancy ultra-light and-stiff cabinetwork.

SL6 then evolved into *SL6S*, with a little more sensitivity and better bass from a redesigned driver. Meanwhile '600 added an optional add-on radical dipole subwoofer system and active crossover to become the *System 6000*. And then came *SL700* as the new flagship miniature, an integration and much further development of '600 cabinet and '6S drivers with a split crossover and a very special single pillar stand.

The SL12 Si – latest prodigy in the Celestion dynasty.

Confused? So were we; and so maybe was Celestion itself, so 1988's rationalisation is very welcome. All (bar the continuing *700* and the *6000* add-on) now have an *Si* suffix and have gone up significantly in price – to a degree which looks more designed to protect overseas agencies than stimulate UK demand.

The basic '6Si now costs £379 and features a new crossover, with improved component quality and internal wiring to enhance sound quality. Specification remains much as before, though trimming the bass inductor has increased sensitivity marginally. A £109 *Si* stand – an economy version of the one supplied with '700 – is designed to partner any of the new *Si* models.

Most interesting of all must be the brand new £579 *SL12Si*. The first of the series to use anything

but the standard 12 litre 'shoobox' cabinet, box size is increased by 50 per cent and an extra bass driver added. Even though the paper specification alters only slightly, the net effect provides the '6Si concept with 2dB more sensitivity and significantly more bass welly and power handling, which should help satisfy rock-oriented critics of the standard size models. The bi-wire crossover is all hard-wired, omitting printed circuit boards and using top quality components – an air-cored HF inductor, polypropylene capacitors etc.

The *600Si* costs £100 more than its predecessor. The update consists of an all new, hard-wired crossover with redesigned tweeter notch filter, improved components and separate bass and treble arms, plus the extra pair of sockets required for bi-wire amplifier connection. And by inference the price of *System 6000* goes up to £1,570, maintaining full compatibility with '600Si.

HAND MADE

A new British amplifier company has presented its debut range of products aimed at the (fairly) economically minded audiophile.

Analogue Electronics offer four 'hand crafted' models starting with the £130 *PR11* preamplifier. The three power amplifiers are class A/B designs, with the *FA11* (£130) beginning

the line-up at 20 watts per channel rating. The identical size *FA111* at £145 offers 35 watts per channel, while the bigger *FA1V* (£220) with its 50W rating is described as "ideal for high listening levels and insensitive speakers alike".

Although limited to a few outlets in the Bath area the units can be bought by mail order with the usual money back guarantee.

Analogue Electronics, Hartley Farm, Upper Swainswick, Bath, Avon, BA1 8AF. Tel: (0225) 859473.

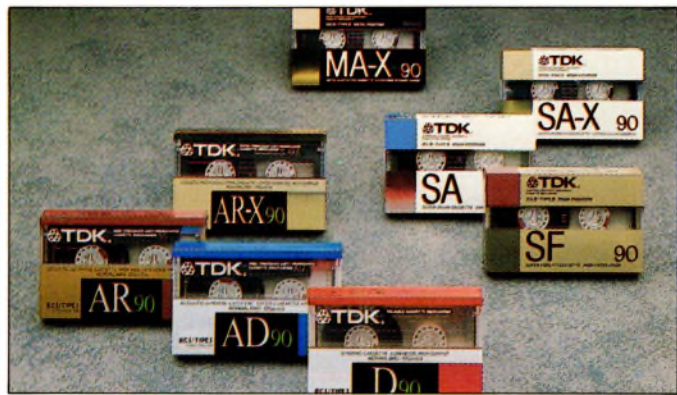
RED SHIFT

Yamaha Electronics have released their latest series of pre and power amplifiers aimed at audio visual buffs. The existing range of control amps (to use Yamaha's nomenclature) are to be replaced by the *CX-50*, '70 and '1000 which, among other features, have 'CD direct' as well as DAT and CD video inputs. The *CX-1000* includes Yamaha's 'Hi-Bit' digital/analogue converters with 8 times oversampling digital filter.

The corresponding stereo power amplifiers *MX-50*, *MX-70* and *MX-1000* feature HCA (Hyperbolic Amplification Conversion) apparently allowing non class A amplifiers to operate as class A with a reduction in required current levels

Power box: put yourself in the red with this one from Yamaha.





eliminating switching distortion. The *MX-1000* (pictured) has a power output (per channel) of 260 watts RMS. Its slightly less powerful siblings have the same design and shifting red LCD power meters

VIDEO WALKMAN

Sony is hoping that its new *Video Walkman* product – expected in UK shops just the wrong side of Christmas, priced around £800 – will repeat the original *Walkman* success story, and at the same time turn the 8mm video format into a serious force in the marketplace.

The unit weighs 1.1 kg, is about nine inches long, five inches wide and three inches thick, and includes full tuner/recorder facilities alongside a small liquid-crystal 'personal' colour TV screen. One obvious application will be to while away commuting time with time-shifted programmes.

Success of the concept will result in more widespread availability of a much larger catalogue of Video 8 prerecorded material. It should also assist in establishing this second-generation video format with its much more compact tape size as a serious alternative to the VHS world standard. This in turn would 'pull through' into the camcorder field, where Video 8 shares a three-way split market with VHS and VHS-C formats.

TDK UPGRADE

Audio cassette tape market leader TDK has relaunched its complete range, with six new out of the eight tape types, claiming significant performance improvement across the board over the previous range.

One reason is to incorporate all the evolutionary, incremental engineering advances that are bound to build up over the two years since the last relaunch. Tape 'engineering' is basically chemistry, and involves pushing various technologies close to the edge.

Most important is the magnetic coating layer, made up of tiny magnetic particles

TDK's new line up

(pigment) suspended in a binder medium. TDK claim its particles are now more uniform, smaller on average and packed more densely than before, with proportionately less binding chemical.

Surface smoothness is another relevant factor in overall performance, as are the mechanics of the shell, hubs etc. Here again improvements are claimed – and the claims are backed up by measurements which stress the importance of the odd dB or so improvements in MQI, SAT, mod noise etc.

Packaging is revised too of course, to emphasise the upgrade and spring clean the presentation. The new range will consist of four Type I ferrics, from the basic *D via AD, AR* to *AR X* (the last two only recently introduced and hence unchanged). The new Type IIs are *SF, SA* and *SA-X* in ascending price/performance order, while the Type IV metal is also updated.

Moving up both the Type I and II ranges offers steadily improving mechanics and mod noise, but also increasingly 'bright' tonal balance characteristics – particularly with *AR-X* and *SA-X*, but also *AD* too. Neutrality is therefore a little suspect, though the rising treble apparently reflects consumer demand, perhaps helping to compensate for the inherent 'dulling' and HF 'squash' of the cassette medium.

ALEXANDER'S RISE

Presence Audio of Horsham are to distribute the diminutive and stylish range of Alexander loudspeakers. The range (three models so far) created the greatest number of "Oohs" at the Bristol Show this year and was reportedly the best selling loudspeaker there. Although the firm has been operating for four years sales have been mostly local to the Bristol area, though Presence hope to change all that.

The three models are the

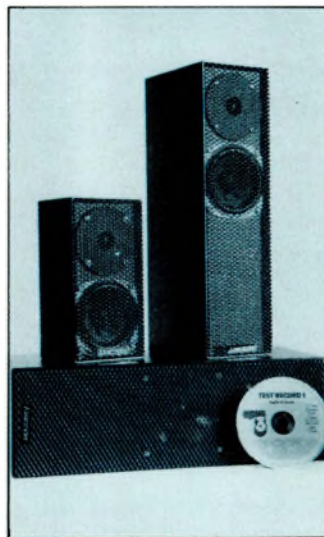
house-brick size *514* (£119), the *566* (£159) and the £349 *Aurora*. All have the same slim design and distinctive metal casing and grilles.

HARBETH FLAGSHIP

Harbeth Acoustics is shortly to introduce a new top-of-the-range *HL5* monitor, priced at nearly £800 and due for public debut at the Penta show. The slightly more sensitive, existing *HL Mk4* (£525) will be retained particularly for some export markets as long as demand continues, but the '5 is effectively a replacement model.

Claimed to represent a substantial improvement over the *Mk4*, the 50litre birch-ply cabinet is about the only part the two designs have in common, and even this is upgraded for the '5. The new model now has a veneered baffle for extra stiffness and to offer the cosmetic option of leaving off the reticulated foam grille. Extra bituminous

Alexander loudspeakers should now have more presence in the market.



damping pads are now used internally.

The bass/mid driver is based on an Audax *7EX* unit but with Harbeth designed cone, and the company now has its own surround, painstakingly developed after many hours experimentation. The tweeter is also new, and is now a metal dome type, sourced from SEAS.

Consequently the crossover network is also completely revamped. It is a complex design that takes account of driver impedance changes with frequency and incorporates damping elements for out-of-band driver resonances. An expensive autochoke system provides excellent frequency and sensitivity matching to the tweeter. A 'separate arm' configuration and an extra set of

terminals permits full bi-wire operation. The specification frequency response is 50Hz-18kHz ±2dB.

SOFT SELL

The changing times have seen an increased popularity for rubber. Sharp have now followed in the footsteps of Richard Branson and his mates in making the material more trendy.

Their latest compact personal stereo – the *JC-K15* – is finished in rubber and obviously targeted at a specific market area. A spokesman said while fondling the machine that it gave a "different sensation. It's not spongy rubber but not hard either," he offered by way of explanation. As well as the unusual exterior there are some novel features inside the *JC-K15* including a bass boost system providing extra power on low notes, an anti rolling mechanism for "active outdoor use", auto-reverse and Dolby noise reduction. The *JC-K15* retails at £79.95, which is just under £240 for a pack of three.

Squeeze me appeal from Sharp's latest personal stereo.



CAM-BRIDGED MONO

Cambridge Audio have launched their latest pre and power amplifier combination at a price of £399.

The "more affordable separates" comprise the *C50* preamplifier with five inputs and a tone bypass switch for the purist, and the *A50* power stereo amplifier which is rated at 60 watts per channel (8ohms). The *A50* can also be rigged for bridged mono operation using a rear panel switch. Cambridge claim it will then deliver 150 watts and only clips at 200 watts. The *A50* is also available separately at £199.

CD FOR JOGGERS

Goodmans have launched their first personal compact disc player, the £120 *GCD 10*.

The player weighs 500 gms and will take full size discs. Among normal features such as search, repeat and memory it also has a function lock facility to keep everything running smoothly while you're out jogging for example. Goodmans also point out that with a pair of Maxamp speakers (or similar) the *GCD 10* becomes a "hi-fi" at home as well.

Have CD: will travel; that's what Goodmans say.



OPEN BAFFLE

SD Acoustics have launched their latest loudspeaker – the *SD OBS* which uses an open baffle midrange unit.

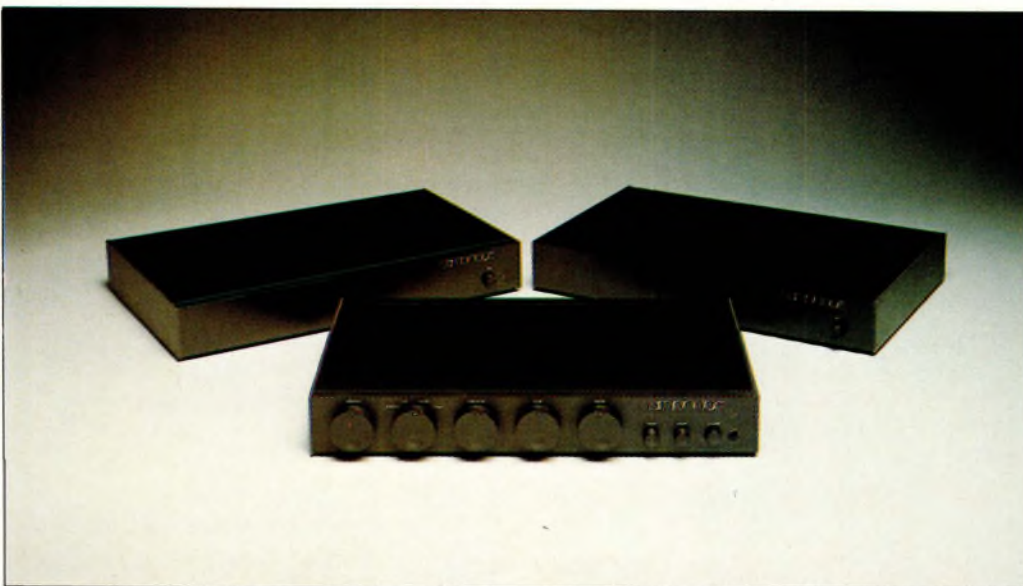
The £695/pair loudspeaker is said to take the qualities of the (Recommended) *SDI* a step further with a bipolar configuration and open baffle midrange unit giving "extended image height, width and depth". The makers claim the result is a deeper insight into the original performance.

Apart from the open baffle which covers the 300Hz-4000Hz bandwidth, *OBS* features a "true piston" metal dome tweeter from SEAS in Norway and 8-inch bass drive unit tucked into a ported 40litre cabinet.

The *OBS* will be on parade at the Heathrow Penta show (September 15-18) and is available finished in American walnut (as pictured), black ash or natural ash.

Moving air: SD Acoustics' new loudspeaker.

The "more affordable" Cambridge pre/power combination.



POCKET STEREOS

Four new personal stereos from Aiwa are now available, bringing the number in this year's line-up to 18. Aiwa have released the new models, priced between £60 and £90, saying that customers are becoming more discerning and want features such as auto reverse and good sound quality with their boogie boxes.

The *HS PC202* which retails for just under £70 with a boasted "hi-fi sound reproduction", and Dolby B and C.

Aiwa say they have ten per cent of the market share in value and that their range offers consumers trading up opportunities at every price point. After that you buy a Sony *Walkman Pro*.

THE SMALLER VERTEBRATE

Mordaunt-Short's *MS442* with its backbone chassis, decoupled enclosure and rear-fitting bass driver is one of the most successful radical loudspeakers on the market, though the £1,150 price tag has inevitably restricted appeal somewhat. Very welcome therefore is advance information of a 'half size' *342*, due to sell at 40 per cent less.

Again built around a central pillar stand with 'suspended' enclosure, the *342* still stands nearly 3ft tall and shares the same unusual forward-sloping and monopod appearance. But each linear dimension is scaled down by 10-20 per cent, so the total enclosure volume is halved. The similar horizontally-opposed twin bass unit arrangement now has 5inch drivers and bass extension is inevitably curtailed somewhat – the spec. quotes – 3dB at 60Hz, for the same 87.5dB/W sensitivity as *442*. A metal-dome SEAS tweeter is used, and the cabinet is extensively veneered.

BUSINESS

APRS '88

The main annual event for the UK professional audio industry emphasised yet again the gulf between the worlds of pro-audio and specialist hi-fi. A handful of companies such as Tannoy and KEF span the gap, and there is some cross-fertilisation of ideas on sound quality – pro-audio has its cable and valve enthusiasts too – but this is very much the exception not the rule.

Whereas hi-fi has patiently waited for or studiously ignored it thus far, pro-audio has clasped DAT enthusiastically to its bosom. The Playback stand had

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Alvin Gold `Hi Fi News and Record Review` Aug 1988

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IN BRIEF

no less than seven different recorders and players on display, including a second generation 'economy' Sony model with fewer motors and shared converters that could sell at around £650. Playback also has its 'own brand' DAT tape, partly manufactured in the UK.

Pro-audio sees DAT providing a more modern 'budget digital' format along the lines of the successful *PCM-F1/701*/Betamax recorders. Several small companies were showing extensively modified machinery to suit specific applications – standards conversion and *1610/1630* interfacing for example. Indeed Fostex has reportedly managed to fit full EBU/SMPTE timecode within the subcode data, which should have major implications for sound-with-video usage. The important unanswered question is whether pro market success will be sufficient to rescue DAT from suffocation by consumer apathy.

Elsewhere, Tannoy has already engineered a pro spin-off from the hi-fi-successful Eclipse. The tweeter dome is now duraluminium instead of polyamide, the cabinet has extra bracing, and the magnet is shielded to avoid CRT interference in A/V work.

JBL showed prototypes of two major 'crossover' models that represent a substantial tooling investment. *Controls Ten* and *Twelve* share the unusual moulded plastic carcass style of the successful baby *Control One*, but are altogether more ambitious and very much larger. The less sensitive (but still 92+ dB/W), cheaper (£850/pair), 3-way *Ten* will be the more interesting for hi-fi purposes.

NEAL, Britain's only hi-fi cassette deck manufacturer – operating almost exclusively in the pro marketplace – introduced *400* series updates on its *300* series range, incorporating bar-graph metering. A ten year product cycle is innovatory amongst institutionalised planned obsolescence, and it's nice to find a company which keeps spare parts going back to 1971.

OXFORD EXOTICA

Oxford has its own dedicated high-end dealer. Oxford Audio Consultants has been partly set up by Jon Harker, (ex Oxford Acoustics) who will be dealing in Oxford Acoustics exotica such as the *Crystal* turntable, and Absolute Sounds products.

An official opening and musical evening for product demonstration is being organised for September 1 at the Randolph

Hotel, Oxford, where there'll be a draw for a Koetsu *Red* cartridge as well as a chance to hear the new *OA* turntable. Oxford Audio Consultants will operate from Cantay House, Park End Place, Oxford. Tickets for the evening can be obtained from there or by telephoning (0865) 790 879.

BELFAST SHOW

Northern Ireland is to have a hi-fi show after a nine-year absence of such activity in the province. The show is being sponsored by Zeus Audio, and many well known brands including the more esoteric will be participating. It will run from October 28-30 at the Stormont Hotel in Belfast. Further details from Zeus, Unit 6, Hope St, Belfast. (0232) 332522.

TECHNOLOGY

CD LIFESPAN

Questions regarding the longevity of compact discs have surfaced recently in both specialist and mass media. The tip of the iceberg was US audiophile label Mobile Fidelity's claim that they were now using gold – instead of aluminium-plating to ensure low error, long life discs. Adding some credibility, engineers at Matsushita are reportedly carrying out ageing tests.

Excrement struck propeller blade when *The Guardian* splashed a story with quotes from Michael Lee, commercial director of CD manufacturer Nimbus Records, which confirmed that CD deterioration could become a problem, at least with some discs from some (other) sources. (Another industry source reported overhearing the loud sounds of Welsh axe-grinding as Nimbus sought to protect its premium pricing from the low cost CD pressing capacity which is coming on stream, and muttered darkly about killing golden-egg-laying geese.)

The most convincing and authoritative – and by implication most worrying – reports have been by Barry Fox, notably in *New Scientist* and *Which Compact Disc*.

The problem arises over the long term stability of the aluminium reflective layer that carries the digital information. Reflectivity can be altered by oxidation or other chemical change, resulting in increased error rate or a failure to track correctly. This has been attributed to printing inks attacking the aluminium's protective lacquer layer, or to the failure to exclude oxygen or

moisture during manufacture.

What is difficult to ascertain at present is how widespread or serious the problem is.

Mobile Fidelity claims to have carried out 'artificial ageing' tests with their Japanese pressing plant Ultech which involved subjecting ten gold and ten randomly purchased aluminium discs to heat and high humidity. The gold discs showed no deterioration after 30 cycles, but most of the standard discs had become unplayable, and all showed an increase in error rate. Again, of course this source has a vested interest, and it is difficult to draw parallels with normal use conditions.

Closer to home, Cambridge Audio manufacture a CD player with an optional error read-out unit. Designer Stan Curtis is quoted confirming that degradation can occur over time, but notes that it only seems to crop up in about five per cent of discs.

More information will certainly come to light before too long (particularly with BF worrying away energetically), while the current balance reading suggests that only a small percentage of discs may be affected. In the meantime, CD collections should at least be kept away from excess heat and sunlight, and not left overnight in warm machines.

And in *Hi-Fi Choice's* opinion the record companies – fat on profits from the last five years of healthy margins – should immediately bankroll the problem by offering lifetime guarantees on their discs. This would counter any lack of confidence in the still new medium, and is good marketing sense in any case – applied to blank videotape, the stragem won Scotch the market leadership it has never relinquished.

HW International has taken over UK distribution of Koss headphones, following the recent reshuffle at previous agent Ortofon UK. HW has also confirmed it will be bringing Carver electronics into the UK.

Yamaha is introducing two new remote control, surround sound (four channel) A/V systems. The midi *MS-555* starts at £550 and optionals can take this to £1,140. The £770 *AVS-33B* uses full width components.

Philips has taken out a patent on a digital loudspeaker system, according to a report in *New Scientist*. Capable of reproducing the acoustic waveform directly from a digital bitstream, the device sounds vaguely similar to a cross between a Magneplanar and a Quad *ESL63*. A magnetically polarised planar diaphragm is divided into 16 concentric circles, each driven (or not) by one of the bits which make up the digital 'word' at a level appropriate to the bit in question.

Gamepath, distributors of Rotel and Infinity brands have confirmed they are to distribute Oracle products in the UK. The new *Alexandria* turntable and a range of tonearms are to join the existing line-up.

Automation Sciences have officially notified us of their winding down. This leaves such exotica as Conrad Johnson, Cello, Martin Logan and Burmester without representation in the UK. Any bidders?

They said it was perfect. Is it?



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New Hi-Fi Sound Feb 1987.

“This is a powerful package at a remarkably civilised price. The Maxim is probably the cheapest true high fidelity loudspeaker on the market, which therefore brings down the entry price of a hi-fi system. Alternatively, when substituted in plans originally calling for more expensive loudspeakers, the Maxim can mean that money could be diverted to a better CD player.”

Compact Disc Review Dec/Jan 1987.

“To sum up then, I must say that I liked the Maxim a lot. It is strong on subtlety, rhythmic push and detail articulation. It has a surprisingly flawless treble quality, lacking in the usual cheap-speaker nasties, and its overall balance makes it a smooth, integrated and highly listenable speaker. I have no hesitation in recommending it.”

Hi-Fi Review Jan/Feb 1987.

“It has the slightly easier and more relaxed quality of the kind that generally goes with bigger loudspeakers – I preferred the Goodmans Maxim.”

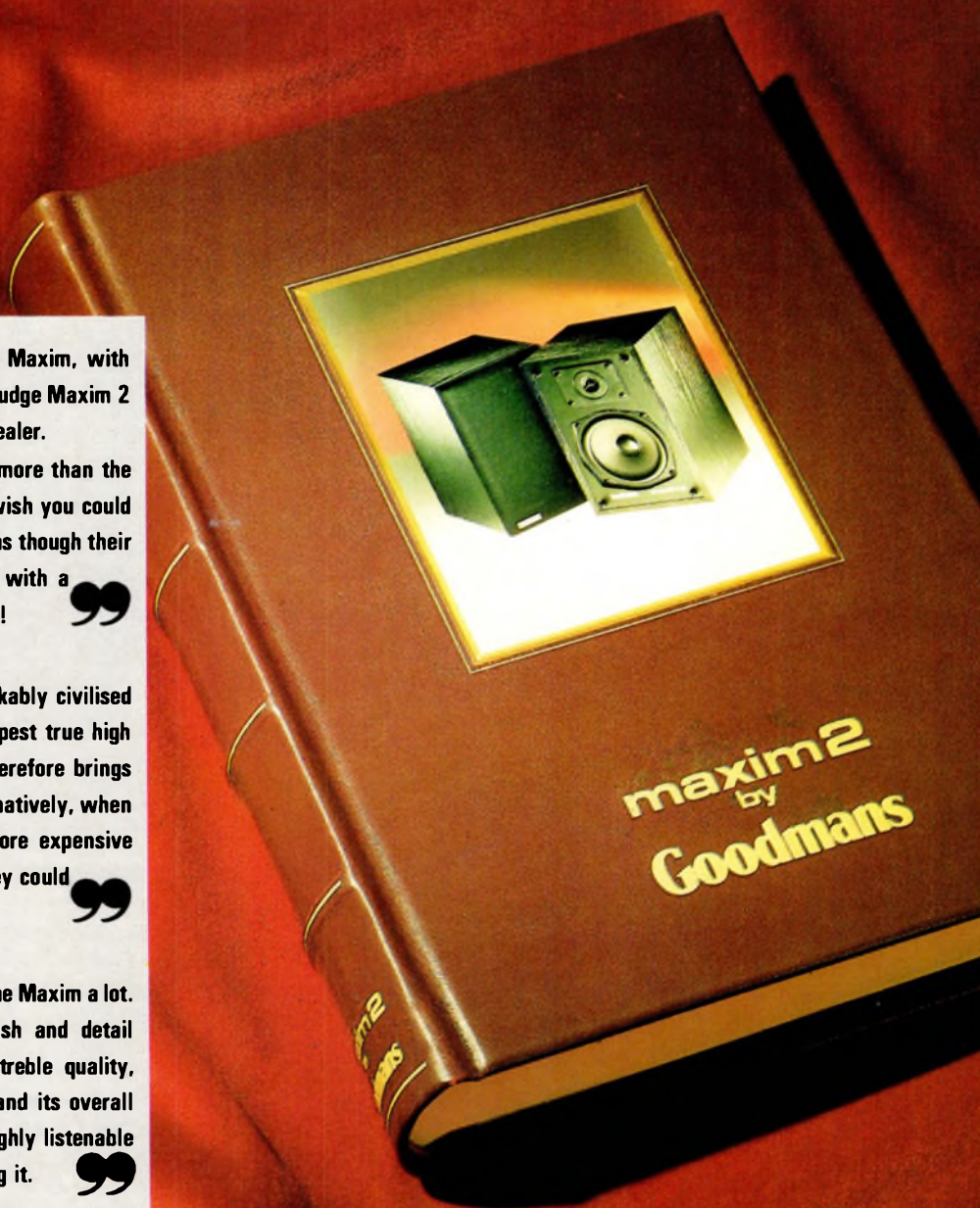
Hi-Fi Answers March 1987.

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SOUND



AND THE SHOW GOES ON . . .

Steve Moore, our intrepid reporter, cuts a swathe through the assorted Americana at the CES and brings news of British Erotica abroad.

The summer CES in Chicago was a big show, in fact large enough for the cab drivers to complain that there were only 80,000 people in town for the show against the expected 100,000.

The main area – known as the Zoo – was filled with extravagant, glitzy stands where the major Japanese manufacturers were showing their latest equipment. Each stand had its own gimmick – waterfalls, professional basketball players, real people pretending to be dummies (moving just when you were sure they were plastic!) and so on. The whole effect was rather like Comet meets Disneyland meets the Price Is Right. (Your worst nightmare come true?)

For all its razzamataz this part of the show was incredibly dull. If I'd been taken to a stand where all the equipment labels had been stripped off, I couldn't have told you where I was, as it was the same bland stuff dressed up in 1989 trim.

Marketing people must have a difficult time in the US because it's so vast. Each state is like a country, and each varies enormously. How can you sell the same product in New York, California and Alaska? The only way it can be done is to bring everything down to the lowest possible level. It's all the really good things that vary from state to state – the music, the food, the great buildings. The junk stays the same all over – the burger bars, the TV game shows, the nylon jogging suits, etc. Someone once said that no-one ever lost money under-estimating the intelligence of the American public, and they were right.

It's for these reasons the reps. and marketing people in the Zoo didn't want to talk about (never mind show you) how the equipment sounded. They just wanted to talk about distortion figures and power ratings and try to convince you that you're getting more this year for your money. Double cassette decks (I'm sure there'll be a triple one soon), multi-disc players, four channel amplifiers – and so on.

The products are mostly triumphs of marketing over engineering, and because they're all competing for that huge faceless, game-show American market, are indistinguishable.

Now that the market for this sort of hi-fi is dwindling they're having trouble selling the equipment. It's getting difficult to fit any more buttons onto the front panel of most American mass-market amps and receivers, and in the absence of any individual character, each company is having to discount heavily. Apparently, around 90 per cent of American homes own a 'separ-



ates' hi-fi system and the same is true for video – there are a staggering 1.6 video recorders per person in the US. You can now pick up a VCR for \$199. In comparison the specialist hi-fi sector seemed relatively healthy. There was a strong British presence at the show this year, with around 30 UK firms represented. Naim and Roksan showed tonearms for the first time (Roksan also played their brand new cartridge), there were new speakers from Linn and Mission, and new CD players from Cambridge Audio and Mission.

The only specialist British firm in the main building was Mission, who were playing their new *PCMII/PSX* switchable phase combination. The £800 *PCMII* can be powered with their *PSX* power supply, which gives a clearer, more confident sound. Linked with the Argonauts it provided the best CD sound in the show.

But there were still plenty of people using records. Roksan (in the Bryston room) played their new arm, *Artemiz*, and their new cartridge – *Shiraz*. (Please Roksan, give us names we can spell, never

mind pronounce, easily.) The cartridge is basically a modified van den Hul *EMT* with a better stylus and should sell for about £300. Makes you wonder why the vdH was so expensive.

The *Artemiz* arm has a clever bearing which allows for very little friction, and hence very low noise. The counterweight has its own unipivot bearing, consisting of



a carrier piece sitting atop the arm tube, with weights held underneath. Because this weight is free to move, it seems to solve two main problems faced by conventional pivoted arms. Ingenious counterweight geometry deliberately reduces downforce marginally when climbing warps, and vice versa. Roksan claim this helps the cantilever's task of mechanically 'driving' the tonearm. Secondly, it's much less susceptible to mechanical interference because of the decoupling at the counterweight, and any vibration that causes the deck's suspension to move won't get the arm to twist. The Roksan people were really clouting the deck but it still refused to mistrack. If the sound was anything to go by it could be a real giant killer (Roksan hope to sell the arm for £325). One floor up, Naim were playing their unipivot arm (available this autumn for around £500) which seems to tackle some of the same problems in a different way. The arm is a straight unipivot, with the whole top portion of the arm detachable. An audiophile version of this arm with

various armtubes and weights means that two or three cartridges can be run on the same deck. (Handy for dealers and reviewers as well, methinks!) Naim's real star product was the IBL loudspeaker, it's essentially a smaller, simplified *SBL*; the single cabinet is subdivided inside, with the lower part acting as a loading chamber for the main bass enclosure above it, using the same type of 'acoustic resistance' found in the *SBL*. It should cost around £700 with the passive crossover and sounded really clean and open with excellent bass for such a small speaker.

Next door, Linn were also showing a new speaker – the *Helix* which is a stripped down version of the *Nexus*. Again, this is a front-ported speaker with a column stand and split crossover (for bi-wiring). I also spotted their new cheap cartridge, the *K5* (essentially a *K9* with a plastic carrier) priced around £30.

What else from the UK? Well, Onix showed a new pre/power combination, with a revised *SOAP* power supply. And QED were showing mock-ups of their *Systemline*

(Far left) Mitek's ZSE380. Look, no cabinet!

(Left top) K5, a new affordable fixed coil from Linn Products.

(Left, below) Naim Audio's forthcoming unipivot pickup arm.

(Far right) *SBL*'s smaller brother, the Naim IBL.

(Right) Linn *Helix*, available this autumn priced £259.

good extended bass and no obvious beaming and looked good too.

The other interesting new speakers were from two American companies – Vandersteen and Mitek. Vandersteen are an established company making a small range of well-regarded speakers. The flagship *2C* at just under \$2,000 should be imported to the UK soon. Mitek's new speaker, the *ZSE380* (Zero Stored Energy) uses two drive units, each with its own small baffle, mounted on a simple metal stand. No enclosure at all! I've never seen anything quite like this before, but they sounded great using just a cheap Adcom amp and CD player; very clean and dynamic with a tight controlled bass.

Probably the most intriguing product in Chicago was the long-heralded Finial laser turntable. For those of you not familiar with this device, it's a record player that reads the grooves with a laser beam. This obviously has some advantages (virtually no friction at the record surface, causing less mechanical noise and virtually no wear on the disc) but it has some disadvan-

machine isn't foxed by scratches and other surface vagaries. The nature of a normal groove wall and a scratch are quite different, and they've developed a circuit (which you can switch out if you wish) which distinguishes between the two. They played a very old record with and without this circuit switched in, and it certainly seemed to remove spurious noises without detracting from the music.

Overall, I thought the sound, when played through an all-DBX system, was very good indeed – it was certainly a lot better than their DBX CD player. Vocals were much clearer and the image was deeper and more solid. However, I've heard better turntables (the Finial seemed to lack the sparkle and excitement of the best decks, giving a darker, slightly laid-back sound) but I don't think that will count against it too much. It is due to be launched in the US at around \$4,000 later this year (and in Europe mid-89, price as yet undecided). If you compare that figure with the best deck/arm/cartridge combinations it's not too frightening. Its only big



multi-room system – an inexpensive way of carrying sound around the house. It will work with any make of main system and if your main system is remote controllable, you'll be able to use that in the normal way, from the second room. Cost will be around \$4-600 per room all in, depending on how ambitious you are and the amount of work involved for the dealer.

Ariston were also showing their new system with the *Image* speakers sounding particularly good. It's interesting to note how some equipment, including Ariston's, is very competitively priced in the US, whereas other stuff more than doubles in price on its cross-Atlantic trip. This happens in the other direction too, and I don't envy anyone juggling with exchange rates.

One company concerned this shouldn't happen to their products is Highwood Audio, a new speaker manufacturer from Calgary. They showed a range of panel speakers of which the smaller (maybe three-foot by two-foot) should sell for under £400. The Highwood *50s* (about £1,500) sounded quite promising with

tages too. Because it relies on the reflectivity of vinyl (Finial say three per cent of the light is reflected and 97 per cent is absorbed) it can't play picture discs or coloured vinyl, and records need to be very clean, because it can't plough through dust and dirt in the way a stylus can. To cope with this, Finial and Allsop have designed a special harmless, wet cleaner which you use each time you play a record.

The Finial laser turntable is about the same size and shape as the old *Video 2000* players. A tray that accepts the record slides out from the bottom of the front panel. Above the drawer a row of buttons control functions (much the same as a CD player) and two LCDs show track positions across the side (à la Technics *SL7/SL10*) and what mode the machine is in (play, pause etc). You can program the machine to play (and repeat) various passages, but it's nowhere near as easy to use as a conventional deck, although it's more foolproof. Apart from the dust problem, and the usual mechanical problems associated with record players, they've had to ensure the

shortcoming at the moment is that it can't play 78s or 7-inch 45rpm singles (it can play 12-inch singles) which will discourage some record collectors.

Acoustic Gold, who plan to distribute the Finial turntable in Europe, were showing a product of their own – furniture for hi-fi and video equipment. And it's not the usual tubular steel variety – this stuff actually looks great and there's the option of showing the equipment off, or hiding it away. It's also got a sensible wire-management system, and somewhere to keep records, etc. It's about time someone did something like this in the UK.

Finally, I'd better tell you about the cutest and cheapest product at the show. For those of you whose hi-fi is so boring that you fall asleep in the middle of a record, Alphason have brought out an end of side arm-lift that picks up the arm so neatly that it had everyone in the room clapping when it happened. It's a simple, little magnetic device and should cost about £15. Who said all the best products were unaffordable?



ASPIRATIONS

This month we visit the home of a long established hi-fi buff who chose his present system to please his ears and his wife's eyes. Words: Dan Houston. Pictures: Chris Richardson.

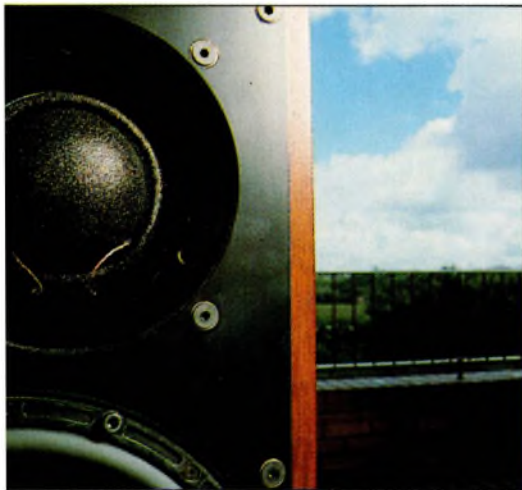
Lakeside Listening

One television advertisement for Milton Keynes, where our host lives, shows a gaggle of McDonald's hamburger-fed schoolchildren sending balloons into the air under a fair-weather sky. It's the sort of advertisement that might discourage historically inclined people with its twee portrayal of the brave new town, but surprisingly, torrential rain on the M1 gave way to blue skies when we reached this planners' paean.

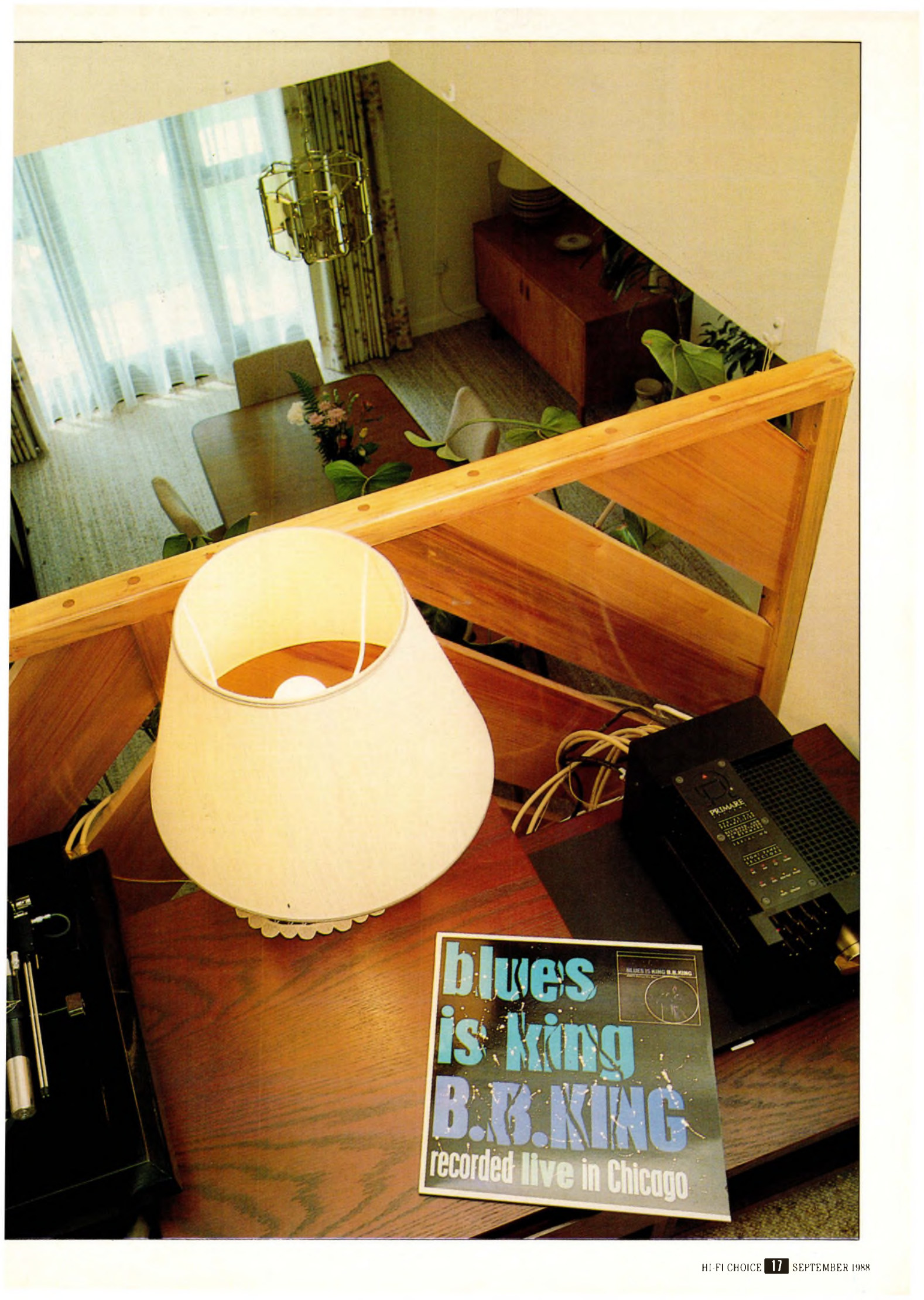
Our host, Tony Scott, a 49 year old projects manager, was of the same sunny disposition having moved to MK six months ago when his brand new house, overlooking a man-made lake, was finished. Although only ten minutes' bicycle ride to the town centre on the ubiquitous 'redway' (an artery for cycling and jogging which connects the districts) the setting is semi-rural. Only the huge glass railway station roof glinting in the distance beyond the sculpted lake and landscape reveals the proximity of Milton Keynes town centre. Trees will soon hide evidence of industry about a mile or two away.

Everything about Milton Keynes seems to follow the original dream of Ebenezer Howard who first envisaged the new town concept before the turn of the century; planners have ensured industry is not focused in one area so, theoretically, there are no traffic jams, and the landscape makes inroads to the town centre creating green wedges between the districts.

The Scotts chose to move to MK even though Tony works in Borehamwood, Hertfordshire, an hour's drive away. Their



Look and listen to the system and let it cure your blues.



blues
is king
B.B. KING
recorded live in Chicago



Mr Scott that tangential arms were right for him. However, when he moved to Milton Keynes he decided to make his hi-fi more visually attractive and therefore chose his present system with the dual criteria of aesthetics and sound quality in mind. The approach pleased his wife: "she had put up with cables all over the floor; disparate bits and pieces everywhere, so I decided I had to start tidying my act up a bit," he told me.

By this time Mr Scott was such a regular at Acoustic Arts that he virtually had claims on the place; he had certainly claimed a great deal of their patience! In fact he has taken an active interest in Acoustic Arts by putting money into the company; which gives him a legitimate excuse to spend more time there!

Being involved has enabled him to visit such outfits as ATC Loudspeakers near Stroud, Gloucestershire, and to get more of a perspective on their operation. Although originally shy of active loudspeakers "for their hard mid-hand" he bought these on the merits of their sound quality, veneered finish and internal craftsmanship, although he says "their smoothness belies the amount of detail presented and needs some getting used to." The problem now was how to drive them.

"One morning I was in Acoustic Arts and heard Dennis Wratten (Acoustic Gold) eulogising the Primare 928 and how it was designed to drive long lines," he remembered. The idea was immediately appealing because several feet of interconnect between the ATCs and the system were to be needed (their being at opposite ends of the room), and he borrowed one of the first models.

However the Primare was not chosen on its looks and active speaker handling capability alone; Mr Scott fell in love with its musicality against some other amplifiers even though he admits they deliver perhaps more detailed and clear information.

The *Crystal* turntable (so called because of its massive platter of clear acrylic) is a piece of furniture in its own right with its sand-filled pedestal stand and black ash wood finish. The Airtangent tonearm uses a fish tank air pump to keep the arm buoyant while it travels hubwards across the record; tiny jets of air support the arm sleeve on the beam. A common complaint about this is that one can hear the pump while it gurgles away. However, here the pump is installed in the garage, below, and a handy switch for it is concealed under the *Crystal*.

The wiring is also concealed, having been run under the floor (across the garage ceiling) to the speakers at the front of the room. Primare's own cable was chosen after some trial and error with other cables. All the hi-fi had to be tailored to the characteristics of the room. The acoustics are quite good with the open rear wall reducing the "liveness" and taking any



The system (top) was partly chosen for its looks; the Primare (left) is styled to be on display though this doesn't detract from its performance via the active ATCs (right).



Crystal Reference turntable with an Airtangent tonearm and Clearaudio *Signature* cartridge (the first in the country?) These run through a Primare preamplifier which feeds the ATCs with its own cables. A Revox A76 tuner and Aiwa cassette deck are kept in cupboards underneath the Primare. The system was bought at Acoustic Arts in Watford where our host has been a customer for a number of years.

Mr Scott's interest in hi-fi goes back to his first system of Goldring turntable, Quad 22/III amplifiers and *ELS* loudspeakers when he was 18. Over the years, apart from a period of stasis when he bought a house and began his family, he maintained his interest – investing in the latest developments as they arrived. Both his son and daughter have separate systems in their bedrooms and are educated on sound quality rather than being subjected to the £200 stack systems that are most of their generation's lot in life.

A spell with the Source turntable and Souther parallel tracking arm convinced

house is in a district; a new village as it were, which boasts a series of facilities such as health and leisure centres. They are positive about the town and praise its facilities and planners. Harlow New Town got it wrong where Milton Keynes got it right, they say.

The hi-fi is installed in the first floor lounge with its all glass 'wall' opening onto a balcony with views of the lake in front of the house. Two ATC *SCM 50a* active loudspeakers, with their power amplifiers on board, stand either side of the window while the remainder of the equipment is positioned at the back of the room. This has a corresponding balcony overlooking the dining room on the level below in an open plan style.

The front-end is the Oxford Acoustics



At night the lights of Milton Keynes twinkle on the horizon adding magic to the music soundstage.

echoes away. The woollen carpet and furniture help with the rest though the floor is very "live" being the span of the double garage beneath, and if you jump up and down the front-end finds life a bit difficult. Mr Scott was aware of potential problems from 'footfall' and bass and these influenced his choice of system.

CD technology hasn't made any inroads to the Scott household although Mr Scott conceded that players were "getting better all the time." Like most audiophiles he criticised CD's cold midband and brashness, but pointed out that comparisons with the *Crystals* were not fair considering the price differences even between high-end CD players and this front-end system worth around £5,000.

Many of Mr Scott's friends look at him in disbelief when he reveals the cost of his hardware. Although people can readily accept the price differences between a Ferrari and a Mini they cannot appreciate the same approach with hi-fi. Listening often produced the same reaction, with guests unable to appreciate fully the advances in music reproduction against cost. When we listened to the system it is easy to understand the layman's reaction; the equipment is very natural sounding and consequently understated. However its musicality comes across very well with a boogie factor that has you immediately tapping your feet. And it was refreshing to feel rhythm without too much bass; many

systems feed you bass as a way of bypassing the ears which isn't necessarily what music listening is all about.

The ATCs' bass rolloff results in a reasonably flat response in 'normal' rooms and the Primare has a series of dip switches which means the system can be tailored to suit the room or musical tastes of the owner. The *Crystal* and its partners pull a great deal of information from the vinyl as well although this isn't presented, as with some systems, all at once, forcing you to concentrate on the music. Again the feeling is relaxed and it's the sort of system you can talk over without feeling you're interrupting something egocentric. The material we listened to included Randy Crawford, Duke Ellington and Amanda McBroom on an audiophile record made by Monster Cable. On each the music came across in hip-swinging fashion with a conveyed atmosphere that got you quite close to the artists.

The system has been cleverly auditioned and chosen according to Mr Scott's criteria and considerable experience with the reproduction of music. He is firmly in the 'musical' camp of hi-fi buffs preferring a system which contributes atmosphere rather than one which has clarity and information dissemination as priorities. The design of equipment also proves that hardware doesn't have to look 'ex-military' in order to sound good. So here there was no need of concealment (except of cables) because the different components have been designed to be on display.

The System:

Crystal Reference turntable by Oxford Acoustics – £1,950.

Airtangent tonearm by Absolute Sounds – 1,998.

Clearaudio *Signature* by Vital Systems – £1,000.

Primare *928* preamplifier by Acoustic Gold – £3,750.

Primare cables by Acoustic Gold (5m) – £242.

ATC *SCM 50a* active loudspeakers by ATC – £2,990.

System installed by owner; supplied by Acoustic Arts Ltd, 101 St Albans Rd, Watford, Herts. Tel: (0923) 245250.

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READERS WRITE CHOICE ANSWERS

PWB AND RF BOMBARDMENT

After reading the May issue of *Choice* I did some serious thinking, your article about Peter Belt reminding me of some facts that I came across whilst studying RF theory.

Essentially RF signals abound in the atmosphere, generated by all sorts of transmitters both man made and natural. The effect that they have on people and electrical equipment depends very much on amplitude and frequency. For example, a microwave oven works by causing moisture particles in foodstuffs to vibrate at very high speed. This is done by directing a high powered microwave RF signal at the food, at a frequency which I believe is approximately 2.5GHz (that's 2.5 million million cycles per second – pretty fast stuff).

Interestingly enough this relates to one of Peter Belt's theories about 50Hz vibration of the saline solution in the inner ear. If he's correct, and he may well be, then apart from those living in screened metal boxes, human hearing is not what it was in, say, 1880!

Taking this to its natural conclusion, things may well be much worse. These days we are all bombarded by RF signals of varying amplitude and frequency. Who is to say that the human ear is not affected by VHF, UHF and microwave emission as well as 50Hz? Let's face it, if 2.5GHz can cook your food, what on earth is it doing to your body!

RICHARD WHITE,
CHATHAM, KENT.

Watch out for the FWB electret foil body stocking!

WHODUNNIT?

Doctor Who was first! Peter Belt has, it seems, merely rediscovered the esoteric principles of the cosmos which extricated the good Doctor from many a tricky situation.

Remember how he used to reverse the polarity of a time-warp module or a Cyberman's silver wellies with a deft twist of his sonic screwdriver? And while we're on the subject of products pinched from Time-Lords, isn't it

time Linn came clean about the K9? I rest my case.

Yours from underneath a small black sticky piece of plastic.
CHRISTOPHER MANN,
THAMESMEAD.

AN AUDIO CROSSROADS

My present system consists of a Roksan Xerxes/Linn LVX Plus/Linn K9 front end, Musical Fidelity A1 amp hooked up with QED 79 strand to Rogers LS1 speakers on Something Solid stands.

I have a budget of £700 and would like to upgrade my speakers. Do you think this is wise considering my system as it stands? What price range would be appropriate – am I likely to benefit considerably from spending a great deal on models like Snell III, Monitor Audio R852MD or Rogers Studio 1A, or would it be more sensible to go for something less expensive such as Epos ES14, Monitor Audio R852MD or JBL L20T, bearing in mind that some time in the future I intend to upgrade my amplifier to the likes of a Musical Fidelity 3a/P140?

At present I am a student, the approaching year being my last. Therefore, over the next two or three years, my listening room is unlikely to remain the same. My musical tastes are pretty diverse.
G. M. RODWELL,
RUSHDEN, NORTHANTS.

You have reached a fairly crucial point in hi-fi upgrading, so before spending anything it is well worth deciding what type of sound you are trying to achieve in the long run and start building in that direction. Theoretically the aim should be to work towards absolute fidelity to the recording, but often personal tastes and the criteria used to assess sound quality lead to quite diverse paths being chosen.

There are various schools of philosophy in audio equipment and to get a taste of two or three you will have to visit more than one dealer – but make sure you do. As a starter you could visit a dealer who sells Roksan, one that majors on Linn (perhaps

alongside Naim) and another that stocks Voyd/Rock turntables (the latter harder to find but probably worth the effort). Ask each to demonstrate a complete £2-£3,000 system of their choice based on those front ends and see which seems the most realistic. Using recordings of acoustic music makes this job a lot easier as you will have some idea of what a piano, for instance, actually sounds like. Once you have decided which of those approaches appeals to you, choose the loudspeakers that are most appropriate to your long run aspirations.



Townshend Rock/Excalibur – one path to audio enjoyment.

A more straightforward and specific answer is: replace the LVX with a Rega RB300 and audition Snell Ks, Musical Fidelity MC-2s and Monitor Audio 852s using a similar source and amplifier to your own. If you've anything left over try out a Goldring Eroica L moving coil cartridge, which is something of a bargain at £90.

UNBIASED

I recently replaced my 20 year old hi-fi with a Linn Sondek/Ittok/K9 based system, and I am concerned about the arm. After it was set up by the dealer and meticulously installed by me on a Target audio table, I decided to give it a spin with my test record – HMV's *The Enjoyment of Stereo*. At the track which tests bias the arm swerved rapidly toward the centre of the disc, bias compensation being set at the same value as the tracking weight (1.7g). I readjusted the setting until the cartridge remained in the centre of the ungrooved section, which pushed the bias up to three, almost as high as it will go!

I queried this with my dealer; he expressed a dislike/mistrust

of test records, and said that as long as it sounds musical, that's all that matters. On this basis I played an ordinary record with bias at 1.7. The moment stylus hit vinyl the arm swerved toward the centre again, missing the first few notes of music, and the sound was distorted with considerable channel imbalance. Returning bias to 2.9 corrected this and considerably improved sound.

This arm is applauded again and again in the hi-fi press, and my retailer tells me it is highly quality controlled. Is this a common problem, and what can be done about it?

A. R. BEVAN,
BRISTOL.

This is indeed an unusual problem and not one that we have encountered with the Ittok before. The ungrooved part of a test disc should require the least amount of bias compensation. Our assessment is that either the bias compensator is significantly miscalibrated or there may be additional unwanted cable torque. Linn are better qualified to help you, so we have forwarded your letter to them. Their reply follows:

LINN'S REPLY

Unfortunately it is not possible to test the bias on any tonearm when it is dropped onto the smooth section of a test record.

The very tip of the diamond is seldom polished and the final shape will affect the final force which the arm will experience pulling it into the centre. I am hardly surprised, therefore, that Mr Bevan had to increase the bias to a setting of three to prevent the arm moving to the centre.

The bias required for any given cartridge is dependent on the stylus shape as well as the tracking weight. To this end, we have selected a bias equivalent to one tenth of the tracking weight at the outside grooves, increasing to one fifth at the inside grooves. This setting is suitable for most elliptical and vital shaped cartridges. Every arm has this setting tested at our factory.

ALLAN GIBB,
LINN PRODUCTS, GLASGOW
Continued on page 24

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

HI-FI CHOICE, MAY 1988.

CD-73.

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

HI-FI NEWS & RECORD REVIEW, APRIL 1988.

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

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NEW HI-FI SOUND, JUNE 1988.

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ARM CABLE CAPERS

I read with interest your *Focus on Tweaking*, especially with regard to arm rewiring, as I own a *Xerxes/RB300/AT OC-7* front end. The point that prompted this enquiry was that you found the upgrade improved detail (information?) and ease of vocal intelligibility, a factor that still doesn't seem to have improved in my system despite many upgrades. (I accept that this problem is often not open to improvement due to the actual quality of the recording.)

I am now contemplating a rewiring job on an *RB300*, but will probably buy a secondhand arm for the job (in case of accidents) I had thought of using van den Hul *M557* internal arm wire and *D502* tonearm cable. Would these offer the improvements you suggest? Roy Gandy of Rega suggests that changing wiring would reduce dynamic range and change tonal balance.

I have no experience of setting up a *Xerxes* and don't feel my dealer, the Sound Organisation in York, would be willing to undertake the job after my experiments, though this is no criticism of them. Is there any precise information available on setting up a *Xerxes*?

GARY RICHARDS,
WAKEFIELD, W. YORKSHIRE

I used a silver van den Hul internal arm wire to rewire my arm, and am definite that this produced all round sonic improvements, the dynamic range being extended rather than reduced with no obvious change in tonal balance

Since then I have come across Audionote interconnects (reviewed in issue 59, June) which work very nicely. Audionote also produces internal arm wire which is used by Helius amongst others, and may well represent an improvement over the vH. It is distributed by Audio by Design who will be able to point you to a dealer that stocks the stuff - call (0273) 601544.

As regards setting up the turntable after the operation, I should imagine the Sound Organisation would, for a reasonable fee, be prepared to carry this out despite your

anarchic tamperings. However, the job of deck set-up would be easier if you could devise an alternative external/internal wire junction that fitted into the arm base. I managed to do this with a modified female DIN plug, but that's another story - JK.

SHORTED AND SWEET

In a number of your compact disc player reviews your reviewer has referred to using a 'shorting plug'. This infers the use of a phono plug with outer and inner cores connected.

I have spoken to quite a number of 'good' dealers and they have never seen one as such. One said Philips put them in with some machines but Philips deny this.

Is there a purpose made plug available from somewhere or is this a DIY job? If the latter is the case, how's it done?

P. ANDREWS,
LEEDS.

Martin Colloms has mentioned that the sound quality of certain CD players can be improved by shorting unused digital output sockets. However, this doesn't apply universally and could damage certain players, so only try it with the players that he has suggested.

We don't know if anybody who markets such devices but most phono plugs can be converted to the task quite easily. All that's required is that the signal (pin) and earth (surround) elements of the plug are linked together electrically, which can be done by soldering a short piece of wire between them.

HAVE I GOT IT RIGHT?

Being a product of the 'sixties when a *Leak Delta 70*, *GI75* and *Goodmans Magnums* seemed to be all I wanted in life, and subsequently retiring to a B&O music centre, I have since rediscovered music!

I took the plunge into 'hi-fi' with a system which I am finding hard to tune my ears to. It consists of a *Linn LP12/Ittok/K9*, *Rotel RA870BX*, *Celestion SL600s* and ancillaries from the larger oriental manufacturers.

I listen to a variety of music from Beatles to Bach, with a preference for Van Morrison, the

Eurythmics and so forth. I am happy with the tuner and cassette deck even though these are so called budget models. However, I am wondering whether my ears are at fault, as the *LP12* and *CD* player just don't seem to be giving me the sound that I hoped I would get. Is it my ears or the system?

I do have an *Ortofon MC10S* and wondered whether it would produce a more rounded sound. The *SL600s* just don't seem to be able to reproduce that sound I remember from the 'sixties. Can you advise me where I might have gone wrong - if indeed I have?

GEORGE PERRY,
CAMBERLY, SURREY.

This sounds like a craving for nostalgia to me. If you really want to get that 'sixties sound, get some 'sixties equipment and some 'sixties ambience and mellow out, not forgetting the Grateful Dead records of course. Unfortunately (or otherwise) we are now in the hard hitting 'eighties, and have sound systems to go with our synth pop records. Some call this progress, and to an extent the standard of fidelity available from reasonably priced equipment has made some strides in the last twenty years. But I can understand your craving for a more relaxed sound.



The London (née Decca) Maroon, a passionate fire-breathing cartridge.

In the SL600s you have picked a loudspeaker that is devoid of wooden box colorations, and therefore unlikely to ever sound like a pair of vintage Goodmans. Although the Celestion is undoubtedly a high fidelity loudspeaker, is that what you are after?

You do, however, mention that you like the sound from tape and radio, so perhaps there's some hope. The difference between these two sources and the two you dislike is basically one of

fidelity to the original recording - the turntable and CD player are much stronger in this respect than the alternatives (usually).

The best way of tailoring the sound to suit your taste in the case of the Linn would be to change the cartridge, the MC10S may do the trick - try it. But something like an A&R E77Mg, a Shure ME97HE, or if you're very brave a London Maroon will give a warmer, and in the case of the latter especially, a more emotionally involving sound.

Making the CD player more palatable may be less easy. One criticism that is often levelled against this medium is that it lacks that certain je ne sais quoi that makes music enjoyable - a certain intangible musicality that is nothing to do with silent backgrounds or flat responses. Something that us analogueophiles have been wittering on about since the introduction of the silver disc, and for that matter digital recording (boo, hiss).

But getting back to your situation, there are almost grounds here for a good quality graphic equaliser. However, that would be expensive and goes against the grain somewhat. Perhaps experimenting with interconnects would help, as might using damping on the disc and Sorbothane feet, or proper support furniture under the player. If you're really desperate you might try some of Peter Belt's anarchic products.

But I suspect you are one of the many who enjoy the romance, nostalgia, soul, call it what-you-like in music, and CD may be incapable of supplying this. You could always sell the player and buy some more vinyl...

EDITOR'S NOTE

Due to the amount of work involved in putting *Hi Fi Choice* together we are unable to answer personally all the enquiries we receive. The letters we select to answer and publish are those which we think will be of interest to the majority of our readers. Therefore the more illuminating and unusual your correspondence the more likely it is to appear in the magazine.

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PERSPECTIVES

Recording engineer Chris Rice contrasts the world of professional audio practice with the trends in hi-fi. In major studios, it seems, new technology has taken over.



The

STUDIO

Effect

Do you realise just how little control you have over the sound that comes out of your hi-fi system? No matter how carefully components are selected to produce the sound that most appeals, you are necessarily at the mercy of the engineers who made the recordings, and the equipment that they used. Whatever they decide sounds good is what you hear, whether you like it or not. This is a (necessarily) brief survey of the current methods, attitudes and equipment used by those responsible for these recordings.

There are as many different ways to make a recording as there are recordings made. For a classical orchestral recording, the microphone technique used is of paramount importance in determining the sound. Some engineers opt for a 'minimalist' approach, picking up the sound from an ideal point in the hall, chosen by calculation, experiment and experience.

Ideally only two microphones need be used, with a minimum of 'spotting' (spot-

lighting, by analogy) with closer microphones if necessary. This method relies on good hall acoustics appropriate to the type of music, sufficient time being allotted for experimentation at the recording session (this is all too seldom possible these days, at least for large-ensemble works), and high quality equipment.

The technique is also highly critical of microphone quality as one needs to discriminate mercilessly between those with good phase response and those designed primarily with other criteria in mind. The Calrec *Soundfield* microphone is frequently used in this manner, but measurement specialist Brüel and Kjaer has recently introduced a series of studio microphones admirably suited for this application, selling matched pairs for this purpose.

At the other end of the spectrum is the multi-microphone technique which rose meteorically in popularity during the 1970s and is still predominant today. This has the advantage that an acceptable (if artificial) balance between instruments can be quickly and easily achieved – even where the ensemble is incapable of a satisfactory internal balance in real life. To some extent the conductor is therefore relieved of full responsibility for the balance between sections (though why it should be necessary to relieve a musician of his creative responsibility has always escaped me). The sound is manufactured according to the producer's ideal, in a manner analogous to rock and pop recording.

These days rock and pop is almost invariably multi-tracked, mixed and remixed using effects like harmonisers, compressors, reverb, echo and sampling 'synthesis'. The sophistication of these devices and the degree of signal processing available has to be seen to be believed, and their development is now central to the professional equipment industry. Mind you, I was interested to see a chart single recently advertised as being free of synthesisers, drum machines and electronic manipulation (it'll never catch on!).

Jazz is also frequently recorded using multi-track and close- or contact-mike techniques, producing a kind of 'studio

synthesis'. This is something of a shame as these techniques sit uneasily on a form of music that is fundamentally acoustic and 'live' in its very nature.

ANALOGUE OR DIGITAL?

I have news for those who still believe that there is an analogue versus digital debate. In the mainstream professional world, there isn't, and there hasn't been for some time. Analogue tape machines are still made by Studer, Otari, Lyrec and others but these latest generation machines sound worse than their simpler predecessors in my opinion. They have excellent technical specifications – frequency response and so on – but process the sound fed into them to an alarming degree. The only genuine advance offered over earlier models is in ease of setting up, control logic and edit-point locating facilities.

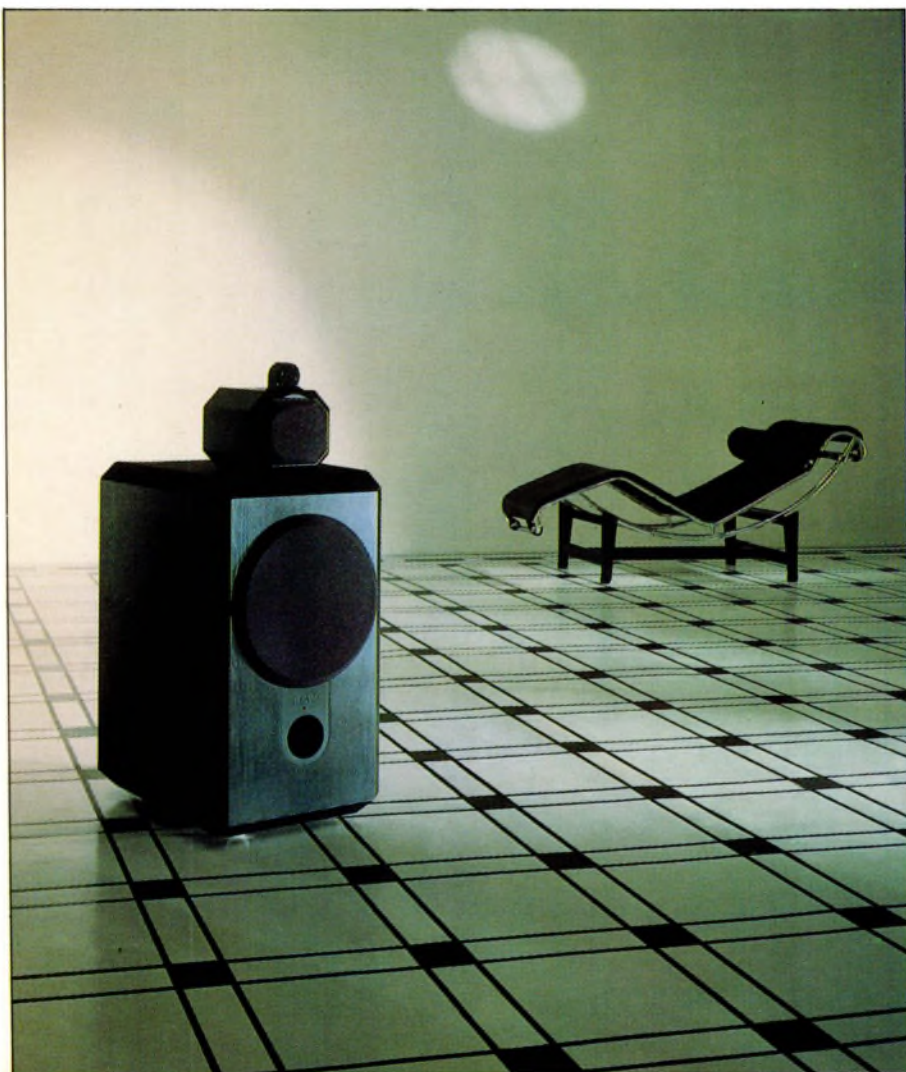
Rock producers who 'prefer the sound of analogue' frequently mean they're deliberately using tape saturation as a special effect, and will quite happily use these modern machines both for multi-track and two-channel mixdowns. Meanwhile the idea that the best possible sound quality can be obtained from analogue tape recorders has been left to small independent businesses which modify and rebuild old machines – produced to individual order by such as Tim de Paravicini (UK), and Mark Levinson and Keith Johnson (USA).

Digital now holds sway. For one thing the public has voted with its feet and marched straight into the CD camp – classical music LPs are becoming increasingly difficult to sell. Interestingly, however, vinyl disc cutting rooms are as busy as ever, albeit using no new technology.

CD's domination of the market has necessarily brought about a digital-obsessed professional world, and like all the best chicken-and-egg situations, this one has matured into a nice little vicious circle. The industry standard for CD mastering is Sony's *PCM 1610* system. If CD is the norm for the end product, then nobody really has any incentive to master onto anything else any more.

Synclavier digital system: the sophistication has to be seen to be believed.

Bowers & Wilkins' 801, found in many hi-fi enthusiasts' homes, is widely used as a classical monitor by both major and independent record companies.



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At long last we have received delivery of the new Creek amplifier. The 4040 S2 is £159.00 and is a radical improvement over the already highly acclaimed 4040. It has a significantly improved power supply and also includes a new protection device.

Naim have released the Nait 2 amplifier. Nicknamed here "our flexible friend" it is small, integrated and reasonably priced at £326.00. It has extra inputs and is able to be converted into a pre-amplifier for use with larger power amplifiers for upgrading.

The big surprise is the release of a new power amplifier from Linn Products which replaces, and sounds dramatically better than, the LK2-75. The LK2-80, which will cost £595.00, is not a modification but a completely new amplifier. As always with Linn equipment we are able to upgrade current models by replacing both main boards and heatsinks at an exchange price of £299.00.

At last we have heard two Japanese amplifiers worth carrying. The Denon POA5500 / POA. 600 pre-power combination costing £1850.00 and the Marantz PM 94 integrated amplifier at £1000.00.

A baby brother is born to the successful Linn Nexus speakers. It will be called the Helix, will cost £250.00 plus stands and is well worth a listen.

In the tradition of trying to get a big sound from a small speaker the Acoustic Energy AE1 speakers exceed anything we have yet found. They combine the need to be articulate and delicate at low levels with the ability to go extremely loud without becoming hard or brittle.

Development of the Naim IBL loudspeakers followed naturally from their research into the more expensive SBL. Smaller and more simple it brings elegance and reality into your listening room.

Finally although it has been available since its launch here last October the Linn AKTIV system sets a new standard of musical performance at, for an active system, an affordable price. If your Isobariks are under a year old we can probably convert them to PMS free when we install the active system.

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Intended originally for the domestic market, Sony's PCM-F1 found favour with many studios. Sony's professional DAT recorder, the PCM 2500, can record at both 44.1kHz and 48kHz sampling rates. The TCD-D10 portable is highly compact. As far as professional engineers are concerned, DAT machines are a delight to use and running costs are low.

KEF's enormous KM1 loudspeaker employs eight on-board power amplifiers with a combined output approaching 1.6kW! Around 100 recording studios worldwide use KM1s for monitoring.

Another reason for the digital revolution is the proliferation of cheap digital recorders. The first of these was the *PCM F1* processor, used with any Betamax video-recorder, which offers comparable quality (pros and cons considered) for about £1,500 to contemporary analogue machines costing several times as much. The *PCM F1* was not the major retrograde step that many of the anti-digital brigade declared it to be; granted it changes the input signal very perceptibly and sounds less than wonderful, but so do most commercial audio electronics.

The *F1* was originally introduced as a domestic format for the audiophile market – a modern alternative to domestic open-reel, which effectively died a natural death some years ago – although very few *F1*s were actually sold on the domestic market.

The *F1* processor is used in conjunction with a rotating head system, a Betamax video recorder. The connections use phono plugs like a domestic hi-fi component, and the on-board microphone inputs are a joke – effectively using the same circuitry as Sony's cheap cassette machines of the time. Most professionals utilise the line inputs instead, or modify the machines.

Clumsy to use and having very slow and basic locate facilities – we all know how long it takes to wind through a video tape – it found favour with many studios for compactness and quality-per-unit-price considerations. So many *F1*s (and *501*s and *701*s – same format, different packaging) have been sold that the format will certainly be around for some time to come.

Sony (and others) have recently introduced DAT (digital audio tape) recorders, also nominally aimed at the domestic market (nominally outside the UK) in which they have significantly failed to take off. DAT is much more carefully thought out than *F1*, using a dedicated cassette transport (the cassette is somewhat smaller than the familiar Philips Compact Cassette) rather than riding awkwardly on existing video technology.

The advantages of DAT over *F1* as a studio standard are considerable. There are several machines now on the market, ranging from the 'professional' £3,000 Sony to the recent £750 Casio and £1,400 Sony portables. The £1,200 'domestic' Sony is the machine that most studios have opted for so far. Functionally very similar to the professional version, it offers most of the

facilities of the more expensive machine, but differs in its capabilities for interfacing with other professional machines.

Domestic DAT records at a sampling frequency of 48kHz and the CD format samples at 44.1kHz. Whereas the professional *PCM 2500* offers both, the reason for restricting the domestic version to the 'wrong' frequency is to prevent direct digital domain piracy from CD. However, it is apparently quite easy to convert domestic machines, and such modified machines, effectively recording in CD-compatible format, are likely to be available soon from small pro industry specialists (not Sony itself), and at a price lower than the professional Sony model.

In any case, DAT looks set to become the new industry standard for digital session recording. The machines are quite delightful in use, one or two small grievances apart (*why* can't you monitor the input signal without putting a tape in the machine?). Running costs are a very low £5 or so per hour (compare *F1* at £3 per hour, 1610/1630 U matic at £30 per hour, and decent quality analogue at £40 per hour). Very rapid access is available to any point on the tape – spooling time from one end of a two hour tape to the other is about 45 seconds. A very useful 'position locate' feature allows individual takes to be numbered as they are recorded (or indeed subsequently), and then dialled up and automatically located.

Opinions vary as to the sound quality of DAT. Most people seem to agree that it is not as good as *1610* but better than *F1*. I have seen a convincing demonstration of the fact that loss of digital information due to tape deterioration with time and repeated playings is significantly lower with DAT than with *F1*. The only major disadvantage at the moment is that editing is not yet possible with DAT.

For the moment, studio session masters have to be transferred to *1610* format for editing. Effectively this means that any recording mastered on DAT has to undergo the loss of sound quality inherent in any standards change. The advantages are popularly seen to outweigh the disadvantages, and DAT looks set to become the next industry standard for low-cost digital session recording.

In parallel with and complementing these rotating-head, two-channel systems, there has also been much development of stationary-head digital systems. There are currently rival incompatible formats from Mitsubishi (PD or Pro Digi) and Sony/Studer (DASH, digital audio stationary head). These formats facilitate the familiar multi-track recorders unavailable with rotating head systems, and with more tracks available allow even greater flexibility than equivalent analogue systems – albeit at a price. The other advantage of DASH and PD is that traditional razor-blade editing is possible. While cruder than the *1610* assembly edit system which

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copies two tapes sequentially to a third, razor-blade editing is much quicker and more familiar to editors brought up on analogue.

THE HI FI CONNECTION

The equipment outlined so far, together with increasingly enormous and complex mixing desks represent the greater part of what studios spend their money on, and have no real parallels in domestic hi-fi. However, in recent years there has been a trend for some, though not all, professionals to accept that the criteria of real hi-fi (predominantly sound quality) are worth considering.

There was a time when, most studio personnel regarded a piece of wire simply as a piece of wire; all amplifiers sounded the same (and were selected for robustness, reliability, and power output); and monitor speakers, provided that their sonic characteristics were familiar, had to be capable of producing high sound pressure levels without distortion and not much else (An honourable exception to this philosophy was the BBC, who took classical recording seriously enough to develop the excellent *LS5/8* monitor, which is both very neutral and goes loud.)

The idea of objective accuracy in rock monitoring was regarded either as irrelevant, or at best an unapproachable if desirable ideal. But these days names like B&W and KEF have joined Tannoy and JBL in the professional market. B&W's *801* is widely used as a classical monitor by major and independent record companies alike (as is the Quad *ESL63*). It looks, and functions, like a large hi-fi speaker, and is tonally very accurate over a reasonable proportion of the frequency range. B&W have recently introduced a new version, the *Matrix 801*, now in use by the BBC and others.

KEF introduced the *KM1* a few years ago, with the help of the BBC's *Radio 1* Maida Vale studios as an accurate speaker capable of the high SPLs demanded by rock recording engineers. Far too large for a (European) domestic loudspeaker, it nevertheless came about as a result of the same engineering research that underlies KEF's hi-fi loudspeakers. From outside the normal establishment, an interesting recent arrival is the Townshend International *Glastonbury* which has been used for monitoring several classical sessions with great success.

The myth that 'all amplifiers sound the same' is no longer acceptable to any serious hi-fi enthusiast, and the sonic performance of amplifiers used to drive the cutting head in LP manufacture, for example, would not normally be countenanced in a respectable hi-fi system. Admittedly these are designed with a diffe-

rent set of criteria in mind, but we have now progressed beyond the point at which such criteria need be incompatible with sound quality.

There is now a disc-cutting studio in London which uses valve amplifiers throughout, designed and built by specialist UK manufacturer Esoteric Audio Research. Discs mastered at this studio have an unprecedented strength and clarity of sound when compared with the product of conventional cutting rooms.

In contrast to the situation a few years ago when, for example I went into a major New York studio and found the main JBL monitors connected up with 6amp bell wire, the importance of cable quality is now accepted by many professional sound engineers. Balanced-line cables with oxygen-free copper conductors are being offered and advertisements in the press exhort customers to "wire up your studio with the best sounding cable available". All but the most sceptical of the old school admit that this is a case of the professionals learning from the audiophile fraternity.

WHITHER PRO AUDIO?

So where is professional audio going next? A visit to the annual APRS (Association of Professional Recording Studios) exhibition in June showed that the mainstream emphasis is now on control systems, signal manipulation and synthesis. I saw very little that could be related specifically to the high-quality recording of acoustic music which is taken to be a completely understood art (it is not).

Digital recording, of one sort or another, is now accepted as the norm and the new products are huge mixing desks, allowing ever more sophisticated routing and re-routing of the signal through effects units of extraordinary cleverness, with an unprecedented degree of automation control over multi-track mixes.

As they become larger and more complex, mixing desks are increasingly equipped with motorised faders and other aids to rapid setting up and control presetting. The number of individual controls is simply too large for an individual engineer to handle in the traditional way. Recognising this, certain manufacturers have started putting all the functions of a mixing desk onto computers, implementing control of the signal in the digital domain. Levels, equalisation and other parameters are adjusted by means of a keyboard or with an interactive screen, mouse and cursor or suchlike.

This new series of studio tools is still very much at the development stage, but it links up very strongly with the other major preoccupation of the industry – synthesisers. These too, are becoming more and more sophisticated and versatile. It is now possible to sample a sound digitally, obtain an immediate graphic display of its frequency components on a screen, and then, by touching the screen with a finger, change the harmonic structure of the sound. Many of the latest generation synthesisers have onboard hard-disk recording capabilities (borrowed from computer technology) and some will even deliver printed copy of music composed on them. Advancement and refinement of synthesiser technology is now the area in which most research and marketing time and money are being spent.

Whether this has any real relevance to the sounds that you go out and buy in your record shop is debatable. And it is a little worrying to speculate that now that we have opted for a common denominator home reproduction system – CD – the opportunities for more fundamental research into areas directly affecting sound quality may be missed for ever, despite the efforts of a small band of dedicated enthusiasts who will always be at the mercy of the major trends in the industry.



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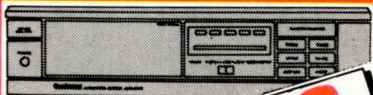
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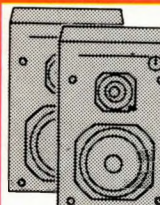
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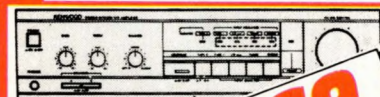
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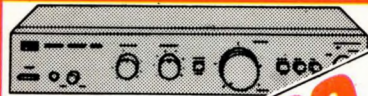
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MARKET RESPONSE

In our exclusive market survey this month Dan Houston reports on the amplifier market summarising dealers' opinions on matters such as reliability and consistency.

What has happened to the British? If you are intending to buy hi-fi at the moment it's likely you're a little different from your next door neighbours. The first survey response I heard this month was that hi-fi has sunk, nay plummeted, to number 14 on the 'items-wanted' list for people in this sceptered isle. The information came from Nigel Crump, of Path plc, who had noted it from a financial magazine. To rub the point in he added that we now want a barbecue set more than hi-fi.

However, the situation in the rest of Europe, where civilisation still seems to flourish, is very different with audio equipment being around number four on the list of desirable possessions. Just why people here want to look silly in butcher's apron and funny hat, forcing polite friends to eat burnt food before being driven inside by the rain anyway, is beyond me. Why do the ten days of frugal summer here hold such an appeal that we are willing to let the rusty Bar-BQ utensils be an eyesore before we give our ears any sweetness? (*Answers on a postcard please.*)

Having got that off my chest, there is some activity in the hi-fi trade even in the summer, and there seem to be a few interesting happenings in the amplifier marketplace at the moment.

This month's *Market Response* feature is based on the market during the six months before July. We received replies to our amplifier questionnaire from 40 dealers covering 69 brands. The aim is to be representative by approaching as many dealers as possible; though if anyone wants to be regularly consulted then we do so. The survey complements the main review topic in the magazine but while a review can accurately examine a given product, it cannot examine reliability (beyond build quality) and cannot comment on consistency. Although sound quality is and should be the premier consideration, reliability

is important in letting you enjoy that consideration. It's these things which *Market Response* essays to do, while including a best seller list and a distillation of dealers' comments.

TAKEAWAYS

If you are in the market for an amplifier at the moment it may prove difficult to assess accurately how it's going to sound when you get it home. Room environments affect the sound of equipment just as much as the components themselves (some might say more), so how do you know how it will perform in your listening room? One dealer we spoke to is trying to get around this discrepancy by allowing his customers home trials of all equipment. Many dealers will let you take expensive equipment home but Pure Sound in Merseyside say they will do it for a budget amplifier.

Carl Woodward, who runs Pure Sound, said people didn't have the time for an audition, so the basics were done over the 'phone and he would then lend the potential customer equipment for a couple of days. While expensive to run, Carl says his takings with the new system are up by 28 per cent (on a 16 per



A few spare ribs: Quad's 306 is the power partner of their 34/306 best-selling combo.

cent forecast anyway) from the same time last year. Pure Sound say service now has to take the retrograde step of going to the customer rather than he or she having to decide in unfamiliar surroundings. The system, made possible by an answerphone and dedication, hasn't run into any snags, although they once took some equipment to an eleventh floor council flat which looked as if no-one lived there; "we decided it would be best to give that a miss!"

VALVES AND CD

Several retailers told us that valve amplifiers were becoming more popular, even among younger buyers. One dealer said that 60 per cent of his amplifier sales were valve amps in the £1,000 plus category. One of the reasons proffered was that the valve sound – famous for its sweetness – was a very good companion for CD, which is criticised for its brashness.

The tubes used in valve amplifiers have a finite life and dealers generally recommend they are left on if they are used often. This keeps the amplifier warm and prevents the harmful current surge when switching on from cold which will shorten the valves' life. Jarvis Woolgar of Stereo Hi-Fi Installations pointed out that a light bulb, if left on, would last about five years. "It's switching the thing on and off that shortens its life," he said.

Another reason for leaving valves on is for sound quality; "the hotter the better", we heard.

Tube damping rings made of Sorbothane, such as those made by Audioquest were also recommended by dealers who say they stop the glass ringing and improve sound quality.

RELIABILITY

Amplifiers are now much better in terms of sound quality and reliability than, say, four years ago. The component industries have made many improvements over this period so just over three per cent of amplifiers arrive from the manufacturer as faulty according to our calculations (This is almost the same as the figure for the first market survey on amplifiers before Christmas.) One dealer summed it up saying: "we're now confident of what

we're pushing out whereas it used to be a lottery.

One dealer pointed out the importance of using compatible cables with an amplifier mentioning that with Naim amps in particular, Naim cable was about the only thing suitable. Unaware customers "had had transformers buzzing away like motorbikes" because of the incompatible impedances with their Naim and a 'foreign cable' he said, adding that in the worst circumstances the wrong cable could blow a Naim up.

A complaint, levelled at amplifiers in general, was that many were not properly protected from shorting which could occur when loudspeaker cables were run under carpets. The problem, of course, is not with your carpet, unless it's the new chain mail pile, but with the carpet grips which can cut into the cable. These grips apparently cause Stereo Hi-Fi Installations much trouble. Only Quad allows for such accidents without damage, they said; with most amps the damage was done by the time the fuse had blown.

From our dealers' answers we calculated the best and worst brands for reliability. The best was A&R Cambridge with 61 points, followed by Quad with 57, Naim: 39, Marantz: 31, NAD: 30 and Audiolab: 29.

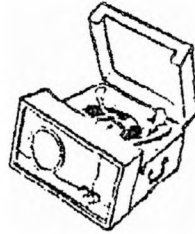
Dealers were reluctant to talk about unreliability and 11 gave no comment. But from those who did we calculated Cambridge Audio had 52 minus points and Musical Fidelity minus 30.

One of the complaints about Musical Fidelity was that they make such hot amplifiers that in some extreme cases the control knobs had actually melted!

Of these results Audiolab and Naim come out particularly well, although they were stocked by fewer dealers (14 and 10 respectively) than the others.

Of course these results don't mean that if you buy another amplifier it is necessarily unreliable; the nature of the survey means that it can only

sale



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cover the well-known brands. For instance, Bryston and YBA amplifiers both received enthusiastic praise on reliability, though we have them as only being stocked by one dealer each.

If you 'short' your amplifier, or burn it out the average repair time is 2.8 weeks if the dealer has to send it back to the manufacturer. However, many dealers promised 48-hour repairs if they had the parts in stock. And generally they did not have the equipment for more than a week. The fast repair manufacturers were given as Quad, who apparently take less than a week, Naim, Rotel, A&R, QED and Linn. Slow manufacturers were cited as NAD, Musical Fidelity and Hayden Labs (who import Denon).

CONSISTENCY

Sound quality consistency from batch to batch of equipment demonstrates an exact approach on the part of the manufacturer to his task. It's difficult to assess because it relies on the different elements in the system as a whole and also the room environment. It doesn't follow that even if you get the exact replica of your friend's system that you will reproduce the sound exactly. However, dealers are listening to equipment day-in and day-out so we asked them for their comments on consistency in the various brands. Although ten dealers could not be drawn on the subject Quad came out best with 66 points followed by A&R (35) and Naim (33).

Inconsistent brands (only half the dealers answered this one) were calculated as Musical Fidelity (minus 19 points), Cambridge Audio (minus 14) and Marantz (minus 13)

CABLE AND WIRING

The number of companies making a living from selling loudspeaker and interconnect cable shows how much interest this area has generated over the last few years. And while QED 79 strand remains the most popular

brand with the dealers several other names are coming to the fore - Monitor PC and Audio Technica's OC-OFC being most mentioned.

In Hi-Fi told us that a system could be tuned with interconnect cable (most commonly between CD player and amplifier). If the sound was too bright they might suggest some *Thunderline* cable, whereas Audio Technica's LC-OFC (Linear Crystal Oxygen Free Copper) could be used to brighten up a dull-sounding system. Several dealers are now selling cable or interconnect as a cost effective upgrade, and many said they could demonstrate the difference.

In Hi-Fi said the most magical cable for them was the silver braided *Mandrake* which at £250 a mono-metre was a "very significant upgrade in comparable systems". The sound "expands and opens up - you can see into it" was how they described the addition of this "fairly expensive" accessory.

THE BEST SELLERS

We gave dealers three price ranges and asked them for their three top-selling integrated amplifiers (or pre and power combinations) in each category.

The results are calculated on a points basis; five for the first, four for the second and three for the third and added up.

Budget, below £150

- 1) Denon PMA 250 83
- 2) NAD 3020E 58
- 3) A&R Arcam Alpha 52
- 4) Rotel KA-820A 49
- 5) Creek 4040 37

Mid-Price £151-£300

- 1) Cambridge Audio P40 47
- 2) A&R Cambridge A60+ 35
- 3) Rotel RA-820BX3 33
- 4) NAD 3130 28
- 5) QED A240CD/III 25

Over £301 (inc separates)

- 1) Quad 34/306 68
- 2) Naim 62/140 35
- 3) A&R Delta.90 29
- 4) Audiolab 8000A 23
- 5) Linn LK1/LK2 20

The results of this survey are only as representative as the comments from 40 dealers can be. We don't pretend the above information is an exact representation. The survey is a poll and should be regarded as such.

PARTICIPATING DEALERS

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

- A. Fanthorpe Ltd, Hull, Humberside.
- Analog Audio, North Finchley, London.
- Andrew Thomson, Kirkcaldy, Fife.
- Aston Audio, Alderley Edge, Cheshire.
- Audio Insight, Milton Keynes, Bucks.
- Bartletts Hi-Fi, London N7.
- Brentwood Music Centre, Essex.
- Cambridge Hi-Fi, Cambridge.
- Chew and Osborne, Saffron Walden, Essex.
- Chichester Hi-Fidelity, Chichester, W. Sussex.
- Cloney Audio, Blackrock, Co Dublin.
- Doug Brady Hi-Fi, London WC2.
- Eastwood Ltd, Leicester.
- ENI, Nottingham, Notts.
- Eric Wiley, Castleford, W. Yorks.
- Gilson Audio, Middlesborough, Cleveland.
- Grahams Hi-Fi, London N1.
- Hampshire Audio, Chandlers Ford, Hants.
- Horns of Oxford Ltd, Oxon.

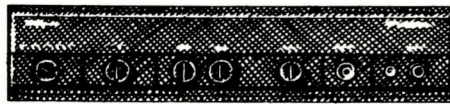
- In Hi-Fi, Edinburgh.
- Lyon Audio, Stanway, Colchester, Essex.
- Nick Dakin, Nottingham.
- Norman Audio, Preston, Lancs.
- Now That's Hi-Fi, Portsmouth, Hants.
- Paul Green Hi-Fi Ltd, Bath, Avon.
- Pro Musica, Colchester, Essex.
- Pure Sound Ltd, Birkenhead, Merseyside.
- Radlett Audio Consultants, Radlett, Herts.
- Rogers Hi-Fi, Guildford, Surrey.
- Sounds Exclusive, Cranleigh, Surrey.
- Standens (Tonbridge) Ltd, Kent.
- Stereo Hi-Fi Installations, London W14.
- Stereo Stereo, Glasgow.
- Subjective Audio, Palmers Green, London N13.
- The Audio File, Bishops Stortford, Herts.
- The Cornflake Shop, Windmill Street, London W1.
- The Music Room, Glasgow.
- University Audio, Cambridge.
- Uxbridge Audio, Uxbridge, Middx.
- Zeus Audio, Dungannon, Tyrone.

NB Any dealer who feels aggrieved that he is not on this list, and would like to be consulted in future, either regularly or intermittently, please write to us at 14 Rathbone Place, London W1P 1DE, or telephone 01 631 1433.

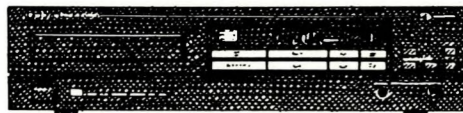


Three of the best-selling amplifiers from the dealers we surveyed.

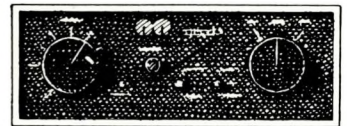
WITH SO MUCH EXCELLENCE THERE'S STILL A LITTLE



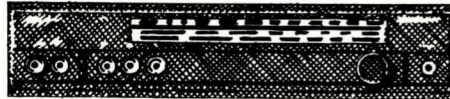
Arcam Alpha Amplifier



Nakamichi OMS-4E C.D. Player



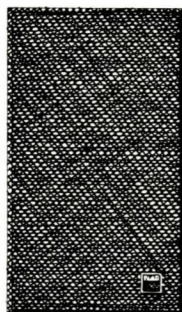
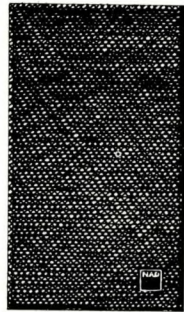
NAIM NAC 32-5 Pre Amp



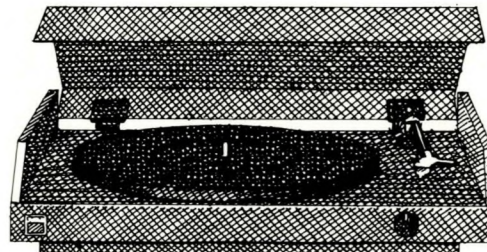
Arcam FM/LW/MW Tuner



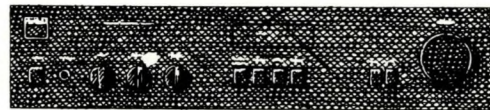
NAIM NAIT 101 FM Tuner



*Sennheiser HD450
Headphones*



NAD VP (vinyl playing) System



Audiolab 8000P Power Amp



Marantz SD35 Cassette Deck



Audiolab 8000C Pre Amp



Heybrook Point Five Speakers



*Alphason Delta
Tonearm*



Ariston Q Deck Turntable



Mission. Nakamichi. Naim. Quad. These are just a few of the very best Hi-Fi names that fill our showrooms at Auditions. But what's in a name unless you can compare and contrast it with other names first.

At Auditions we've got special demonstration studios where you can do just that. Where you can give our equipment a proper hearing, in a relaxed atmosphere, before you make your final choice.

WALTON-ON-THAMES, 44 High Street. Tel: 0932 232393.

ORPINGTON, 200 High Street. Tel: 0689 70625.

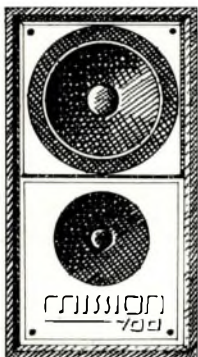
CHELSEA, 124B Kings Road. Tel: TBA. Open late September.

OPENING SOON

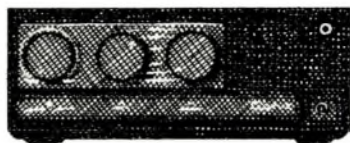
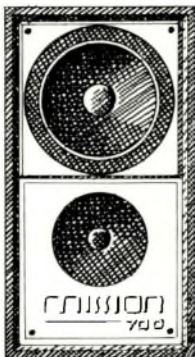
WHITHAM, Unit 1, The Grove Centre. Tel: TBA.

BRIGHTON, 89 Western Road. Tel: TBA.

T HI-FI TO CHOOSE FROM, LE ROOM TO HEAR IT.



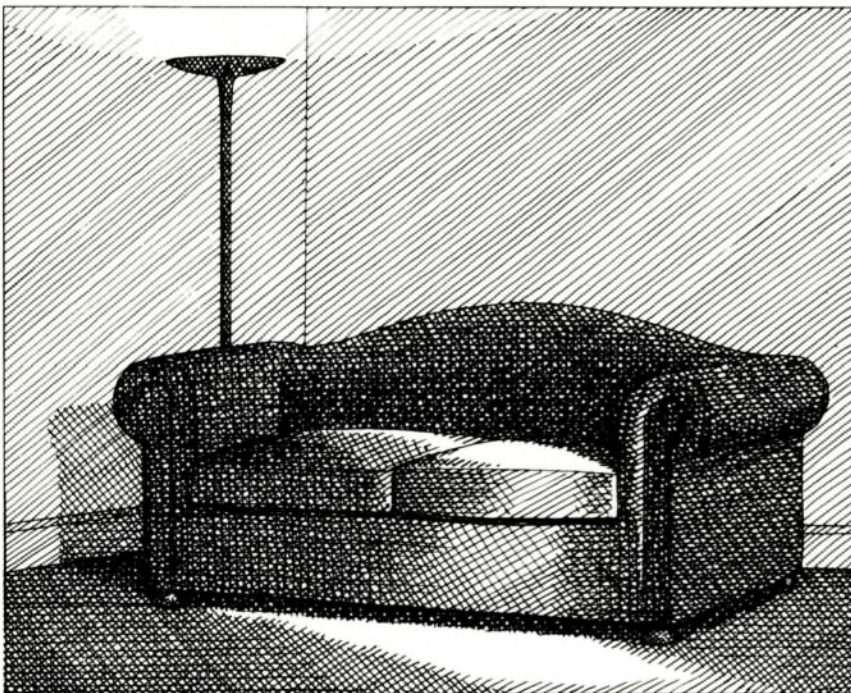
Mission 700 Speakers



Cyrus One Amplifier



Cyrus PSX Power Supply



A little room to hear it



Mission PCM
7000 C.D. Player

We've also got expert staff standing by to give you friendly impartial advice whenever you need it.

It's not often you get room service when you buy your Hi-Fi. So sit back and enjoy it.



For our recommendations on ready to run systems, we believe the following all offer excellent reproduction and value.

NAD 3020E Amplifier (20+20)
Dual CS: 503/1 Turntable*
AR 6BX Speakers
£299.95

SAVE £30

NAD 3020E Amplifier (20+20)
Dual CS: 503/1 Turntable*
B & W DM 110 Speakers
£329.95

SAVE £60

A & R Alpha Plus Amplifier (20+20)
Dual CS: 503/1 Turntable*
Mission 700 LE Speakers
£349.95

SAVE £50

NAD VP System
NAD 3020E Amplifier (20+20)
NAD 5120 Turntable
NAD 8020E Speakers
£299.95

SAVE £20

NAD 3130 Amplifier (30+30)
Dual CS: 503/1 Turntable*
Tannoy Mercury Speakers
£379.95

SAVE £50

NAD 3130 Amplifier (30+30)
Dual CS: 503/1 Turntable*
Heybrook HB1 Speakers
£389.95

SAVE £60

AR A04 Amplifier (40+40)
AR EB101 Turntable
AR 6BX Speakers
£399.95

SAVE £80

Inc. of 10m x 79 Strand Speaker Cable.

Savings shown are the difference between buying items individually.

*Add £20 for Ariston Q Deck.

Auditions

STAFF Staff are required at all levels for Auditions stores opening in Chelsea, Brighton and Whitham. Tel: 04024 43512 for details.

PRODUCT AVAILABILITY. In a few instances not all stores carry every listed brand. Please phone before making a journey.

FREE MAIL ORDER. For Auditions carriage free mail order service, contact our Walton-on-Thames store.

EXTENDED 2 YEAR GUARANTEE. Auditions offer an extended 2 Year Guarantee on all items of equipment except styli.



CHOOSING AND USING . . . AMPLIFIERS

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 compactness.

Twenty 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 valve versus transistor debate is a fascinating one, though too rarefied for much of an airing in this introduction. Where cost-effectiveness is king, the transistor still rules.

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 pre-amplifier section was a useful means of making the best of a bad job. During the Japanese invasion of the '70s, 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 was encouraged to fantasise that he was on the bridge of the Starship Enterprise. However, improvements in sources have since started a 'simply better' backlash. Ten 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 since 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-rather than upmarket products. Those who appreciate the flexibility of extensive switching and tone shaping can now take advantage of the low prices which derive from highly efficient manufacture for a mass market.

However, the real hi-fi amplifier action has been 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.

PREAMPLIFICATION

As hi-fi amplifiers become increasingly minimalist, the pre-amp 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, CD players, and what-have-you all put out more or less the same sort of signal, which is already equalised to 'flat'. Vinyl disc apart, the pre-amp then becomes little more than a glorified switch with volume and balance controls. Which explains why suchlike devices – using purely passive components and hence inherently simple – are now becoming available in the most specialist end of the market.

Vinyl disc replay is quite a different kettle of fish. The pre-amp 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 becoming accepted, with others planned for the future, we will also shortly be seeing a new type of preamp which accepts digital signals directly, carrying out various functions by means of an on-board microcomputer before finally converting the signal back to analogue before feeding to the power amplifier. Such a system should theoretically be immune from the signal degradation which has been leading the market towards simpler analogue amplifiers, and could lead to a revival of more complex preamps, though progress will be slow because any preamp section will need to handle conventional signals alongside digital for many years to come.

POWER AMPLIFIERS

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 the 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 determines the current demand.

This current demand 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 with an eye on the stability of the voltage signal whatever the current demand.

The main measurements on amplifiers relate to power output and distortion. Power is normally expressed in Watts, but we translate this into a measure of relative loudness, the dBW, which is far more meaningful. 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

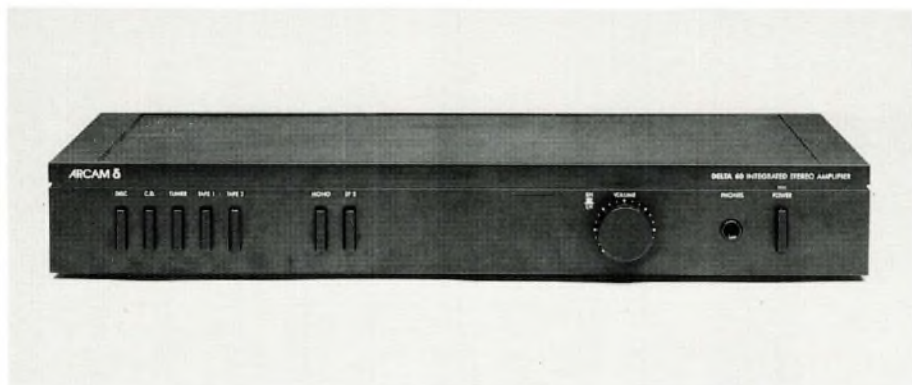
There are a number of criteria one could use when selecting an amplifier, and the most valid is probably sound quality. Despite the attention it attracts, power output comes much further down the list, because the differences between most models is not in fact that great, and measured power is by no means a reliable indicator of subjective loudness capability.

The range of facilities required should naturally be taken into account, paying particular attention to the type of cartridge being 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. While some people seem more sensitive than others to the sound of amplifiers, both pre- and power sections are fundamental to the system as a whole, because all signals pass through them en route to the loudspeakers.

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

A&R ARCAM DELTA 60

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



The *A60* amplifier has been one of hi-fi's most timeless products, in continuous production for more than a decade, and is still in popular demand – partly because it provides an island of stability amidst the ocean of budget separates changes. But there comes a time when it's impossible to resist the steady advances in production technologies, and the need to rationalise an old favourite within a broader and more up to date range. That said, the *A60* itself will continue for the nonce – nearly 30,000 examples have already been sold, and the film rights for 'Twelve Glorious Years' are up for grabs.

The £250 *Delta 60* therefore slots in neatly just above the *A60*'s price point, roughly midway between the 'budget' £150 *Alpha Plus* and the £330 *Delta 90*. The black all-metal presentation with white and blue graphics borrows styling from the more recent models while retaining the ultra-slim lines that are such a hallmark of the *A60*. The one (anti)feature that does distinguish it from previous Arcams is the absence of tone controls.

Our sample came from a pre-production batch, so there may be minor changes – indeed improvements – in final production. However, the finish was very good in any case, with attractively clean lines, a well built fascia and side panel extrusions.

A single friction-locked dual concentric knob controls both volume and balance. Adjusting balance precisely is a tricky two-handed manoeuvre, but there is bound to be some sonic benefit from omitting the extra potentiometer. Five clearly labelled input selection pushbuttons cater for vinyl disc, CD, tuner and tapes 1 and 2; another two provide mono/stereo and select the switchable set of loudspeaker terminals.

Ingenuous loudspeaker wiring is an Arcam speciality, so here we have the 'best choice' unswitched set of terminals hardwired in parallel with the headphone socket. 'Phones listeners who prefer not to disturb the neighbourhood can connect their loudspeakers to the set of terminals that can be switched off (via relays) from the front panel, while headphone haters could use the second set for a pair of remote loudspeakers in another room. The remaining rear panel connectors use phono sockets, and there is also the switch to

select MM/MC cartridge sensitivity.

Beneath the case lies a very neat internal layout with ribbon cables and a well laid out board. A large Holden & Fisher toroidal transformer feeds two 10,000 μ F, 50V capacitors sited close to the basically discrete power stages. The RIAA equalisation is part passive and a new discrete transistor circuit provides the extra MC boost.

LAB REPORT

Not too surprisingly the measured power output comfortably beats its 55W spec. and slots in neatly between *Alpha* and *Delta 90* – 2dB more than the *Alpha*, 1.5dB less than the *90*, with a similarly competent but unexceptional delivery into difficult loads. Peak current output remains more or less the same throughout the range.

Harmonic distortion does deteriorate at high frequencies, and IM distortion could be improved on the high boost MC cartridge input. The power modulation spectrogram has negligible mains related components (100Hz, -95dB), and the frequency responses show excellent RIAA accuracy with sensible rolloffs at band extremes. Low level volume/balance tracking might have been better.

SOUND QUALITY

This consistent performer made a good first impression, delivering an explicit and well ordered sound. However, the initial euphoria wore off, and the overall rating came out at a rather disappointing 'fair', CD marginally preferred to vinyl disc. It must be stressed that these results apply to a pre-production sample; A&R claim to have already improved the sound quality after having worked on refinements and the 'final polishing' of the presentation prior to launching the amplifier to UK dealers.

Soundstages seemed a bit small and narrow, rather 'dry' in terms of ambience and 'air'. The good midrange definition and dynamics is accompanied by a bass which lacks full weight and precision and a slightly 'lisp' treble character. Though one would not go so far as to describe the sound as bland, it is unexceptional. The unit plays quite loud, but with some preference for 'kind' (6-8ohm)

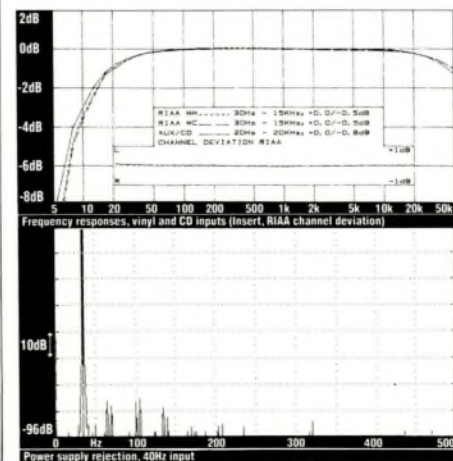
loudspeaker loads.

CONCLUSIONS

In many ways an attractive package, the *Delta 60* is well built, nicely presented and a potentially worthy successor to the famous *A60*. At this early stage of development our subjective reactions are insufficiently positive for formal Recommendation, though it is still worth considering as a versatile allrounder. It's a shame there was insufficient time for us to assess a revised sample before going to press. We'll keep you posted during coming months.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		55W (= 17dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.2dBW	18.3dBW	18.0dBW
Both channels, 4ohm load	15.8dBW	16.3dBW	15.9dBW
One channel, 2ohms, pulsed	-dBW	16dBW	-dBW
Instantaneous peak current		+10A	-12A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	-78dB	-86dB	-62dB
Intermodulation, 19/20kHz, rated power, aux input			-90dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-76dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-48dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-76dB
Disc (MC) input (IHF, CCIR weighted)			-71dB
Aux/CD input (IHF, CCIR weighted)			-79dB
Residual, unweighted (volume control at min)			-80dB
DC output offset		left 0mV, right 2mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	25.4dB	25.0dB	24.7dB
Disc (MC) input (IHF)	25.4dB	24.8dB	22.0dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	71dB	86dB	60/73dB
Aux/CD input	75dB	77dB	51dB
Output impedance (damp)	0.14ohm	0.14ohm	0.21ohm
Channel balance, disc, at 1kHz			0.89dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.21dB	0.93dB	5.10dB
Input/Output			
	sensitivity	loading	
Disc (MM) input	0.25mV	47kohms	115pF
Disc (MC) input	0.037mV	220ohms	-nF
Aux/CD input	50mV	7kohms	160pF
Power amp	-mV	-kohms	-pF
Output, preamp (tape)		9.5V max, 1.8kohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -0.5dB	
Size (width, height, depth)			43x6x32cm
Typical price inc VAT			£250





NEWSLETTER

Vol. 4, No. 3 September 1988

Last month we discussed the best of valve amplifiers, but transistors can approach the performance and satisfy their owners' needs. The new **KRELL** KSA-80/KMA-160 offer something approaching reference quality, quite superior to the older models they replace; so our demonstrator PAM-5 Pre-Amp is available for £1,100, a true bargain, and the KSA-50 for £1,990. Let us quote you for a trade-in/part exchange and even finance the balance over 12 months. Now you can afford it!

Second-hand amplifiers currently available are an **AUDIO RESEARCH** SP-10 Mark II for £2,495 and a pair of **MENT-MORE** M-200 valve monoblocks for £1,595. Our Summer Sale to slim our stocks includes 10% off all **SUMO** and **ALBARRY** so that now is the time to strike! Things are so slow that we still have for sale in Manchester our **COUNTERPOINT** SA-20 for £2,100 (very much a bargain) and a set of **LINX** Stratos Pre-and Power-Amps for £595.

Ten percent during August Amplifiers means that you can acquire the **AUDIOLAB** Pre-and Power amps for £690 (£600 + vat) ex-demonstration. In Glasgow, second-hand opportunities also include **NAIM** 42 (almost new) plus 160 for £325 the pair. We have a black **A & R Cambridge** A60 plus integrated amp reduced from £229 to £160, and a **MERIDIAN** Component amplifier for £250, second-hand but in excellent condition; the cost is the new price of its three inputs alone (Tape, aux and MC).

To round off our amplifier news this month, it is nice to see **SUGDEN** return to state-of-the-art amplifiers with their new '51 series. Our Manchester shop is the first British Dealer to have the Au51P; costing £995, it delivers a high-current 75 watts per channel. Matching Pre-Amp is the Au51C costing £1,295. Au

is the symbol for Gold, in case your Latin and Chemistry is rusty or non-existent. However, no looker or listener could fail to note that these products are truly distinguished.

LOUDSPEAKERS

We have a mint pair of **LINN KANS** with their own excellent stands for only £225 (second-hand) and one pair only ex-dem of the classic **DECCA** Ribbon loudspeaker systems for £150 (worth it easily for the Kelly Drivers alone!) We have a pair of IMF TLS-50's for only £275 – this is a classic British speaker now enjoying a worldwide comeback under the TLS banner, so our price is very reasonable due to the time of the year. Finally we have two pairs of **SONUS FABER** Electas at £995 per pair.

We have a used but mint-condition **AUDIO PRO** B-400. Sub-woofer with built-in amplifiers for £495. This is a large and very high-quality device with correct adjustments for level and crossover frequency to enable seamless tuning to the appropriate room and acoustics. Used correctly, it frees the mid-range to sound more open, pure and detailed which is arguably even more important than the extension and weight at the bottom end. The price is less than half current new price to reflect the UK's resistance to such products, yet if you only knew what you were missing!!

SOURCE COMPONENTS

We have a **LINNLP-12** with Ittok and AT-95 with less than 4 months use: does £595 seem fair? We'll even accept a part-exchange – we can't be fairer than that; but to step up further we have an ex-dem **SOURCE** turntable with a slight damage to the top-plate. It is medium Oak with grey top-plate and is available for £595 without tonearm.

State of the art arm and cartridge for any turntable is the **ORTOFON** MC-3000 Moving-Coil Cartridge; ideal with either the SME Series IV or V tonearms. A different musical balance which some may prefer is undoubtedly offered by the (also British) **ZETA** company at a very reasonable £459 inc. vat.

The quality available from an ultimate tonearm must be heard to be appreciated, and the very select list now comprises the **GOLDMUND** T3-F at an appropriate £3,850. Until Ricardo Franassovici brought one to Glasgow and demonstrated to a very cynical listener it was hard to believe how much articulation, detail, tunefulness (call it what you will) is engraved onto ordinary LP's. Your record collection is beyond value, and with respect to the growing excellence of CD technology, true music-lovers should invest in fine LP's (new, used, deleted etc.) whenever they get the opportunity.

It is very negligent to risk LP's deteriorating, especially when they are becoming hard to get. And there is no excuse not to use the **LAST** System Formulae. Please note that these are not the same products as are being offered by one UK Hi-Fi Dealer at claimed lower prices. Formula One is a powerful cleaner and removes MRA: cost is £12.50. Formula Two is the preservative: it is applied to a record once every ten years or 200 plays to harden the top surface. This lubricates the stylus/record interface and wear to negligible proportions: as if that doesn't justify £16.95 per bottle, the increased sound quality is an additional bonus.

Formula Three costs £7.95 for refur record cleaning; and Four is a fluid guaranteed safe for stylus cleaning (£6.25). Formula Five is the famous **STY-LAST** fluid. At £19.95 it really does last for years: one tiny dab onto your stylus and it is

guaranteed to extend the diamond up to ten times! How can this be possible? Well, the coating lasts 30 minutes or so and smoothes the microscopic pit-holes of your diamond tip. The record wears the coating to some extent rather than the tip itself. Again, as a bonus, the stylus/groove interface is smoothed and cooled down to eliminate elastic deformation and because "action and reaction are equal and opposite" according to High School thermodynamics all the energy is transferred to the stylus and you can easily hear the improvement. It really makes an ordinary record sound like a supercut – and it stays that way (lasts!) Next month, Last products will be featured in the Hi-Fi News Accessories Club – so you have no excuse to let your LP's deteriorate.

To return to excellent tonearms, the two world leaders at £1,995 are the legendary Triplanar and the Air-Tangent. Both differ radically. The Triplanar is a pivoted arm with the ultimate engineering design principles and materials. We have one ex-dem Mark II for £1,595 and the same Summer Sale Price for our Air Tangent; this is an air bearing parallel tracking arm. We will have a brand new Air Tangent on a brand new Oracle Delphi Mk III which was loaned to a film company for the forthcoming TSB adverts. This famous deck, full guaranteed, is available for £2,850 (RRP £3,498) while your neighbours can only watch it on their TV over the Autumn!

COMPACT DISC BARGAINS

All fully guaranteed, we have a few **MISSION** PCM 4000 from £175 second-hand to £225 ex-dem; **YAMAHA** CD1000 £375; **DENON** DCD-1500 £399; and the magnificent **DENON** DCD-3300 flagship product, DCD-3300 for £995.

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BEST BUY



This East Coast US manufacturer must be one of the longest established brands in hi-fi. Known first and foremost for loudspeaker design, specifically as inventor of the 'infinite baffle' sealed box system of bass loading, the sprung subchassis AR turntable made no less a contribution to high fidelity's state of the art. Intermittent electronics products have also put in an occasional appearance over the years.

Soon after the arrival of compact disc, the company launched a range of electronics products sourced in the Far East, including amplifiers, tuners and CD players. Nothing special in terms of technical innovation, these are at least aesthetically distinctive, with a 'slope front' design. This not only has the ergonomic logic of being equally easy to operate from above or below the level of the unit, but also provides the option of aligning a stack of components with a zigzag profile or so as to maintain the slant continuously.

The A-04 is the least costly of the amplifiers, selling at around £160. Built on a metal chassis with a rather rattly ventilated wrap, the plastic slant fascia has a hinged panel (with rather sharp corners if left open) to conceal some of the less essential controls. Flap closed it therefore presents an unusually clean face to the world.

Just the headphones socket, power switch, volume control and a small bank of plastic electronic source switches are on view, labelled tape, VCR audio, tuner, CD/aux, and phono (where did you last see a phonogram, or phonograph for that matter - in a museum?). A convenient mute bar is sited alongside for use when changing sources or discs. Indicator bars illuminate the selected input, but it is difficult to imagine switches that feel more flimsy to probing digits - one half expects the whole panel to fall out of the unit in pieces, and wonders whether to keep a handy tube of polystyrene cement inside the glove box in case of accidents. Concealed controls include bass, treble and balance on little rotaries, plus pushbuttons for mono (/stereo), (tone control) defeat and speakers (to hush them when using headphones).

The rear panel carries the usual phono sockets, with high or low output (MM/MC)

cartridge options on vinyl disc. An eight-pin special DIN socket is provided for system remote control, plus a single set of 4mm/binding post loudspeaker terminals.

LAB REPORT

Internal inspection reveals nothing particularly special and a rather untidy multiboard construction with messy interlinking wiring harnesses. Component ratings are quite generous, with a substantial transformer and 2x6,800µF capacitance on the shared supply, plus four 25A complementary bipolar transistors per channel. The vinyl input follows low noise transistors with an NE5534 op amp, the electronic switching uses IC FETs.

Power output comfortably exceeds the 40W specified, and is well maintained across a wide bandwidth. Peak current capability is a generous 20amps, and delivery is reasonably well maintained into low impedance loads - there should be no shortage of power with this amplifier.

Distortion is negligible, noise levels and input overload margins very good, separation and channel balance perfectly respectable. The flattish responses show tight bandwidth tailoring on all inputs - certainly worthwhile with vinyl disc, but possibly less than ideal with compact disc. The supply modulation spectrogram shows fine mode rejection.

SOUND QUALITY

Results were pretty consistent with both vinyl disc and line inputs, and the overall 'good' rating is an excellent result for the price. The high sensitivity MC disc input does suffer a little from mild hum, but the sound otherwise is clean, clear, solid and informative. Stereo images are well defined, giving decent focus and depth. Mild criticism was made of slight treble 'lispiness', and bass is a little lightweight, though quite dynamic and tuneful nonetheless.

CD sounds just a shade too sharp and lively perhaps, but is essentially competent, well balanced and nicely defined. Stereo images show good focus and depth, though the midband sounds a shade thin and a similarly 'breathy' treble quality was again noted. Slight slowing in the bass also attracted comment. Nevertheless this amplifier sounds

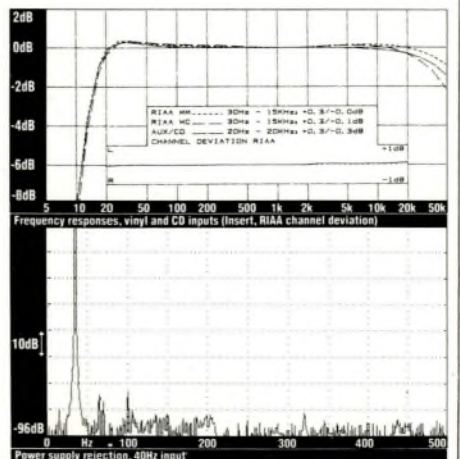
convincingly powerful and is a good allrounder with few flaws.

CONCLUSIONS

Although some of the constructional ingredients look superficially unpromising, the lab performance is very competent and the subjective impression of a big, powerful yet finely detailed amplifier is pretty irresistible at this comparatively modest price. Add in the attractive aesthetics and ergonomics and a Best Buy rating drops out of the slot.

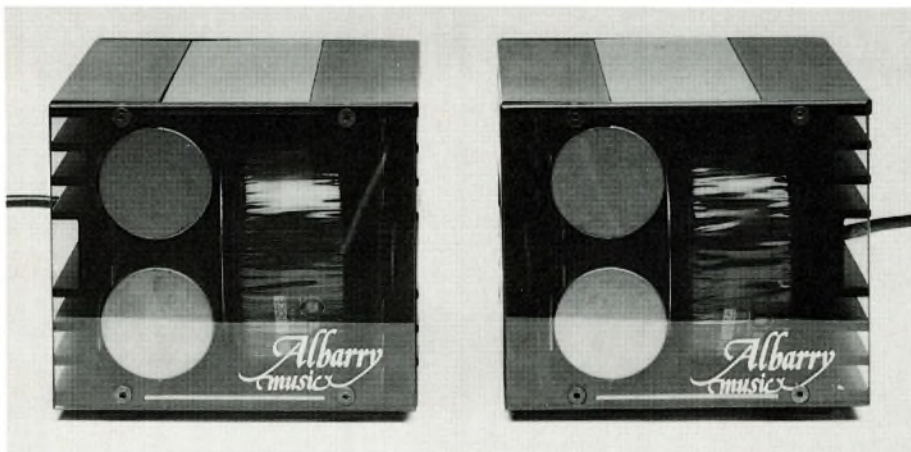
TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		40W (= 16dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.1dBW	18.1dBW	18.1dBW
Both channels, 4ohm load	15.1dBW	16.2dBW	16.1dBW
One channel, 2ohms, pulsed	-dBW	17dBW	30V
Instantaneous peak current	+20A	-20A	-20A
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-80dB	-88dB	-74dB
Intermodulation, 19/20kHz, rated power, aux input			-90dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-89dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			95dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-74dB
Disc (MC) input (IHF, CCIR weighted)			68dB
Aux/CD input (IHF, CCIR weighted)			-76dB
Residual, unweighted (volume control at min)			-80dB
DC output offset		left 37mV, right 34mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	33.1dB	32.6dB	31.3dB
Disc (MC) input (IHF)	31.8dB	31.2dB	30.0dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	70dB	64dB	39dB
Aux/CD input	70dB	65dB	41dB
Output impedance (damp)	0.054ohm	0.05ohm	0.08ohm
Channel balance, disc, at 1kHz			0.82dB
Volume balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.02dB	0.84dB	1.54dB
Input data			
	sensitivity	loading	
Disc (MM) input	0.40mV	44kohms	85pF
Disc (MC) input	0.030mV	100ohms	-nF
Aux/CD input	23.3mV	21kohms	285pF
Power amp	-mV	-kohms	-pF
Output, preamp (tape)		12.3V max, 1.8kohms	
Disc equalisation error, 30Hz-15kHz		+0.3dB, -0.3dB	
Size (width, height, depth)			43x9x35cm
Typical price inc VAT			£160



ALBARRY M1008 SERIES II

PRESENCE AUDIO, THE OLD POST HOUSE, PLUMMERS PLAIN, HORSHAM, WEST SUSSEX. TEL: (0403) 76777.



Albarry is one of the smaller UK amplifier specialists, specialising entirely in monoblock power amplifiers with unusually distinctive styling. The outline design goes back several years, but availability has been somewhat intermittent. Since 1987 the enthusiastic Presence Audio organisation has handled UK distribution of a revitalised *Series II* Albarry range, which has ensured a rather higher market profile than before. *Choice* reviewed the smaller (40W) '408 in March '88 (see *Directory* entry), so now it's the turn of the larger *M1008* model, rated at 100W.

These compact almost cube-shaped monoblocks retail at £900 the pair – as against £650 for the smaller version. The casework is most unusual – indeed controversial as far as individual taste is concerned – the most prominent feature being the semi-transparent smoked Perspex end cap inscribed "Albarry music" in a flowing gold copper-plate 'hand'. Tasteful or not, at least it's different from the achromatic monotony that bedevils every hi-fi magazine front cover photo session.

Large metal heatsinks form the rigid side members connecting one metal and one Perspex end plate. Mirrored plastic strips fill in the top and bottom spaces. The transparency reveals the substantial ILP toroid transformer and a pair of capacitors. The 'business end' features a pair of the biggest wire wrap terminals you've ever seen, plus a captive mains lead, a nostalgic toggle switch, fuse, phono input and a tiny pushbutton labelled 'i.r.reset' (which restores the infra-tripped protection circuitry should it be triggered).

Circuitry is classic class A/B using bi-polar transistors throughout. Tip142/147 output transistors are bolted directly on to the generous heatsinks, but quiescent current is set low and the amplifier barely warms up when idling. Generous multistrand cables and a central copper bus bar link the components. Construction is neat if a touch old-fashioned.

LAB REPORT

The various power output parameters show

that the '1008 is utterly load tolerant, virtually maintaining the 8ohm voltage into both 4 and 2ohms – which in turn implies 200 and 400W outputs, and across the full bandwidth without difficulty. Being a monoblock helps of course, but it's an impressive performance for all that, reflected in the substantial 30A peak current capability. The power supply modulation spectrogram is excellent, showing very good common mode rejection and system grounding.

THD is surprisingly high, at least in comparative terms (and some 20dB poorer than the '408), but this is not any real cause for concern. Other measured performance parameters are all fine. Sensitivity is quite high (70mV for 1W and 700mV for 100W) so direct CD player connection is possible. However, the lowish 5.5kohm input impedance could react adversely with a few of the higher Z-out players, and might also give difficulties with some valve preamplifiers.

SOUND QUALITY

The overall 'good' rating for sound quality is competent enough, but a little disappointing in view of a pricetag that approaches £1,000. Ultimately the '1008 was considered a little uninspiring, though it's certainly capable of delivering plenty of real, practical power.

The sound is subjectively a little bandlimited in character, with slightly 'slowed' pace and mildly rolled off treble. Bass is pretty good but more weight 'slam' and 'speed' would be preferred. The midrange sounds a little 'thin' with a slight 'brittleness' in the presence region. Treble is slightly roughened and forward but lacks 'sparkle'. Stereo images are precisely detailed and focused, though depth was not fully developed.

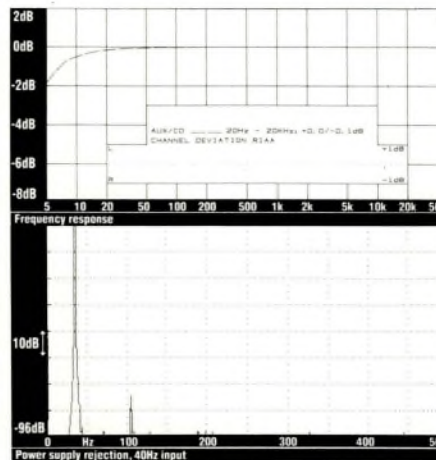
CONCLUSIONS

Generous loudness capability and power delivery, aesthetics that are refreshingly different and a very good lab performance are sufficient for the '1008 to merit consideration, but some lack of sonic precision and transparency prevents formal Recommendation

tion at the fairly high asking price.

TEST RESULTS

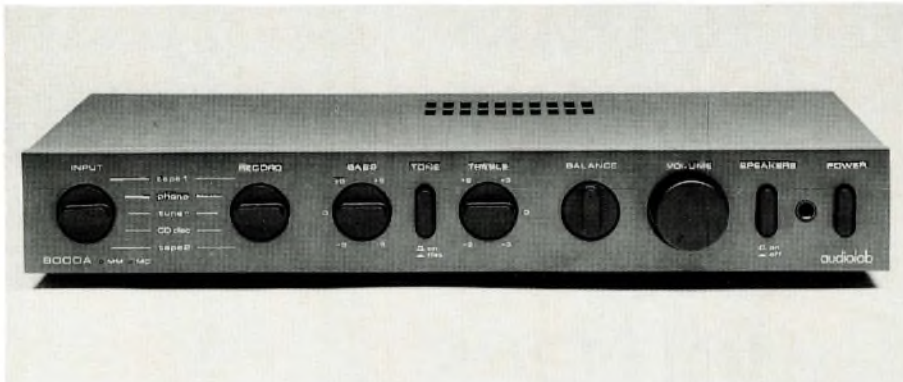
Power output		Monoblok power amplifier		
Rated power into 8ohms, maker's spec		100W (= 20dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	20.3dBW	20.45dBW	20.3dBW	
Both channels, 4ohm load	19.4dBW	19.6dBW	19.5dBW	
One channel, 2ohms, pulsed	-dBW	20dBW	40V	
Instantaneous peak current		+30A	-30A	
Distortion				
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz	
	-43dB	-54dB	-47dB	
Intermodulation, 19/20kHz, rated power, aux input			-72dB	
Noise				
Residual, unweighted (volume control at min)			-94dB	
DC output offset			left 4mV, right 6mV	
Input overload	20Hz	1kHz	20kHz	
Stereo separation				
Output impedance (damp)	0.1ohm	0.1ohm	0.11ohm	
Input data				
Power amp	sensitivity	loading		
	70mV	5.5kohms	-pF	
Size (width, height, depth)		15.8x14x28cm		
Typical price inc VAT		£900 per stereo pair		



AUDIOLAB 8000A

CAMBRIDGE SYSTEMS TECHNOLOGY LTD., 26 ROMAN WAY, GODMANCHESTER, HUNTINGDON PE19 9LN. TEL: (0480) 52521.

RECOMMENDED



While the 8000A has not changed in the least externally, the internals have been subject to constant development over the years, to the point where we have lost count of the number of reassessments that have been necessary and decided to rewrite the review from scratch for a change, based on listening tests with samples from 1988 production.

£350 buys a slim and attractive if conservatively styled full width integrated stereo amplifier, rated at 50W per channel and well endowed with comprehensive facilities. A cast front panel gives good structural rigidity and 'feel', and a ventilated metal wrap forms the case and allows ventilation to the internal heatsinks. Aside from the prominent volume control, the row of neat knobs have raised 'lozenge' sections to show their setting, and there are also three 'lozenge' push-buttons to match, plus a headphone socket.

The bass and treble tone controls operate across a deliberately limited range and have a partnering defeat switch. Two rotary switches select input and record output independently either side of clearly labelled legends. Purists may agree it's a pity Audiolab chose the tautological 'CD disc' for the sake of visual symmetry.) Options include MM and MC high/low output sensitivity vinyl disc inputs, selected on the rear with front panel indicator LEDs, plus two line inputs and two tape recorder in/out sets. Balance sits logically beside volume, and relay loudspeaker muting is provided on a switch beside the 'phones socket.

Internally, a 250VA transformer is carefully mounted to reduce mechanical hum. The high current complementary CD output stages have a DC servo to roll off the subsonic response need for a feedback decoupling capacitor. Circuitry is all discrete, and the MC vinyl disc input has been designed with particular care.

The very latest samples have revised open loop gain/phase characteristics for the power amplifier, resulting from research into the forthcoming tuner. There are number of component changes, including the electrolytics and in the avoidance of magnetic materials. Protection circuitry now goes directly to disconnection rather than via a period of distortion if asked to drive an impossibly dif-

ficult load at high levels. And the switch on/off output muting is now available on the preamplifier section alone, maintaining this feature if the A is used as such with an 8000P as an upgrade.

LAB REPORT

Spot checks show no significant changes in the measured performance - minor improvements in S/N ratios and HF distortion, so a full retest was not undertaken. Though only rated at 50W (17dB), the 8000A delivers a full 19dBW across the full bandwidth (8ohms, one channel). The 4ohm delivery is also pretty good, while the $\pm 28A$ peak current capability is more than ample to drive any loudspeaker load.

TH and IMDs are negligible, noise levels fine and DC offsets low. Input overload margins are ample and stereo separation up with the best. Output impedance is low and channel balance is very accurate, with some volume/balance mistracking at low levels. Input sensitivities are fine, and MM disc input characteristics may be adjusted via optional loading plugs. The RIAA equalisation is accurate through the midband with sensible edge-of-band rolloffs.

SOUND QUALITY

Although the 8000A still delivers a very respectable 'good' overall sound quality, the actual score is slightly behind that obtained a year or so ago.

The latest version has perhaps gone a little too far in seeking to counter the lack of tonal warmth, so as well as sounding sweeter the latest 8000A is also somewhat softer, losing some of the 'slam', dynamic pace, definition and 'grip'.

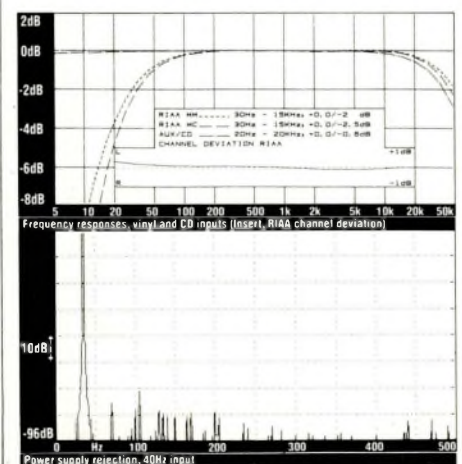
Using vinyl discs and an MC cartridge, backgrounds are quiet, focus good but depth is still a little lacking and bass could be firmer, while the treble is a touch 'dry', though overall control is still good. CD sources give improved dynamics and focus with more detail, smoothness and sweetness, but again the sound seemed more inclined to stimulate the cerebellum rather than set the toes tapping. The overall sound seems to be a little 'shut in', appearing short on dynamics and soundstage scale.

CONCLUSIONS

The 8000A continues to evolve, though the direction now seems a little at variance with our subjective criteria. It remains a worthy contender with a fine range of versatile features, excellent flexibility, presentation and ergonomics plus a very good measured performance at a very realistic price, and so deserves confident Recommendation. But it's no longer quite such an automatic choice in this increasingly competitive mid-price market.

TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		50W (= 17dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	19.4dBW	19.5dBW	19.0dBW	
Both channels, 4ohm load	17.2dBW	17.6dBW	17.0dBW	
One channel, 2ohms, pulsed	17.8dBW	18.0dBW	17.3dBW	
Instantaneous peak current	+27A	-28A		
Distortion				
Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz	
	-90dB	-95dB	-80dB	
Intermodulation, 19/20kHz, rated power, aux input	-85dB			
Intermodulation, 19/20kHz, at 0dBW, disc (MM)	-85dB			
Intermodulation, 19/20kHz, at 0dBW, disc (MC)	-80dB			
Noise				
Disc (MM) input (IHF, CCIR weighted)	-78dB			
Disc (MC) input (IHF, CCIR weighted)	-73dB			
Aux/CD input (IHF, CCIR weighted)	-82dB			
Residual, unweighted (volume control at min)	-78dB			
DC output offset	left 2mV, right 3mV			
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	29dB	30dB	30dB	
Disc (MC) input (IHF)	26dB	26dB	26dB	
Aux/CD input (IHF)	>20dB	>20dB	>20dB	
Stereo separation				
Disc input (MM)	-90dB	-72dB	-50dB	
Aux/CD input	-78dB	-77dB	-56dB	
Output impedance (damp)	0.03ohm	0.04ohm	0.12ohm	
Channel balance, disc, at 1kHz	0.04dB			
Volume/balance tracking	0dB	-20dB	-60dB	
Aux/CD input	0.04dB	0.0dB	3.6dB	
Input data				
	sensitivity	loading		
Disc (MM) input	0.3mV	47kohms	35pF	
Disc (MC) input	0.007mV	100ohms	4.7nF	
Aux/CD input	12mV	20kohms	70pF	
Output, preamp (tape)	7.7V max, 600ohms			
Disc equalisation error, 30Hz-15kHz	+0.1dB, -2.2dB			
Size (width, height, depth)	44.5x7.4x34cm			
Typical price inc VAT	£350			



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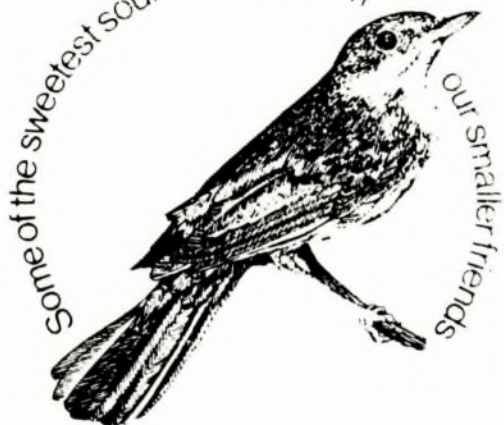
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AUDIOLAB 8000C/P

CAMBRIDGE SYSTEMS TECHNOLOGY LTD., 26 ROMAN WAY, GODMANCHESTER, HUNTINGDON PE19 9LN. TEL: (0480) 52521.



The 8000C is a slim and attractive if conservatively styled full width preamplifier, well endowed with comprehensive facilities. A cast front panel gives good structural rigidity and 'feel', and a sheet metal wrap forms the outside casework. Aside from the prominent volume control, the row of neat knobs have raised 'lozenge' sections to show their setting, and there are also three 'lozenge' push-buttons to match, plus a headphone socket driven from a real, dedicated headphone amplifier.

The bass and treble tone controls operate across a deliberately limited range and have a partnering defeat switch. Two rotary switches select input and record output independently either side of clearly labelled legends - a logical layout. Language purists can always attempt to obliterate the D on the disc on the 'CD disc' logo.

Options include MM and MC high/low output sensitivity vinyl disc inputs, selected on the rear with front panel indicator LEDs, plus two line inputs and two tape recorder in/out sets. Balance sits logically beside volume, and the output is muted from a switch beside the 'phones socket.

The 8000P power amplifier has a matching case, but with ventilation slots in the top and an almost featureless front panel, enlivened only by a power switch one end and LED the other. A single set of loudspeaker connecting 4mm socket/binders are mounted on the rear, plus two pairs of phono sockets, one for the input and one to reduce the input impedance if so desired.

Discrete transistor circuits are used internally in carefully designed op-amp configurations. The preamplifier uses a single rail supply allowing high quality electrolytic coupling capacitors to be properly polarised. The power amplifier has a direct coupled split rail supply, feeding a paralleled complementary output.

Changes for the latest production models parallel those incorporated in the 8000A. Revised open loop gain/phase characteristics for the power amplifier, result from research into the forthcoming tuner. There are a number of component changes, including the electrolytics and in the avoidance of magnetic materials.

LAB REPORT

Spot checks showed no significant changes in the measured performance. The power amplifier is a gutsy performer, offering an extra 1.5dB over the specification rating (8ohms, one channel). Peak current is a massive 40A, ample for subduing even the most awkward loudspeaker load. Harmonic and intermodulation distortions are negligible, and DC offsets microscopic, thanks to the servo circuit.

The 8000C has fine noise levels, input overload margins are ample and stereo separation up with the best. Output impedance is low and channel balance is very accurate, with fine volume/balance tracking at low levels. Input sensitivities are fine, and MM disc input characteristics may be adjusted via optional loading plugs. The RIAA equalisation is accurate through the midband with sensible bandlimiting.

SOUND QUALITY

Assessed separately and together, the 'C' and 'P' were rated from 'good' ('C' via MC) to 'very good' ('C' via CD, and 'P'). Starting from the bottom, so as to speak, the MC vinyl disc input has an impressive driving bass with generally good detail. Vocal lines are clean and well focused, lacking depth and transparency but with a degree of subtle clarity nonetheless. Tidy and well balanced with a clean, integrated treble, the sound is nevertheless a bit flat stereophonically. Compact disc delivers a worthwhile improvement in most areas - bass extension and 'slam', stereo focus and image scale and treble detail. The balance suits rock rather more than classical due to some loss of ambience and atmosphere.

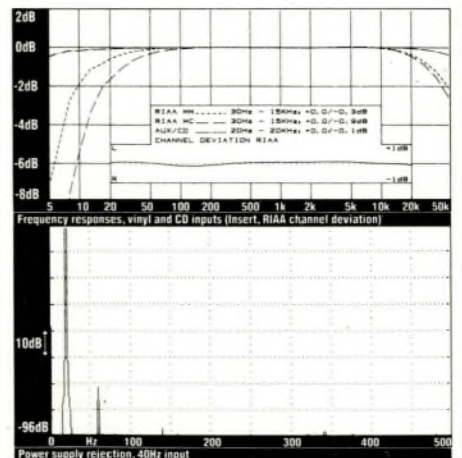
The power amplifier remains much as before, at a very realistic price besides. The sound is now perhaps a little sweeter and less clinical, yet maintains confident dynamics and rhythmic power. Lacking a little depth and transparency and with a tendency to hardness at higher levels on some program, it is nonetheless a very good allrounder, though one listener described a mildly manic and robotic character - the priority of grip and control over emotion perhaps?

CONCLUSIONS

Still comfortably meriting Recommendation, the 8000C/P provides a combination of unusual versatility and fine sound quality at a realistic price. Recent modifications do not seem to have provided an advance, more of a marking time in fact, but the Audiolab separates remain a competitive proposition, albeit with rather less edge than before.

TEST RESULTS

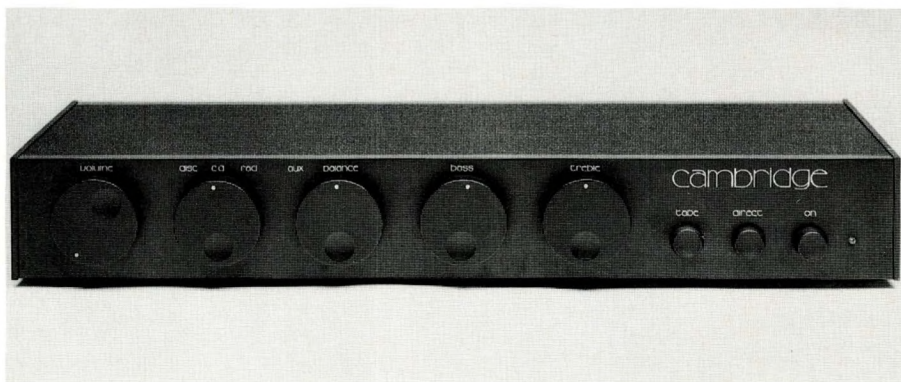
Power output		Pre- and power amplifier	
Rated power into Bohms, maker's spec		100W (= 20dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	21.8dBW 21.8dBW 21.4dBW		
Both channels, 4ohm load	19.6dBW 20.0dBW 19.6dBW		
One channel, 2ohms, pulsed	-dBW 20.3dBW -dBW		
Instantaneous peak current	+40A -40A		
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz 1kHz 20kHz		
	<-90dB -93dB -74dB		
Intermodulation, 19/20kHz, rated power, aux input			<-100dB
Intermodulation, 19/20kHz, at 0dB, disc (MM)			-82dB
Intermodulation, 19/20kHz, at 0dB, disc (MC)			-83dB
Noise			
Disc (MM) input (IHf, CCIR weighted)			-70dB
Disc (MC) input (IHf, CCIR weighted)			-67dB
Aux/CD input (IHf, CCIR weighted)			-70dB
Residual, unweighted (volume control at min)			-80dB
DC output offset		left < 1mV, right < 1mV	
DC offset, preamp		left < 1mV, right < 1mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHf)	26dB 31dB 30dB		
Disc (MC) input (IHf)	30dB 26dB 25dB		
Aux/CD input (IHf)	<20dB 20dB 20dB		
Stereo separation			
Disc input (MM)	82dB 78dB 86dB		
Aux/CD input	-dB -dB -dB		
Output impedance (damp)	0.025ohm 0.028ohm 0.084ohm		
Channel balance, disc, at 1kHz			0.1dB
Volume/balance tracking	0dB -20dB -60dB		
Aux/CD input	0.15dB 0.2dB 0.4dB		
Signal data			
	sensitivity	loading	
Disc (MM) input	0.28mV	47kohms 50pF	
Disc (MC) input	0.018mV	10ohms -nF	
Aux/CD input	15/52mV	20kohms -pF	
Power amp	1100mV	47kohms 320pF	
Output, preamp (tape)		>5V <600ohms	
Disc equalisation error, 30Hz-15kHz		+1.0dB -2dB	
Size (width, height, depth)		45x8x34cm, 45x8x34cm	
Typical price inc VAT		£325/£495	



CAMBRIDGE AUDIO P55

CAMBRIDGE AUDIO SYSTEMS INTERNATIONAL, BURREL ROAD, ST. IVES IND. EST., CAMBS PE17 4LE. TEL: (0480) 496496.

BEST BUY



The *P55* is the middle model in the Cambridge Audio lineup, and the only one to feature tone controls. It is also apparently known as the *Integer*, presumably in some overseas markets. Priced at £289, and delivering a specified 55W the model '55 is clearly not aimed at the budget sector of the mainstream market, but instead slots into an increasingly competitive middle market – in direct competition with models from Audiolab, Mordaunt-Short, Musical Fidelity and others.

Housed in a simple slimline all-metal black enclosure that is well enough finished, one could still pick a nit or two over the rather sloppy 'feel' of the controls. It's an attractive looking unit with its five large, identical rotary knobs, though that in turn means you'll be squinting at the graphics until pertinent positions become intuitive.

Alongside the five control knobs are three pushbuttons. The former handle volume, balance, bass, treble and input selection, the latter power on/off, tone defeat and tape monitoring – tone defeat replacing the mono/stereo mode switch on the *P40*, which of course has no tone controls to do battle with in the first place.

The rear panel has a single row of gold-plated phono plugs for interconnection, plus 4mm sockets for loudspeakers; between the disc inputs a switch selects the appropriate gain for MM or MC (high or low output) cartridges.

Tone control section apart, the *P55* is constructed on a single board. The output stage is class A/B quasi-complementary direct coupled, with four 25A bi-polar transistors per channel. The driver stage is all discrete components, with film type coupling capacitors, and high quality gain-switched ICs are used for the disc input. A large Airlink toroidal transformer with 2x6,800µF 50V caps provides the split-rail power supply.

LAB REPORT

Powerwise this is effectively a slightly enlarged *P40* – add 1.5dB to each of the latter's power ratings and you'll end up with a *P55*. The losses into low impedances and at the bandwidth extremes are indicative of a slightly 'soft' shared power supply, but the

basic figures are well ahead of specification, deliver a very good power bandwidth into 8ohms and a fine $\pm 26A$ peak current capability. 'Difficult' loudspeaker loads should not be a problem. The power supply modulation spectrogram might have been cleaner, with 100Hz registering at $-80dB$.

Distortion is pretty good except at high frequencies where there was some deterioration. The noise figures are reasonable except on the MC setting of the vinyl disc input; $-60dB$ will be marginal, especially with lower output cartridges. Stereo separation deteriorates somewhat towards high frequencies and overload margins are fine. Sensitivities are a little lower than average, and volume/balance tracking could certainly have been improved at low levels. The RIAA disc equalisation curve shows quite sharp bandwidth curtailment particularly at low frequencies, and all responses are slightly mid-prominent.

SOUND QUALITY

Comfortably preferred using CD sources, the *P55* rated very good overall, which is an exceptional result for the price. The MC vinyl disc input sounds a touch hissy but is particularly good through the midrange and lower mid. The bass is impressive – full-blooded or fat according to different listeners' interpretations – but also shows precise timing. Treble is slightly 'tizzy' and a little vague in focus, but midband stereo is very good indeed, with fine projection and space.

CD sounds similar in overall character, but enhanced by a further lifting of the veils between source and listener. The midband is again the main strength, combining neutrality, liveliness and transparency to an unusual extent. Bass is still on the heavy side – paradoxically so considering the measured frequency responses – but this gives a likeable 'bally' sound with fine dynamics. The treble is again a shade on the vague and imprecise side of the ideal, but the overall effect is of a large scale soundstage that can be delivered at high sound levels when required.

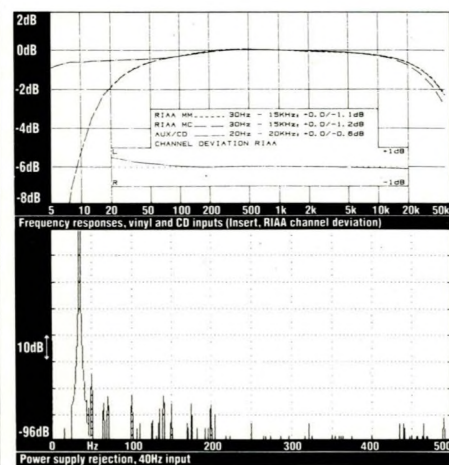
CONCLUSIONS

Subjectively one of the best integrated amplifiers around, clearly deserving Best

Buy rating on these grounds alone, the *P55* measures well but does show room for improvement on the moving coil disc input. Although the sound quality more than handsomely justifies the price, it does seem a shame that the overall build and 'feel' don't quite measure up to the standards now expected – and provided elsewhere – in the middle market sector.

TEST RESULTS

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	55W (= 17.5dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.8dBW	19.0dBW	18.7dBW
Both channels, 4ohm load	15.7dBW	16.6dBW	16.3dBW
One channel, 2ohms, pulsed	-dBW	18.5dBW	-dBW
Instantaneous peak current		+26A	-26A
Distortion	20Hz	1kHz	20kHz
Total harmonic distortion, at rated power, aux/CD input	-77dB	-77dB	-61dB
Intermodulation, 19/20kHz, rated power, aux input			-85dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-88dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-81dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-72dB
Disc (MC) input (IHF, CCIR weighted)			-60dB
Aux/CD input (IHF, CCIR weighted)			-75dB
Residual, unweighted (volume control at min)			-75dB
DC output offset		left 27mV, right 25mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	32.3dB	29.7dB	29.5dB
Disc (MC) input (IHF)	32.6dB	30.0dB	30.0dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	70dB	62dB	38dB
Aux/CD input	70dB	67dB	42dB
Output impedance (damp)	0.13ohm	0.13ohm	0.15ohm
Channel balance, disc, at 1kHz			0.9dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0dB	0.6dB	5.4dB
Input data	sensitivity	loading	
Disc (MM) input	0.56mV	47kohms	120pF
Disc (MC) input	0.065mV	47ohms	120nF
Aux/CD input	41mV	24kohms	80pF
Output, preamp (tape)		11.5V max, 1.2ohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -1.2dB	
Size (width, height, depth)			43.6x6.7x30cm
Typical price inc VAT			£289



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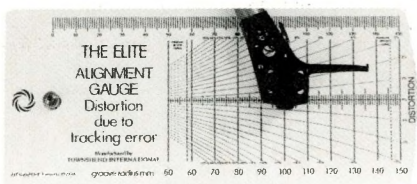
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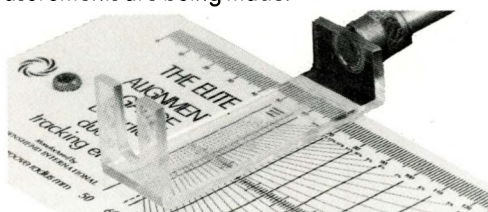
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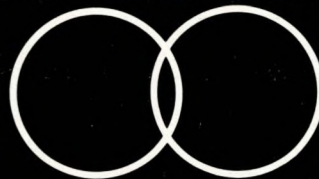
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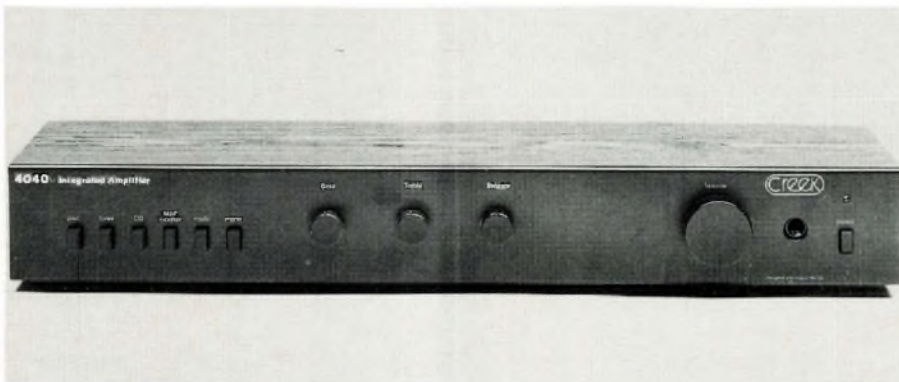


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CREEK 4040 SERIES 2

CREEK AUDIO SYSTEMS, 2 BELLEVUE ROAD, FRIERN BARNET, LONDON N11 3ES. TEL: (01) 368 4425.

BEST BUY



Creek has been established for a number of years now. Products which started out with a distinct cult status through the enthusiastic support of a loyal group of dealers are becoming increasingly refined and mature – hopefully retaining their characteristic charm whilst broadening their appeal.

The 4040 has been the mainstay of the range since the company was formed – a simple budget integrated amplifier with its own attractive-to-some character which ran unchanged for a number of years. However, the £160 4040s2 reviewed here is an early production example of a major redesign, differing both cosmetically and technically from the earlier model.

Thankfully, the touch of whimsy remains. Built on a metal chassis/fascia U-section, this was the only amplifier amongst the test group with a wooden sleeve – nostalgic perhaps, but nice nonetheless in a standalone unit that isn't necessarily destined to wind up in a stack.

Mike Creek must have had leprechauns in mind when planning the presentation. The graphics – including the new logo – are a bilious green, and typefaces vary from small to very tiny. Nimble fingers will be useful for selecting the little pushbutton switches or adjusting the minimalist balance and tone controls too. The buttons select between MM vinyl disc, tuner, CD and tape monitoring, plus mute and stereo/mono switching.

Happily the volume control retains its traditional dominance, having been moved over to the right to match the tuning knob on a new T40 partnering tuner (not yet tested). Our knobs were plastic, but metal ones will be used in future production. The rear panel now carries a protruding heatsink, though the fins are not unpleasantly sharp, alongside phono signal and two sets of 4mm loudspeaker sockets. The switched/unswitched option here avoids compromising performance for the sake of headphone listeners.

Beneath the tree (*aka* plastic and sawdust) lies a steel chassis with a neatly arranged single board layout, the only obvious compromise being the long track connection to the displaced volume control. The s2 uses a split-rail circuit in place of the single rail used for the 4040, which has

helped remove distortion creating capacitors from the signal path. Vinyl disc and line inputs are handled by ICs, while the three-stage power amplifier section has a differential input, class A drivers and a discrete component darlington output configuration, protected by current and voltage limiting.

LAB REPORT

The frequency responses are certainly flatter than the 4040, though probably still show sufficient LF lift especially on MM disc to introduce a measure of sonic character. There is a slight HF rise on this input too, whereas the CD rolls off sensibly from around 20kHz. The difference between channels on the MM input suggest that tolerancing could be improved here – as could the input overload margins.

The power output meets its 8ohm spec. without difficulty, across the full bandwidth. Peak current output is pretty generous, but power delivery is somewhat restricted into lower impedances, so 'kind' loudspeaker loads are to be preferred. Distortion performance is reasonable enough, noise levels are fine, but the output impedance is on the high side and stereo separation was asymmetric at high frequencies. The power supply modulation test result is poor; at the time of writing we are hoping to check a second sample.

SOUND QUALITY

Technical quibbles notwithstanding, the 4040s2 gave a fine account of itself in the listening tests, delivering a 'good' overall rating that is exceptional at the near budget price. More neutral than its predecessor tonally, substantial improvements in transparency were also noted, while the lively, 'punchy' character of the original is retained, indeed imbued with greater authority than before.

The fine balance between control and dynamics is a major strength, along with the ability to go surprisingly loud without effort or distress into normal loads. There is a fine sense of ambience and atmosphere due to good information retrieval, creating well formed stereo images with fine focus and reasonable depth. Bass is tuneful and only slightly softened, while the treble consis-

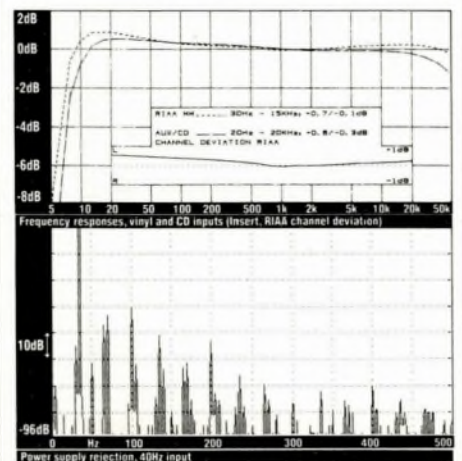
tently and impressively failed to draw attention to itself.

CONCLUSIONS

The 4040s2 is a most impressive achievement. There remains a little cause for concern, particularly as regards the power supply modulation level generated in the original sample, but this did not seem to interfere unduly with the subjective performance, which retains the undoubted strengths of the somewhat idiosyncratic original model and adds welcome neutrality and transparency. The sound quality alone demands a Best Buy rating.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		35W (= 15.4dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.8dBW	16.1dBW	15.9dBW
Both channels, 4ohm load	11.7dBW	13.2dBW	13.0dBW
One channel, 2ohms, pulsed	-dBW	12dBW	16V
Instantaneous peak current		+11A	-11A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	-48dB	-68dB	-66dB
Intermodulation, 19/20kHz, rated power, aux input			-75dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-74dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-76dB
Aux/CD input (IHF, CCIR weighted)			-79dB
Residual, unweighted (volume control at min)			-80dB
DC output offset		left 7mV, right 3mV	
DC offset, preamp		left 15mV, right 15mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	16.1dB	16dB	15.5dB
Aux/CD input (IHF)	21.2dB	22.0dB	22.1dB
Stereo separation			
Disc input (MM)	51dB	48dB	42/27dB
Aux/CD input	80dB	57dB	51/28dB
Output impedance (damp)	0.14ohm	0.18ohm	0.20ohm
Channel balance, disc, at 1kHz			0.39dB
Volume/balance tracking			
Aux/CD input	0.23dB	0.32dB	2.5dB
Amplifier		sensitivity loading	
Disc (MM) input	0.42mV	47kohms	60pF
Aux/CD input	84.5mV	35kohms	25pF
Output, preamp (tape)		9.7V max, 220ohms	
Disc equalisation error, 30Hz-15kHz		+0.7dB, -0.1dB	
Size (width, height, depth)		42x6.2x22cm	
Typical price inc VAT			£160



CREEK CAS 4140 SERIES 2

CREEK AUDIO SYSTEMS, 2 BELLEVUE ROAD, FRIERN BARNET, LONDON N11 3ES. TEL: (01) 368 4425.



This *Series 2* version of the *CAS4140* integrated amplifier is essentially a new design rather than just an upgrade. It lacks the tone controls of the cheaper *4040* and is seen here in an old-style Creek case. This is currently being redesigned to match Creek's new-look products. (See *4040/III* review.)

The front panel carries a row of push button selector switches covering the normal phono, tuner, CD/aux and tape inputs, plus mono and mute. The other front panel facilities are volume and balance rotaries, a headphone socket and on/off switch. Loudspeakers are connected by 4mm sockets, with a choice of switched or unswitched outputs. The disc input sensitivity may be matched to either moving magnet or moving coil cartridges via internal switches.

Internally the amplifier is constructed on a single printed circuit board, with the circuits laid out to facilitate short signal paths. The phono stage has low noise transistors followed by good quality integrated circuits around which RIAA equalisation is performed. A large 160VA toroidal transformer fills one end of the case, and the rectifier and smoothing capacitors are located on the PCB adjacent to the power amplifier. The power section itself is constructed from discrete components with high current *TIP35/36C* output transistors.

LAB REPORT

The rated output was easily achieved into an 8ohm load, giving a maximum of 17dBW. Overload protection limited power delivery into 4ohms, with both channels restricted to a lowly 9dBW. Although a reasonable 14.5dBW was recorded on the 2ohm pulsed test, only $\pm 4A$ was available on the peak current test before protection circuits operated.

Intermodulation performance was good on both line and moving magnet inputs, but was just adequate via moving coil. DC offset was a little high but not too serious, and volume/balance tracking was acceptable. Stereo separation was reasonable on disc inputs but could benefit from some improvement on 'aux' - after all some CD players have better than 90dB separation at 1kHz. Input overload was good on 'aux', acceptable on moving magnet disc, if rather restricted on moving

coil. This is currently being attended to, we understand. Sensitivities (especially moving coil) are on the low side, but loadings are well chosen.

Poorer than average 50Hz and related harmonic break-through was found on the supply mod test. The RIAA is accurate, with the amplifier designed to have a limited bandwidth which rolls off sensibly at the frequency extremes. The moving coil response shown on the graph was altered by its restricted input overload margin - in reality, when not driven into clip, the response is the same as for moving magnet. Channel deviation meandered a little but stayed within reasonable limits nonetheless.

SOUND QUALITY

This improved Creek *4140* amplifier sounded different from its predecessors, reflecting the new generation nature of its design. The sound quality scores for both the analogue and the CD inputs were significantly lifted compared with earlier Creeks.

Strong central focus highlighted the main performers and provided a good level of clarity and detail via moving coil. Sounding slightly filtered at the frequency extremes, this has the advantage of warding off spurious effects such as rumble or low bass boom, or fizz and other similar cartridge high frequency anomalies.

The bass was considered a little lightweight, but was tight and articulate, tuneful and agile, complementing a clear and precise treble with low distortion and good control. Stereo images presented well above average depth and ambience.

The CD input produced a mild improvement. More bass extension was noted, and the crisp and well detailed sound is impressive for the price. The moving magnet disc input provided a small improvement over moving coil, though the performance was pretty good on both inputs despite the MC's modest measured overload margins.

CONCLUSIONS

Creek's *4140* achieves a level of performance which should satisfy both established Creek fans as well as earlier critics. The possibly over-cautious protection system indicates

preference for speakers with a kind impedance characteristic, and the MC disc input could usefully trade some sensitivity for more overload margin, but the overall result represents good value.

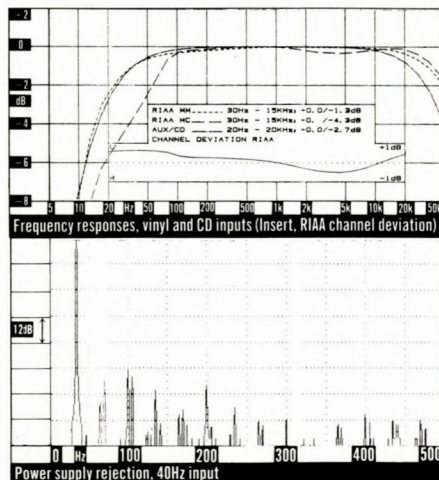
Setting a new Creek standard for sound quality, it was neutral and well balanced, clear and well focused, remaining tidy and well controlled to the audio band extremes.

TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		40W (=16dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	17.0dBW	17.5dBW	17.0dBW	
Both channels, 4ohm load	9dBW	9dBW	9dBW	
One channel, 2ohms, pulsed	-dBW	14.5dBW	-dBW	
Instantaneous peak current		+4A	-4A	
Distortion				
Total harmonic distortion, at rated power, aux input	20Hz	1kHz	20kHz	
	-65dB	-65dB	-46dB	
Intermodulation, 19/20kHz, rated power, aux input			-70dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-67dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-34dB	
Noise				
Disc (MM) input (IHF, CCIR weighted)			-72dB	
Disc (MC) input (IHF, CCIR weighted)			-79dB	
Aux/CD input (IHF, CCIR weighted)			-84dB	
Residual, unweighted (volume control at min)			-84dB	
DC output offset		left 17mV, right 28mV		
DC offset, preamp		left 0mV, right 0mV		
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	23.7dB	21.8dB	21.3dB	
Disc (MC) input (IHF)*	13dB	9dB	9dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	54dB	58dB	42dB	
Aux/CD input	56dB	56dB	42dB	
Output impedance (damp)	0.09ohm	0.08ohm	0.1ohm	
Channel balance, disc, at 1kHz			0dB	
Volume/balance tracking	0dB	-20dB	-60dB	
Aux/CD input	0.12dB	0.26dB	3.0dB	
Input data				
	sensitivity	loading		
Disc (MM) input	0.47mV	112kohms	200pF	
Disc (MC) input*	0.032mV	1kohms	n/a nF	
Aux/CD input	62mV	55kohms	80pF	
Power amp	n/a mV	n/a kohms	n/a pF	
Output, preamp (tape)		8V max, 1kohms		
Disc equalisation error, 30Hz-15kHz		+0dB, -1.3dB		
Size (width, height, depth)		42x5.5x16.5cm		
Typical price inc VAT		£219		

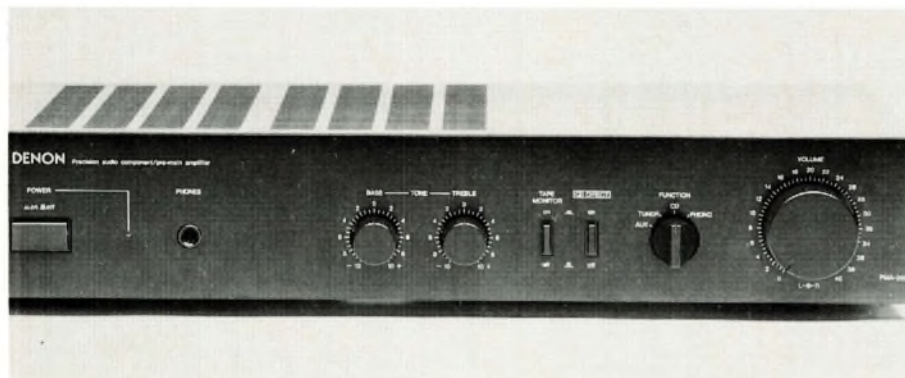
*See text

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DENON PMA-250

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



Originally introduced some eighteen months or so ago, Denon recently updated the PMA-250 by incorporating higher power output transistors and suchlike underskin modifications. The rest stays much as before, though the price has crept up a fiver to around £125.

Stereotypical of the UK trend towards simpler 'straight line' designs that accept some of the convenience compromises necessary to achieve good sound quality, the 250 has become the cornerstone of Denon's very successful budget separates range. For example, there is no switching in the output to the loudspeakers, so headphone listeners will have to unplug the speakers (at the amplifier and with a little care please) if they want to avoid disturbing others.

Tone controls are still fitted, and can only be bypassed when using the CD input, but these remain the only unnecessary frills. The rest of the front panel comprises input switching (MM only disc), tape monitor and 'CD direct' pushbuttons, plus the headphone jack, volume control and on/off switch. Phono sockets cater for signal inputs and outputs, and substantial binding posts provide high quality connection for a single pair of loudspeakers. Overall build and finish quality is very good, the whole unit mounted in an undamped metal case.

LAB REPORT

Technically this amplifier has a conventional class/B direct-coupled complementary bipolar output, with IC driver stage. Generously rated fuse-protected output transistors are fed from a good size shared transformer and 2x8,200µF capacitors. The vinyl disc stage is a simple op-amp, and the amplifier is built on a single board, to a high standard, using standard grade components.

Despite the efforts of Hayden Labs' Desktop Publishing Dept to persuade us to the contrary, the measured power output of the current 250 seems to have changed very little - indeed the ultimate current delivery has been somewhat curtailed. That said, power output comfortably exceeds the admittedly modest 80hm power rating, and is pretty good for the price, though delivery into lower impedances might have been more generous - this design is not particularly

tolerant of 'difficult' loudspeaker loads.

Distortion is low, signal-to-noise ratios are good. Stereo separation and input overload margins both measured very well. The volume potentiometer tracking was a bit out at low levels on our sample - much like our previous example. Input sensitivities are sensibly chosen, but note that the disc input already has a significant 360pF capacitance loading: add another 100pF or so for tonearm leadout wires and the total might be on the high side for ideal matching with some cartridges.

The power supply modulation test gave a respectable though far from exceptional result, and the basic frequency responses could also be flatter: the gentle undulation here will probably play a minor role in determining the overall character of the sound.

SOUND QUALITY

Similarity to the original 250 was unmistakable - the frequency responses are sufficient to ensure that - yet the latest version does represent a small but distinct improvement. However, it is equally true to say that standards elsewhere have also improved, and generally by a rather greater margin.

On balance the overall sound is fair enough, particularly considering the modest price. With vinyl disc sources the bass is quite good, though the overall subjective bandwidth seems a little limited. Images focus well, though the depth and width of the soundstage is somewhat restricted and dynamics are also a little constrained, though this may be partly the result of a slightly muted and reticent treble.

There was a slight preference for CD as signal source, as this provides improvements in focus, detail and instrumental separation. However, the bass here seems a little lightweight and a touch of 'steeliness' serves to colour the sound and exaggerate vocal sibilants. Nevertheless the overall effect is lively and tuneful, with good clarity and immediacy, if lacking the weight and scale of more generously endowed models.

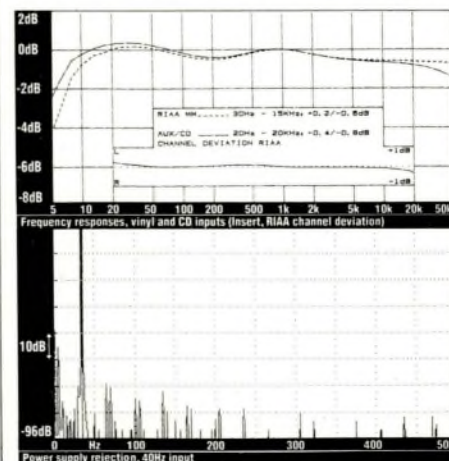
CONCLUSIONS

The 250 remains a well balanced package, sensibly conceived and attractively priced,

presenting a good compromise between sound quality and convenience. However, the sonic competitiveness is starting to date a little, and the recent facelift has done little more than mark time. Worth considering, particularly for those wishing to match cosmetics with other popular Denon components, the PMA-250 now falls just short of formal Recommendation.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		30W (= 14.8dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.7dBW	16.8dBW	16.4dBW
Both channels, 4ohm load	13.2dBW	13.7dBW	13.7dBW
One channel, 2ohms, pulsed	-dBW	13dBW	-dBW
Instantaneous peak current		+6A	-6A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	-71dB	-82dB	-67dB
Intermodulation, 19/20kHz, rated power, aux input			-90dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-96dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			—
Noise			
Disc (MM) input (IHF, CCIR weighted)			-71dB
Aux/CD input (IHF, CCIR weighted)			-80dB
Residual, unweighted (volume control at min)			-83dB
DC output offset		left 19mV, right 13mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	32.5dB	31.6dB	30.8dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	72dB	51dB	47/35dB
Aux/CD input	79dB	51dB	47/35dB
Output impedance (damp)	0.14ohm	0.14ohm	0.08ohm
Channel balance, disc, at 1kHz			—dB
Volume balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.1dB	0.1dB	4.65dB
Frequency response			
Disc (MM) input	sensitivity	loading	
Aux/CD input	0.57mV	47kohms	360pF
Power amp	32mV	96kohms	150pF
Output, preamp (tape)	—mV	—kohms	—pF
Disc equalisation error, 30Hz-15kHz		+0.2dB, -0.6dB	
Size (width, height, depth)		43 x 8 x 226cm	
Typical price inc VAT			£125

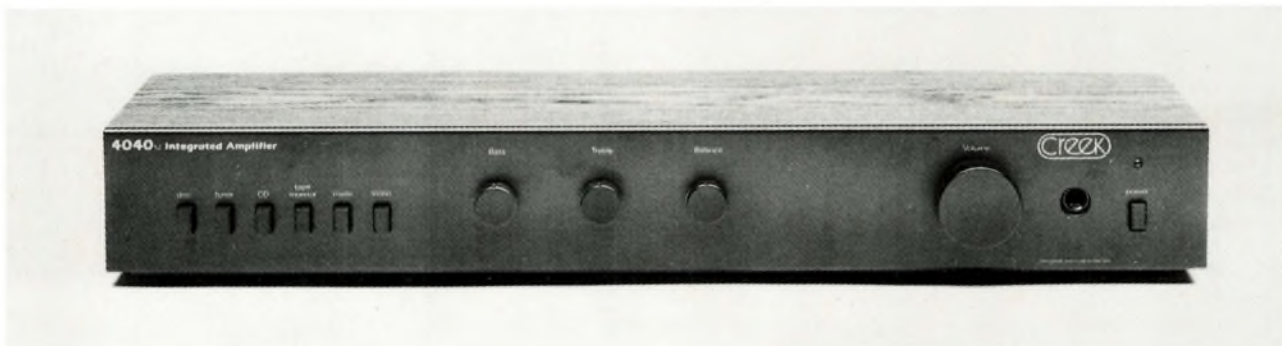


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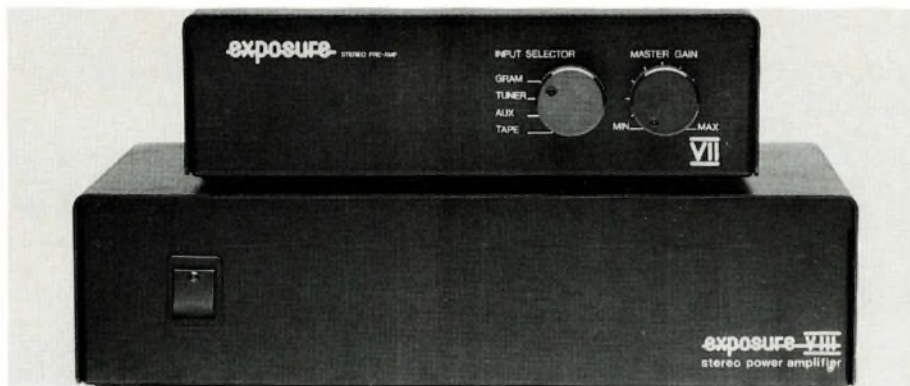
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AUDIO SYSTEMS

EXPOSURE VII/VIII

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Both units of this pre-/power amplifier combination are compact, neat and finished in matt black, even if they are very different sizes. Each is formed from two sheet metal U-sections, and is consequently nicely solid and free from rattles.

The VII preamplifier is significantly narrower than the power unit, and unusually light in weight, as it has no power supply of its own – a modus operandum which allows a range of different quality power supplies to be used with the same basic circuitry. The cheapest version tested here takes its power from the transformer in the power amplifier (adding regulation of course), but an upgrade path to improved performance is available by adding a substantial outboard preamp power supply.

The VII is a simple 'straight line' design – Exposure were one of the first to abandon tone controls – with just two large knobs, providing 4-way input selection and 'master gain' respectively. The rear panel complement consists of phono sockets for inputs and outputs (gold-plated for vinyl disc and pre-out), a toggle switch to select between MM and MC high/low output cartridges, and a special 5-pin DIN socket to take power from the power amplifier (or outboard supply).

The much larger and reassuringly heavy VIII power amplifier has a corresponding preamplifier power supply DIN socket alongside gold-plated phono inputs and 4mm loudspeaker connection sockets. The front panel has a chunky mains on/off switch, and that's it – well what more do you want... an on-board light show or something?

The preamplifier is very neatly built with a separate, good quality board for each channel and classy 317/337AT on-board power supply regulators. All circuits are discrete op-amps and the MC input uses a traditional multiple parallel transistor array for low noise. The power amplifier is again double mono and neatly executed. A large Holden & Fisher toroid transformer is shared between the two channels, each of which has a pair of Exposure-branded supply capacitors. Regulators pre-condition the preamplifier supply. It uses discrete class A/B bi-polar output devices with good layout and high quality build.

LAB REPORT

It's quite difficult to distinguish between the measured performance of this latest version of the VII/VIII combination and its predecessor (see issue no. 50), though the supply modulation spectrogram is now exceptionally clean and the RIAA equalised vinyl disc responses are also tidied up a little. The rest is history, plus or minus a few percent tolerancing.

Power output comfortably meets the modest specification with good bandwidth, the acceptable 2.4dBW drop into 4ohms being partly due to the channel shared supply transformer. The peak current of 10A is on the low side, but practical load tolerance is good.

Distortion levels are nothing special, with the MC disc input intermodulation standing out a little. Noise is fine, and both stereo separation and input overload margins are excellent. Channel balance and volume tracking both show good quality control, and input sensitivities are generous enough to match any ancillaries. Note, however, the moving magnet disc input capacitance is rather high for some cartridge types: a prior trial is advised here.

SOUND QUALITY

The Exposures still rate good overall, with some improvement over the earlier edition reflecting the upgrading in the power supply circuitry. Unusually, the MC vinyl disc input rating was higher than that obtained from CD sources. The sound is a little bandlimited subjectively, with some loss of high frequency 'air' and 'sparkle' and a 'boppy', well controlled bass that lacks full extension.

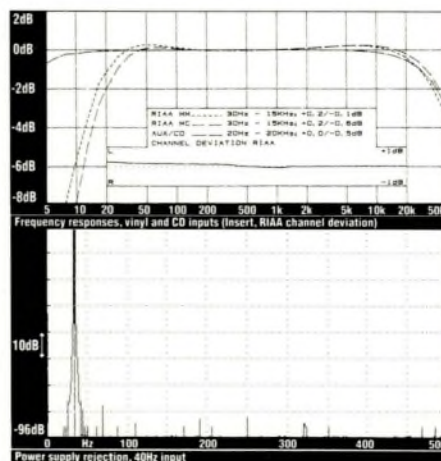
The midrange is nicely articulate with fine tonal balance but some loss of stereo transparency and depth. Treble is distinctly 'tidy' with little sibilance or 'grain', and the sound as a whole demonstrates a fine sense of rhythm and convincing dynamics. Compared with the MC input, CD possesses a 'wiry', 'sharpened' character that will prefer 'sweet' sounding partnering loudspeakers. The soundstage is generous and the rendition loud, with explosive dynamics and strong bass.

CONCLUSIONS

This well built and sensibly conceived pre-/power amplifier combination is nicely presented and delivers a very competent performance throughout. The listening test ratings are insufficient to ensure formal Recommendation at the £700 total price – however, the VII/VIII combo could be potentially recommended with the additional preamplifier power supply. Somewhat different from the norm, the Exposure pairing is likely to have particular appeal to rock music vinyl disc enthusiasts.

TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		50W (=17dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	18.0dBW	18.2dBW	17.5dBW	
Both channels, 4ohm load	15.2dBW	15.8dBW	14.4dBW	
One channel, 2ohms, pulsed	-dBW	14dBW	21V	
Instantaneous peak current		+11A	-11A	
Distortion				
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz	
	-77dB	-78dB	-60dB	
Intermodulation, 19/20kHz, rated power, aux input			-67dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-77dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-44dB	
Noise				
Disc (MM) input (IHf, CCIR weighted)			-68dB	
Disc (MC) input (IHf, CCIR weighted)			-70dB	
Aux/CD input (IHf, CCIR weighted)			-76dB	
Residual, unweighted (volume control at min)			-91dB	
DC output offset				
DC offset, preamp			left 15mV, right 9mV	
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHf)	40dB	38.2dB	37.6dB	
Disc (MC) input (IHf)	36.7dB	34.0dB	33.0dB	
Aux/CD input (IHf)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	72dB	75dB	65dB	
Aux/CD input	106dB	80dB	66dB	
Output impedance (damp)	0.26ohm	0.27ohm	0.27ohm	
Channel balance, disc, at 1kHz			0.06dB	
Volume/balance tracking				
Aux/CD input	0.02dB	0.19dB	0.38dB	
Input data				
	sensitivity	loading		
Disc (MM) input	1.06mV	47kohms	510pF	
Disc (MC) input	0.063mV	470ohms	—nF	
Aux/CD input	34mV	7kohms	280pF	
Power amp	183mV	—kohms	535pF	
Output, preamp (tape)	12.6 (12.2)V max,	5 (560)ohms		
Disc equalisation error, 30Hz-15kHz			+0.2dB, -0.5dB	
Size (width, height, depth)	Pre 25.2x8x27/Pow 34.5x9.5x24.2cm			
Typical price inc VAT				£360 + £340



HARMAN KARDON PM645Vxi

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



We have been gradually working our way through Harman Kardon's four model Vxi (volts times amperes, ie power) range for some issues now, and this review of the £300 645 plugs the final gap. Successive models on the price ladder show more extensive facilities and power, while the range as a whole shows good consistency in design philosophy. There is an obvious American accent in the cosmetics and technology, though manufacture is undertaken in Japan, to a standard which matches any Japanese brand.

Construction is metal throughout - fascia, chassis and cover wrap, though both the latter rattled readily if rapped. Finish is very nice indeed, though the controls themselves didn't feel particularly positive. The 45 shares the slimmer case of the 40, while adding a few of the features fitted to the more elaborate and chunkily styled 655.

The American influence is most obvious in the extensive range of facilities, including elaborate switch configurations for linking up a complete integrated audio and video system via the preamplifier section. This is achieved by adding an additional row of phono sockets for carrying (composite) video signals to and from VCRs and CTVs in parallel with audio pairs, so a VCR can be connected in place of a conventional cassette recorder, and a TV set left connected for use when pictures are available. Fortunately, HK's brochure is a model of clarity when it comes to explaining how various components connect together, even though the design has made no attempt to address some of the more esoteric considerations of 'hi-fi' image connection (Y/C component etc.).

Available in either black or 'champagne' finish, the layout is neat enough, with just the volume control properly distinguished by size. A string of six identical rotaries add bass, treble and balance, plus loudspeaker, VCR/tape and source switching. Five little pushbuttons - four more than the 40 - add 'phase correct loudness', subsonic filtering, mono/stereo mode, external processor (eg graphic or loudspeaker equaliser) selection, and MM/MC cartridge matching.

Then there's the power switch, headphone socket and indicator for the 4/8ohm voltage/current optimisation switch that is selected

on the rear panel. The latter is festooned with phonos for two vinyl, three line level plus two tape recorders and the processor in/out patch, and has two sets of loudspeaker binding posts.

Internal inspection reveals a generous power supply with entirely discrete component circuitry, preamplifier included, mounted on a number of boards which are neatly enough arranged. There are a number of good quality components, and the class A/B power stage has two large complementary output transistors per channel.

LAB REPORT

Power delivery is well above specification, and well maintained into low impedances and across the whole bandwidth. The maximum peak current capability should ensure fine tolerance of different loudspeaker loads. The power modulation spectrogram result is satisfactory, with the 100Hz component at -80dB.

Most of the other measurements are satisfactory or better, apart from the IM distortion and overload margin on the phase-inverting MC vinyl disc stage, both of which look distinctly marginal. The frequency responses are probably flat enough for tonal neutrality, but are certainly not as carefully tailored as some, while the ultrasonic rise on the moving coil disc input might create unpredictable interactions with the odd cartridge.

SOUND QUALITY

The overall rating for sound quality just made the 'good' category, which is respectable rather than exceptional for the price. Results were pretty consistent with both vinyl disc and CD sources, with a positive initial impression but some difficulty in holding on to long term listener involvement.

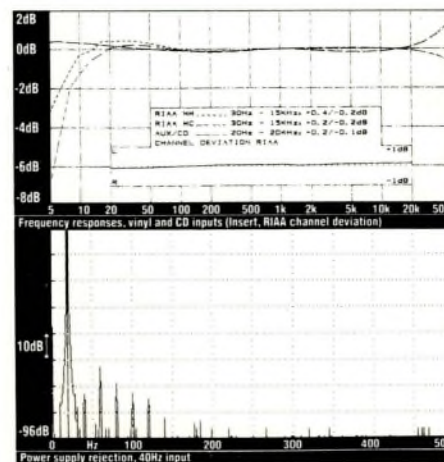
The sound is lively and detailed, with fine bass slam and precision, good detailing and transient reproduction, and a pleasant, slightly 'rounded' treble. Stereo images are nicely presented, but there is some loss of 'air' and atmosphere in the upper ranges. The particular strength in the bass perhaps favours rock and popular music rather than classical type material.

CONCLUSIONS

The 645Vxi comfortably passes muster in most respects, and shows no serious technical or sonic flaws. Though good, it's not the best sounding amplifier in this competitive price area and so falls just short of formal Recommendation. But it's nevertheless well worth considering, particularly for those who anticipate integrating TV/video facilities in their hi-fi systems in the not too distant future - a very important consideration given the rapid changes in broadcast technologies.

TEST RESULTS

		Integrated amplifier 60W (= 17.8dBW)		
Power output			1kHz	20kHz
Rated power into 8ohms, maker's spec				
Power output	20Hz	20.3dBW	20.3dBW	20.3dBW
One channel, 8ohm load	20.4dBW	17.4dBW	17.9dBW	17.7dBW
Both channels, 4ohm load	17.4dBW	19dBW	-dBW	-dBW
One channel, 2ohms, pulsed	-dBW	+20A	-20A	-20A
Instantaneous peak current				
Distortion				
Total harmonic distortion,	20Hz	1kHz	20kHz	
at rated power, aux/CD input	-64dB	-65dB	-62dB	
Intermodulation, 19/20kHz, rated power, aux input				-80dB
Intermodulation, 19/20kHz, at 0dB, disc (MM)				-64dB
Intermodulation, 19/20kHz, at 0dB, disc (MC)				-29dB
Noise				
Disc (MM) input (IHF, CCIR weighted)				-70dB
Disc (MC) input (IHF, CCIR weighted)				-67dB
Aux/CD input (IHF, CCIR weighted)				-72dB
Residual, unweighted (volume control at min)				-78dB
DC output offset				left 0mV, right 0mV
DC offset, preamp				left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	28.3dB	28.3dB	27.7dB	
Disc (MC) input (IHF)	25.6dB	25.0dB	16.2dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	63dB	82/91dB	61/76dB	
Aux/CD input	62dB	74/94dB	50/68dB	
Output impedance (damp)	0.09ohm	0.09ohm	0.1ohm	
Channel balance, disc, at 1kHz				1.0dB
Volume/balance tracking	0dB	-20dB	-60dB	
Aux/CD input	0.32dB	1.02dB	0.1dB	
Input data		sensitivity	loading	
Disc (MM) input		0.31mV	47kohms	180pF
Disc (MC) input		0.032mV	50ohms	—nF
Aux/CD input		18.5mV	27kohms	345pF
Output, preamp (tape)			80V max	—ohms
Disc equalisation error, 30Hz-15kHz			+0.2dB, -0.1dB	
Size (width, height, depth)			44.3x10.3x35.3cm	
Typical price inc VAT				£300



HITACHI HA-006

HITACHI SALES (UK) LTD., HITACHI HOUSE, STATION ROAD, HAYES, MIDDLESEX UB3 4DR. TEL: (01) 848 8787.



The Hitachi UK sales operation is oriented towards the mainstream consumer electronics markets, where hi-fi components tend to be midi system based. While the company has announced its intention of moving more seriously into separates hi-fi, and has always had a tuner with pretensions to the state of the art, there is no avoiding the fact that fashion now virtually dictates a full 430mm width for separates – and the £120 HA-006 was the only 'midi' component to come in for this latest set of tests. Not that the width influences performance in any negative way – and a height of nearly 13cms leaves plenty of room inside for the components. It's more a matter of attitudes and expectations, on the part of both designers and customers. The fact that a fairly extensive range of A/V switching facilities is provided yet low output MC cartridges are not accepted is indicative.

The midi width is reflected in the flashy midi style of feature oriented presentation, though the '006 successfully avoids going to extremes. Ergonomics are pretty straightforward, while the switchbank has LED indicators and shares brightwork highlights with the volume control rim.

Appealing to all ages, with optional wooden endcheeks for traditionalists and shiny feet for the trendy, the latter might offer a minimal degree of vibration isolation in this instance, while the former could help damp the rather rattly metal wrap – though I wouldn't bet on either. No doubt attempting to supplement the rather dry instruction manual, the front panel sees fit to inform us that the: "low impedance Pure Drive volume control circuit ensures optimum signal characteristics for use with digital audio components".

Small rotaries provide 4-way speaker switching (off, a, b, a+b), bass, treble and balance. Sporadic small switches operate defeat switch too, loudness, stereo/mono, –20dB mute and subsonic filtering (15Hz), and a row of large pushbuttons select the various inputs and tape monitoring.

Three prominently placed gold-plated phono sockets immediately below the volume control parallel similar (cheap skate unplated) connectors on the rear. Designated for patching in video recorders, these

trios accept and switch a composite video signal alongside stereo audio to a video output socket on the rear, and thence to a CTV. The front panel set is useful for patching a recorder in temporarily.

The internal multi-board layout seems a little haphazard, though detail assembly is neat. Integrated circuits are used extensively, with an op-amp for the vinyl disc input and a thick-film hybrid for the class A/B complementary DC coupled output. A good sized transformer and two 8,200µV 50V capacitors are shared by both channels.

LAB REPORT

Power output easily meets the rated 55W specification on 8ohms, but the drop recorded with both channels driving 4ohms is rather excessive. Peak current capability is fair enough, but lower impedance loudspeakers, or use of two sets simultaneously is probably better avoided. The supply modulation spectrogram is impressively clean.

The same applies to most of the other lab measurements, leaving little room for nit-picking. The frequency responses are accurately tailored with sensible bandwidth limitation; distortions and noise are low; input sensitivities are sensible and headroom adequate.

SOUND QUALITY

Reflecting the feature rather than sound quality orientation, listening tests gave largely negative results, with vinyl disc consideration significantly weaker than performance with CD. Vinyl was considered uninspiring, with a soft and anaemic sounding bass, a 'lispy' treble and a degree of muddle with little 'hear through' clarity. Stereo lacks focus, scale and depth, and dynamics are muted.

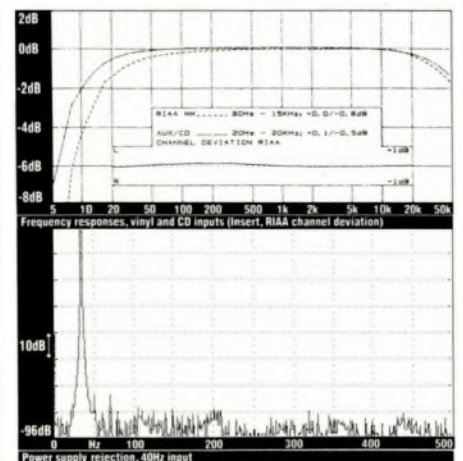
CD does register an improvement, but many of the same criticisms were still voiced by listeners. Bass lacks precise timing, sounding loose and a touch boomy; treble again suffered some 'sizzle'. The midband sounds a little hard, though detail is rather clearer, and there is a tendency towards fatigue in long term listening.

CONCLUSIONS

Hitachi's '006 with its extensive A/V switching is clearly aimed more towards the mass market consumer rather than the hi-fi enthusiast. As such it is not unsuccessful, providing good lab performance and decent ergonomics with fine build and finish. However, it remains surprising that the company is out of step in adopting a midi width while others are trying to establish full width so as to make the distinction clear between systems and components – perhaps Hitachi is after the midi system replacement amplifier market! Certainly '006 doesn't make the subjective grade as a specialist hi-fi amplifier.

TEST RESULTS

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	55W (=17.4dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.8dBW	19.6dBW	18.5dBW
Both channels, 4ohm load	14.9dBW	15.6dBW	15.2dBW
One channel, 2ohms, pulsed	-dBW	15.5dBW	-dBW
Instantaneous peak current	+12A	-14A	
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
Intermodulation, 19/20kHz, rated power, aux input	-80dB	-80dB	-70dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-78dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-80dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-71dB
Aux/CD input (IHF, CCIR weighted)			-71dB
Residual, unweighted (volume control at min)			-72dB
DC output offset		left 16mV, right 12mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	30.8dB	29.5dB	26.8dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc (MM) input	75dB	73dB	48dB
Aux/CD input	82dB	73dB	48dB
Output impedance (damp)	0.135ohm	0.136ohm	0.2ohm
Channel balance, disc, at 1kHz			0.48dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.10dB	0.23dB	2.2dB
Input data			
	sensitivity	loading	
Disc (MM) input	0.39mV	45kohms	110pF
Aux/CD input	24mV	41kohms	1.1pF
Output, preamp (tape)		8.5V max,	1kchm
Disc equalisation error, 30Hz-15kHz		+0.0dB,	-0.8dB
Size (width, height, depth)			37x12.9x29.8cm
Typical price inc VAT			£120



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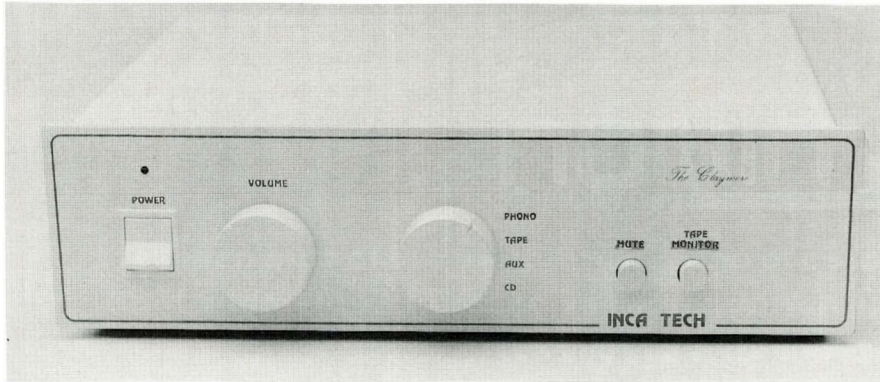
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RECOMMENDED



The chunkily styled, cutely titled *Claymore* 50W integrated amplifier has been busily building something of a cult reputation for itself recently. This British amplifier is available in a variety of colours, and our sample was finished in white with gold lettering and gold plated screws holding the case together.

Moving coil cartridge sensitivity can be selected via switches accessed through a hole in the bottom of the case. A preset balance control is also set by a screwdriver from underneath. A rotary switch allows selection of disc, CD, and aux, with pushbutton switches selecting tape monitor and mute. The back panel has a standard set of phono signal and 4mm speaker sockets.

The case is made from two 'U'-shaped metal pressings, the chassis of aluminium and the cover of steel. Inside a single double-sided printed circuit board contains all the active circuitry. The toroidal power transformer is mounted directly onto the PCB and feeds 4x4700µF Elna smoothing capacitors (one pair per channel).

The power amplifier comprises discrete components feeding the MOSFET output transistors, with the aluminium case acting as heatsink. Good quality commercial grade components are used throughout, and some care has been taken to select components that provide good sound quality at reasonable prices. The disc input stage relies on selected, low noise, high quality operational amplifiers. The speaker terminals are wired to the board via spade connectors, which in our opinion would benefit from hardwiring. And the volume control could also have been better secured with tighter channel tolerancing.

LAB REPORT

The *Claymore's* 50W rated power was met with only a small margin of 8ohms, and output fell by 3dB with both channels driven into a 4ohm load. However, the peak current was a very adequate ±20A, which provided a pulsed output of 16dBW into 2ohms on one channel.

Total harmonic distortion was poorer than average, but this is merely indicative of a low feedback design, and there seems little correlation between sound quality and mea-

sured harmonic distortion. Intermodulation distortion products were quite well suppressed. With the exception of the moving coil input, which was just acceptable, noise figures were all very good. DC offset was a little high on one channel. The output impedance was negligible.

Overload margins were unexceptional but should be adequate in practice. Stereo separation was just average, showing some decline at high frequencies. Volume/balance tracking was passable except at low levels, where it would benefit from a better potentiometer. Input sensitivities and loadings have been sensibly selected, while disc equalisation was reasonably accurate, with a subsonic rolloff and a slight HF boost that continued above the audio bandwidth. The bass anomalies on the moving magnet charted response were caused by clipping due to the modest overload margins. The power supply spectrogram results were unexceptional, showing some 100Hz breakthrough.

SOUND QUALITY

First auditioned on the moving coil input, the *Claymore* sounded dynamic and 'punchy' with a lively sense of drive and rhythm. Stage focus and depth were nicely portrayed, with soloists well separated from the backing performances. Central focus was sharp and stable. The treble was rated above average, essentially free from sibilance or 'grit', though a touch more clarity and sparkle would be welcome. The bass proved articulate and sounded sufficiently extended.

Some improvement in clarity and focus was obtained from the CD input, while the bass sounded faster. The treble appeared more open and the midrange was both impressively detailed and articulate. Here the *Claymore* proved itself, competing with some of the better examples in its class. Driven hard, it clipped without unpleasantness, and higher than expected sound levels could be attained.

CONCLUSIONS

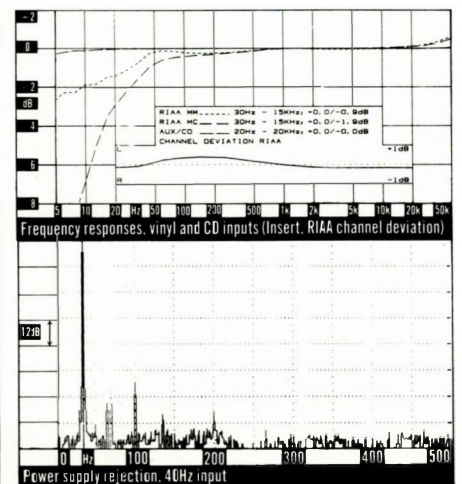
Clearly the good reputation enjoyed by this specialist amplifier has not been misplaced. Constructional standards will hopefully be improved, along with a volume control with

better channel matching at low volume settings; the accuracy of the RIAA components could also have been tighter. On the plus side, it was a load tolerant design offering a good power capacity and a well balanced, musical sound. Mid clarity and instrumental separation were strong points, while the solid, rhythmic bass also deserves mention. Such a performance merits firm recommendation.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		50W (=17dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.3dBW	17.5dBW	17.2dBW
Both channels, 4ohm load	13.8dBW	14.4dBW	13.9dBW
One channel, 2ohms, pulsed	-dBW	16dBW	-dBW
Instantaneous peak current		+20A	-20A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD in.	-50dB	-51dB	-48dB
Intermodulation, 19/20kHz, rated power, aux input			-78dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			68dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-62dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-78.0dB
Disc (MC) input (IHF, CCIR weighted)			-63dB
Aux/CD input (IHF, CCIR weighted)			-86dB
Residual, unweighted (volume control at min)			-88dB
DC output offset			
DC offset, preamp		left 1mV, right 35mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	17.8dB	17.2dB	15.6dB
Disc (MC) input (IHF)	20.1dB	16.6dB	14.39dB
Aux/CD input (IHF)	15.6dB	15.6dB	13.8dB
Stereo separation			
Disc input (MM)	57dB	56dB	34dB
Aux/CD input	52dB	50dB	35dB
Output impedance (damp)	0.05ohm	0.05ohm	0.06ohm
Channel balance, disc, at 1kHz			0.27dB
Volume/balance tracking			
Aux/CD input	0.0dB	1.84dB	7.0dB
Input data			
	sensitivity	loading	
Disc (MM) input	0.27mV	28kohms	140pF
Disc (MC) input	0.264mV	470ohms	n/a nF
Aux/CD input	27.2mV	35kohms	20pF
Output, preamp (tape)		10V max,	-ohms
Disc equalisation error, 30Hz-15kHz		+0dB,	-1.9dB
Size (width, height, depth)			34x9.4x30cm
Typical price inc VAT			£345

Reprinted from issue No 56



MUSICAL EVENINGS

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Hi-Fi Experience are pleased to announce that we are to hold a series of Mission musical evenings during the week of 19-23 September 1988. The schedule of musical evenings is as follows:-

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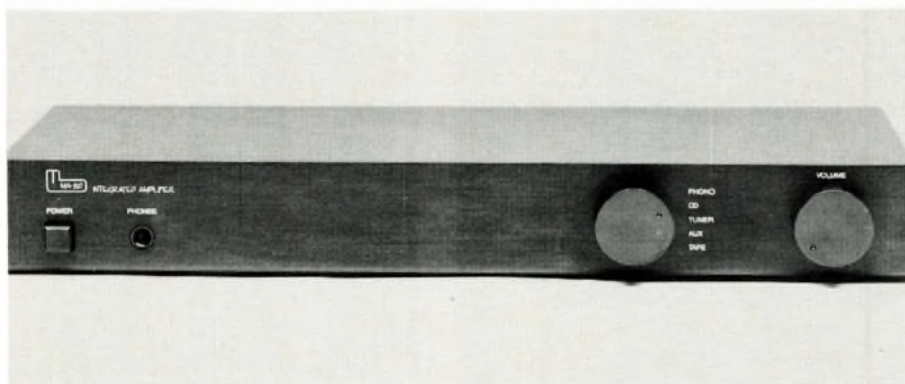
Leamington Spa
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Leamington Spa, Warks.
Tel: 0926 881500

Birmingham
Superfi. 67 Smallbrook,
Queensway.
Tel: 021-631 2675

ITL MA-80

ITL, 158 NEW ROAD, PORTSMOUTH, HAMPSHIRE PO2 7RJ. TEL: (0705) 293051.

RECOMMENDED



The nicest surprise of the Bristol hi-fi show, held in February 1988, was probably the debut of new Portsmouth-based amplifier manufacturer ITL. The surprise was not that a new brand of amplifier was appearing on the scene – which happens several times a year and often at hi-fi shows – but that this previously unknown company was starting off with no less than six brand new models.

The range starts with the compact integrated £150 MA-80 reviewed here. At £100 and £130 respectively there are separate pre- and power amplifiers based on the same 'midi' width chassis. The larger 120, '12 and 200 models cost correspondingly more – £330 for the integrated and £440 for the pre/power combination – and will no doubt receive *Choice* scrutiny in due course.

The MA-80 is a simple affair, with minimal facilities confined to the basic handling of vinyl disc and up to four line level inputs (CD player, tuner, 'VCR' and tape recorder), with just a volume control feeding the MOSFET output stages – the latter being regarded as something of a luxury in themselves.

Such a layout leaves little room for either cosmetic creativity or ergonomic errors. It takes a while to get used to the fact that the strange logo typeface is deliberate, not just an unfortunate accident involving a dipsomaniac spider. That aside there are no surprises, just decent size knobs for volume and input selection, a headphones socket and power switch.

All signal sockets are phonos, the vinyl disc input designed for both MC and MM cartridges. Each channel loudspeaker output has three 4mm sockets, one pair connected directly for maximum quality, the other via the headphone socket for the convenience of private listeners. Two metal sections form the chassis and cover, doubling up as heat-sinks. The surface finish is pretty ordinary, but the unit as a whole is nicely enough built, without sharp edges and corners, and with enough mechanical integrity to avoid much vibration excitation.

Internally this is a simple, single board design, using Hitachi MOSFET output devices. The disc input is based on two NE5532 op-amps, gain switched for MM or MC, but maybe a little short of gain for the

latter. Good quality Alps remote switching is used on the inputs.

LAB REPORT

The modest 30W rating is comfortably exceeded at 8ohms, though the limited power supply is reflected in the significant drop into 4ohms; the 20kHz figure here was blocked by distortion components. Nevertheless the peak current figure is pretty good. The THD readings again show the high frequency distortion problem, though the IM figures are rather good.

The supply modulation spectrogram gives a rather poor result, the 100Hz component appearing at a highish –50dB, and the vinyl disc frequency response shows a slight error in the RIAA equalisation, though the CD input is flat. The final weak spot is the noise level on the MC disc input setting: –57dB is not really sufficient, so higher output MC cartridges will be the better choice, though even a Koetsu didn't really drive the stage hard enough.

All the other measurements gave satisfactory results, including input sensitivities and overload margins, separation, volume/balance tracking, DC offsets, output impedance and channel balance.

SOUND QUALITY

There was a significant discrepancy between the ratings for vinyl disc and CD sources. The latter was comfortably preferred, and indeed achieved a confident good rating, though vinyl only rated fair. Criticisms here focus on a narrow and rather small soundstage, with some low bass softening and a slight hardness and 'edge' at higher frequencies, adding some 'lispiness' through the treble.

CD delivers a good dynamic range and decent loudness capability, along with much improved clarity and definition. Again the low bass could have been firmer and faster, but focus and transparency are much improved and the treble region sounds open and sweet.

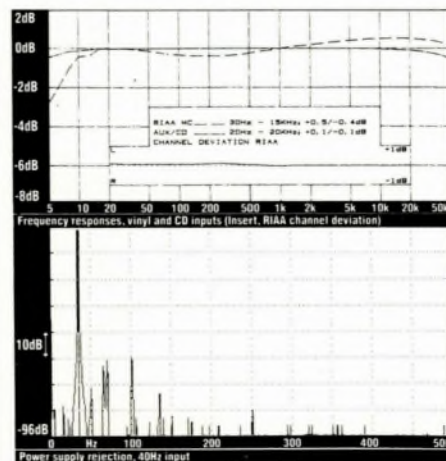
CONCLUSIONS

On balance this is a fine result for a brand new amplifier from a brand new company, and clearly deserves Recommendation for

the sound quality it delivers at a relatively modest price. However, there is clearly room for both technical and subjective improvements in the vinyl disc stage, which doesn't measure up to the performance with CD. Were this aspect to be improved by more accurate equalisation, and perhaps by optimisation to either MM or MC rather than attempting both, a Best Buy rating could well be on the cards.

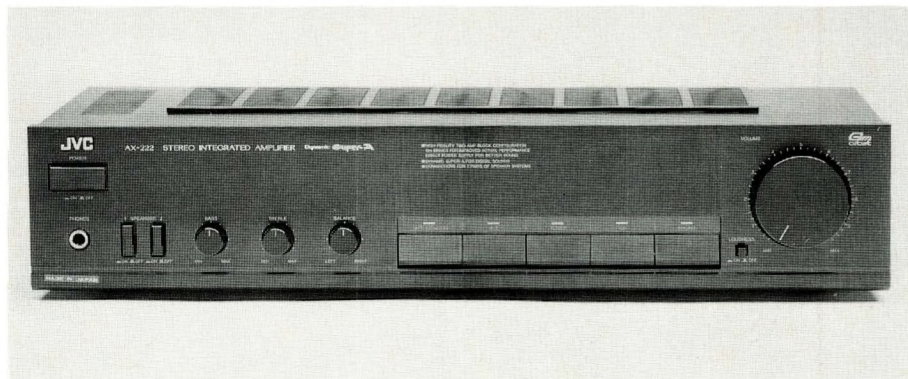
TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		30W (= 14.8dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	16.4dBW	16.4dBW	16.1dBW	
Both channels, 4ohm load	13.0dBW	13.5dBW	0dBW	
One channel, 2ohms, pulsed	–dBW	14dBW	–dBW	
Instantaneous peak current		+14A	–13A	
Distortion		20Hz	1kHz	20kHz
Total harmonic distortion, at rated power, aux/CD input		–65dB	–65dB	–40dB
Intermodulation, 19/20kHz, rated power, aux input				–65dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)				–8.1dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)				–80dB
Noise				
Disc (MM) input (IHF, CCIR weighted)				–74dB
Disc (MC) input (IHF, CCIR weighted)				–57dB
Aux/CD input (IHF, CCIR weighted)				–78dB
Residual, unweighted (volume control at min)				–82dB
DC output offset			left 19mV, right 23mV	
DC offset, preamp			left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	27.2dB	27.2dB	26.3dB	
Disc (MC) input (IHF)	27.7dB	27.7dB	21.7dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	53dB	53dB	43dB	
Aux/CD input	53dB	53dB	44dB	
Output impedance (damp)	0.1ohm	0.12ohm	0.19ohm	
Channel balance, disc, at 1kHz			0.06dB	
Volume balance tracking	0dB	–20dB	–60dB	
Aux/CD input	0.04dB	0.23dB	2.27dB	
Input data		sensitivity	loading	
Disc (MM) input	0.44mV	47kohms	100pF	
Disc (MC) input	0.048mV	47ohms	100nF	
Aux/CD input	31mV	90kohms	40pF	
Output, preamp (tape)		7.6V max,	100ohms	
Disc equalisation error, 30Hz–15kHz		+0.5dB,	–0.4dB	
Size (width, height, depth)			42x5.5x23cm	
Typical price inc VAT			£150	



JVC AX-222

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



As inventors of the VHS videorecording system which has become the de facto world standard, JVC seems to have paid rather less attention to specialist hi-fi in recent years. Not that the company has neglected it altogether (unlike some we could name), but certainly attention has been directed more towards the mainstream consumer electronics market, with a broad range of audio and video products that cover all manner of personals, portables, midi systems and the like.

However, the company has always had a strong reputation in the budget separates sector – perhaps more oriented towards build quality or value for money than sound quality per se – and the £109 35W 222 tested here is one of several such models.

In defiance of the current fashion for discrete minimalism, the front panel carries sufficient propaganda to render sales literature redundant. *Dynamic Super A* is one key ingredient “for digital sounds” we are elsewhere informed. A ‘Gm circuit’, stresses the use of Germanium driver transistors “for improved actual performance”. This “high fidelity two amp block configuration” incorporates a “direct power supply for better sound”. While for those too idle to look at the back panel, there are “connections for two pairs of speaker systems” (though we wouldn’t advise using both at once). Perhaps it’s all an attempt to compensate for a rather inscrutable multi-lingual instruction book.

The 222 is solidly enough built and shows sensible enough ergonomics. The volume control is nice and large, if a trifle indifferent in feel, and a small loudness button is located nearby. Large LED-indicated pushbuttons select tape monitor, aux, tuner, CD and phono (vinyl disc for readers born into the TV age). Little rotaries apply bass and treble tone bending if so desired, alongside balance and on/off switching for both sets of loud-speaker terminals, plus a headphones socket and power switch.

Construction is standard but certainly solid enough, using metal for chassis, fascia and wrap. The latter has ventilation slots (partly in a plastic insert) for the internal heatsinking, and large slots in the base should ensure good cooling even amongst a stack of other components. The rear panel

uses phono sockets throughout, accepting high output (usually moving magnet) cartridges only on the vinyl disc input, and accommodating just one tape recorder. Two sets of slightly flimsy binding posts accept bare wires but not 4mm plugs.

The internal multi-board layout seems a bit haphazard, with the generous power supply sitting in the middle of everything, but good quality components and remote input switching are both used. The vinyl disc stage is an IC op-amp and the class A/B complementary direct coupled power amplifier is assembled from discrete components.

LAB REPORT

The measured performance turned out to be a rather mixed bag. While the 222 meets its basic power spec. without difficulty, the drop into 4ohms with both channels driving is a little severe, and protection prevented us obtaining a 2ohm figure. The peak current capability is pretty miserly too, and the supply modulation spectrogram reveals a 100Hz component at only –58dB.

Distortion figures are good, noise satisfactory, but stereo separation is both marginal and asymmetric at higher frequencies and the output impedance is on the high side. The frequency responses are reasonably flat, but the RIAA equalisation and channel balance could both be improved with closer component tolerancing. The remaining measurements are all satisfactory, though the highish vinyl disc input capacitance should be noted as it might influence cartridge selection.

SOUND QUALITY

Sound quality is disappointing, certainly below average and heading for a poor overall rating, though the results with CD were marginally preferred. Using vinyl disc there was criticism of ‘slowness’ alongside treble ‘brittleness’ and sibilant emphasis. The midband has a mild ‘nasal’ coloration and bass is resolutely nondescript. Detail and clarity are below par, and the stereo image is vague, flat with weak focus. Not actively unpleasant, the sound is determinedly lightweight.

Compact disc renders marginal improvements in the bass but the music remains fun-

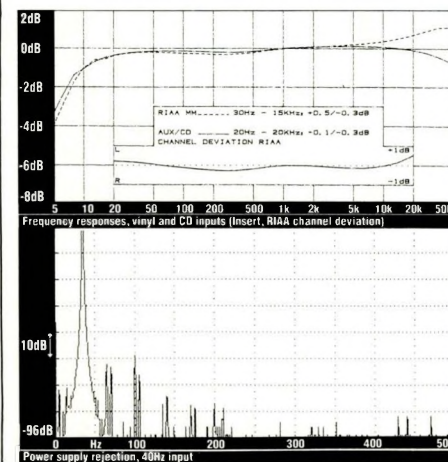
damentally uninvolved. The amplifier itself never ‘disappears’ sonically, adding hardness and grain and imparting a ‘wiry’ character to string tone, for example.

CONCLUSIONS

The AX-222 is competitively priced considering the engineering content, feature count and build quality, and the lab performance just about passes muster (just about). But the sound quality is altogether too uninspiring for Recommendation, and in some senses is indicative of the gap which continues to open between the mainstream consumer electronics brands and the hi-fi specialists.

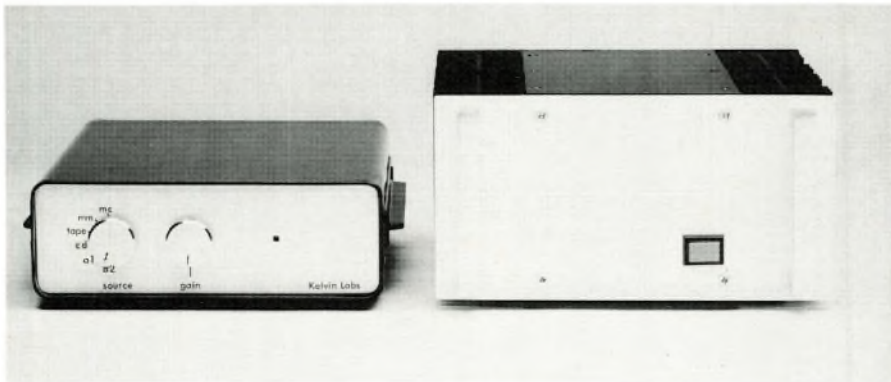
TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		35W (=15.5dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	17.0dBW	17.0dBW	16.9dBW	
Both channels, 4ohm load	13.3dBW	14.0dBW	13.9dBW	
One channel, 2ohms, pulsed	–dBW	*dBW	–dBW	
Instantaneous peak current		+7A	–6A	
Distortion				
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz	
	–62dB	–87dB	–78dB	
Intermodulation, 19/20kHz, rated power, aux input			–86dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			–87dB	
Noise				
Disc (MM) input (IHF, CCIR weighted)			–67dB	
Aux/CD input (IHF, CCIR weighted)			–69dB	
Residual, unweighted (volume control at min)			–82dB	
OC output offset			left 7mV, right 19mV	
DC offset, preamp			left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	30.1dB	29.4dB	28.8dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	73dB	42/58dB	18/34dB	
Aux/CD input	62dB	40/56dB	16/32dB	
Output impedance (damp)	0.23ohm	0.22ohm	0.24ohm	
Channel balance, disc, at 1kHz			0.85dB	
Volume/balance tracking	0dB	–20dB	–60dB	
Aux/CD input	0.12B	0.92dB	1.06dB	
Input data				
	sensitivity	loading		
Disc (MM) input	0.38mV	48kohms	260pF	
Aux/CD input	23.3mV	39kohms	280pF	
Output, preamp (tape)		8.6V max, 850ohms		
Disc equalisation error, 30Hz–15kHz		+0.5dB, –0.3dB		
Size (width, height, depth)		43.6x9.5x25cm		
Typical price inc VAT			£109	



KELVIN LABS JUNIOR/J30

6 SHANKLIN CRESCENT, UPPER SHIRLEY, SOUTHAMPTON SO1 2RB. TEL: (0703) 785123.



Kelvin Labs is one of the smaller, newer British companies, operating out of Southampton and driven primarily by an enthusiasm for class A amplification. The combination tested here is the *Junior* preamplifier and *J30* power amplifier, the least expensive models in the range selling at £295 each. One might be forgiven for assuming that the *J30* might bear some relationship to the 8ohm power output, but the specification is in fact only 20W, which doesn't sound much but in fact is not bad for a small class A device. Kelvin also has more expensive models, including a £575 *MCI* preamplifier and a (60W) *M60* monoblok power amplifier that retails at £1,895 a pair.

The *Junior* is a simple, minimalist design housed in one of the small Radiospares boxes that are so useful for the smaller company faced with getting both metalwork and electronics together. There are two knobs, one for gain (volume) the other for input selection. And that's all. The rear panel uses phono for MC (gold-plated) and MM disc and for the signal output to the power amplifier. The other four line level inputs/outputs use 5-pin DIN connectors, but to phono type compatible standards; DINs are increasingly rare these days, but arguably more convenient (especially for tape recorder connection). There is no built in power supply, *Junior* taking energy from *J30* via 4-pin DIN.

Since class A operation invariably means lots of waste heat, generous cooling provisions are essential, and siting should also take account of air circulation and avoid precious vinyl collections. The *J30* stereo power amp has generous heatsinks down both sides, and the output transistors are actually brought outside the main case and mounted directly on the sinks. The very thin fins do their job well enough, but are quite sharp and clearly threaten knuckle grazing as a secondary function.

Though our samples were pre-production, the aluminium front panel is well enough finished, with just an on/off illuminated pushbutton. The rear has well spaced 4mm socket/binding posts for loudspeakers, the power-to-preamplifier DIN output and two pairs of phono inputs. Casework is all metal with small vent grilles for internal power

supply and driver stage cooling. The well built preamplifier uses an FET input and bipolar, with polystyrene capacitors. RIAA vinyl disc equalisation has active bass boost with a passive HF section. The power amplifier is neat and tidy, using a shared dual rail supply.

LAB REPORT

Though 20W is a modest enough specification, the *J30* just failed to meet it, so this is clearly a design which will be best suited to fairly sensitive loudspeakers, or listeners who don't require high levels. Nevertheless the delivery pattern shows good bandwidth and load tolerance, the 8.5A peak current is ample under the circumstances, and the -80dB power modulation worst case is quite satisfactory.

Distortion figures are not particularly good, but are not particularly bad either. Signal-to-noise ratios are a bit marginal bearing in mind the performance of CD players, and the -56dB on the MC vinyl disc input is not really sufficient either.

The basic frequency responses are flat, with a very wide power amplifier bandwidth, but the RIAA equalisation is a bit of a roller coaster, +1dB from 100-300Hz and -1dB above 5kHz, discrepancies which will influence the subjective tonal balance. The other measured parameters are quite satisfactory, though the power amp input impedance is a rather low 10kohm, so caution is necessary if planning to partner alternative preamps.

SOUND QUALITY

Assessed in isolation, the power amplifier achieves a very good overall sound quality rating, but the *Junior* preamplifier brings this back to a straight good, with fair consistency between vinyl and CD. The limited power output is clearly evident when using insensitive loudspeakers, and the MC input hiss level is only just acceptable.

Aside from those points, the sound is 'boppy' and dynamic with a sweet, detailed midband and clean, slightly 'dry' treble character. Vocals are accurate and well defined without sibilant exaggeration, and the generous, solid stereo images show good depth and focus. The overall character is pleasantly

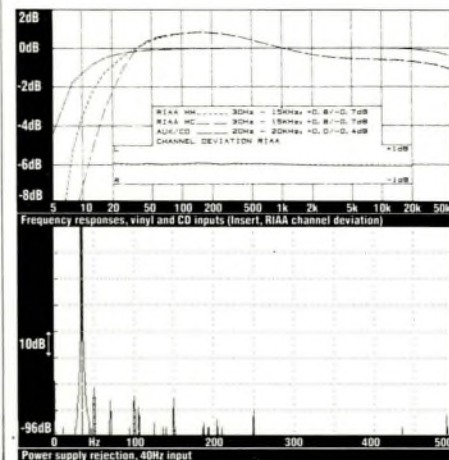
musical and well controlled.

CONCLUSIONS

Respectable enough on the lab test programme, with a sweet and attractive subjective performance, this is a neat and competent performer that augers well for the future of this new company. The only reservation that mitigates against formal Recommendation is a price which is a little high, particularly considering the low power output, but if the latter consideration is unimportant it is well worth considering - and auditioning.

TEST RESULTS

Power output		Separate pre- and power amplifier	
Rated power into 8ohms, maker's spec		20W (= 13dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	12.3dBW	12.7dBW	12.7dBW
Both channels, 4ohm load	10.6dBW	11.6dBW	11.3dBW
One channel, 2ohms, pulsed	-dBW	10.5dBW	-dBW
Instantaneous peak current		+8.5A	-8.5A
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-62dB	-64dB	-52dB
Intermodulation, 19/20kHz, rated power, aux input			-67dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-57dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-57dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-66dB
Disc (MC) input (IHF, CCIR weighted)			-56dB
Aux/CD input (IHF, CCIR weighted)			-70dB
Residual, unweighted power amp			-85dB
DC output offset		left -21mV, right -12mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	43.0dB	42.2dB	24.3dB
Disc (MC) input (IHF)	41.1dB	41.0dB	26.2dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	54dB	80dB	70dB
Aux/CD input	75dB	77dB	58dB
Output impedance (damp)	0.064ohm	0.067ohm	0.08ohm
Channel balance, disc, at 1kHz			1.05dB
Volume/balance tracking			
Aux/CD input	0dB	-20dB	-60dB
	0.07dB	0.40dB	5.0dB
Input data			
	sensitivity	loading	
Disc (MM) input	1.83mV	47kohms	120pF
Disc (MC) input	0.22mV	100ohms	—nF
Aux/CD input	300mV	50kohms	10pF
Power amp	260mV	10kohms	—pF
Output, preamp (tape)		8.1V max, 7ohms	
Disc equalisation error, 30Hz-15kHz		+0.8dB	-0.7dB
Size (width, height, depth)		23x13x25cm;	23x8.0x28.5cm
Typical price inc VAT		£295 +	£295



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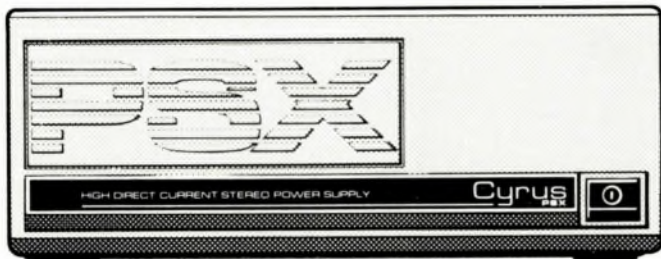
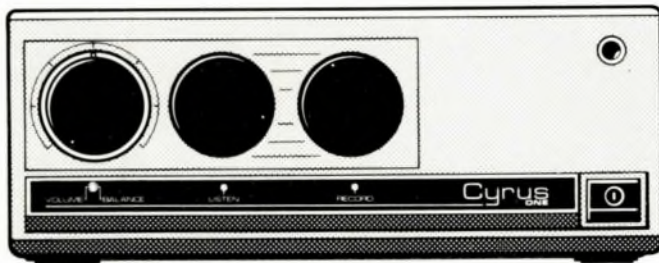
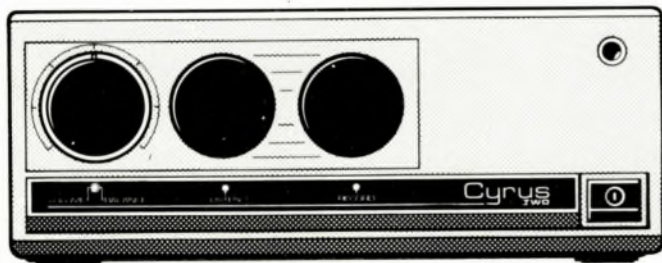
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KENWOOD KA-550D

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RECOMMENDED



Known as Trio for more than a decade in the UK – a distinction shared only with the Japanese home market – this company ran foul of the pre-CD slump of a few years ago but was helped by the much larger Toshiba group. The brand was then relaunched worldwide under the Kenwood banner, and has been gathering a growing reputation and market share, not least because of highly competitive pricing in the budget separates sector.

The £130 *550D* is a typical enough budget amplifier, albeit with the high standard of external finish that has become something of a Kenwood hallmark – just that little bit deeper gloss on the inevitable black. The price is the same as last year's *550*, but the new version lacks the low output (MC) cartridge compatibility that was an impressive feature at the price – this is effectively a disguised price rise.

Construction is metal throughout, though the top is rattly. The fascia is dominated by the large concentric volume/balance control, the two channels friction-locked for normal operation but allowing independent channel adjustment without the need to have an extra potentiometer in circuit (the tight friction locking making fine adjustment an awkward two-handed job).

Tone controls continue to get smaller year by year, but the *550D* has the usual bass and treble rotaries that still seem obligatory amongst the ranges of most bigger manufacturers. Two rotary switches provide some visual symmetry. One handles the basic source input selection, the other combines selection of or dubbing between two tape recorders with an LED-highlighted 'source direct' position which provides direct-to-volume control connection of CD, vinyl disc and 'aux' sources. It sounds complicated when spelt out, but is in fact neat, flexible and simple to master.

Then there's a headphones socket, a power switch, and that's your lot. Apart from the large shiny feet. Definitely the cosmetic accessory for '88, at least Kenwood makes an attempt to provide a measure of vibration rejection, though this budget model lacks the elaborate spring/hinge arrangement that is fitted to some upmarket models. The rear panel has phono sockets throughout, for high

output (MM) cartridges, three line sources (tuner, CD, 'aux'), plus two tape recorders. Decent size binding posts handle loud-speaker connection.

LAB REPORT

A logical development of the *550*, assisted by UK opinion, this simple budget amplifier uses normal commercial grade components and class A/B complementary direct coupled circuitry. Despite the fact that specification power seems to have slipped 5W from 40W to 35W, the power capabilities of the *550D* are practically indistinguishable from its predecessor – save that on this occasion the peak current output is a nicely symmetrical and generous $\pm 15A$. Delivery clearly exceeded the spec in any case, and still held up reasonably well into lower impedances. The power supply modulation spectrogram shows mild mains artefacts at around $-76dB$.

The various distortion and stereo separation measurements are all good enough, if marginally poorer than those of its predecessor. Noise figures and input overload margins are ample and output impedance usefully low, but the DC offset is a little high.

The various input parameters seem to be generally sensibly chosen, though the very high 600pF capacitance on the vinyl disc input is a source of some concern. This will certainly influence the tonal balance of a number of cartridges, yet the wide variety of possible combinations make it difficult to predict the effect in a given system context. The disc input response shows good channel correspondence and a slightly 'bright' balance – which incidentally could help balance vinyl and CD sources subjectively.

SOUND QUALITY

Judged fairly good overall, the *D* is a distinct improvement over its predecessor, suggesting that Kenwood's ongoing development work is proceeding in the desired direction for UK tastes. Preferred using CD as source, the sound is punchy with good grip and dynamic range, where the vinyl version was somewhat softened in this respect.

Tonally a little bright and slightly rough in terms of treble textures, stereo depth also has room for improvement and the sound

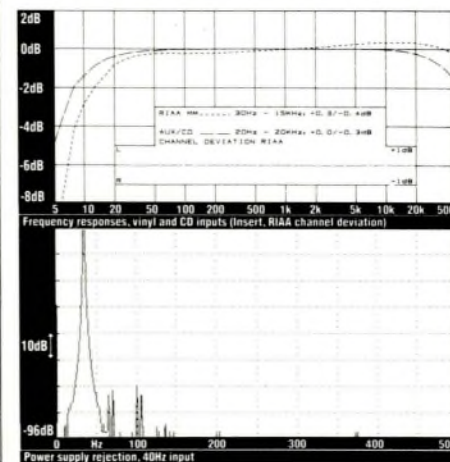
could become a little fatiguing over extended periods. But the crisp bass, good pace and decent focus remain notable strengths, as is the ability to play loud irrespective of the loudspeaker load.

CONCLUSIONS

Deserving firm Recommendation on the basis of its decent sound quality at an affordable price, the *550D* is a worthwhile subjective improvement over last year's *550*. However, the lack of the MC input that was such an important feature of the similarly priced *550* makes the *D* a less obvious choice from the point of view of future upgrading.

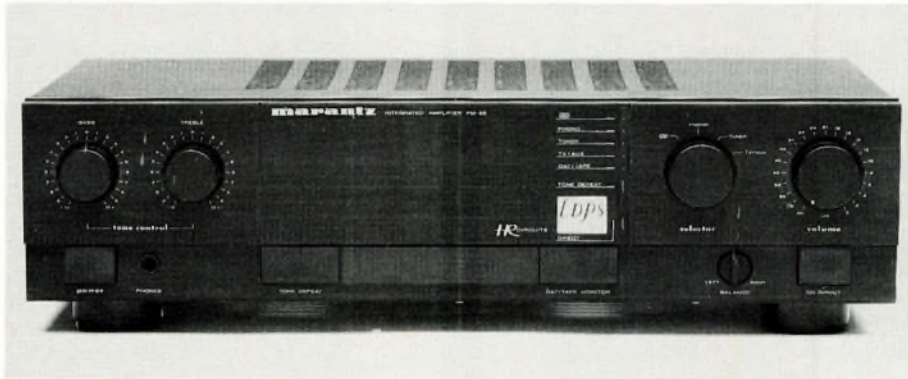
TEST RESULTS

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	35W (= 15.4dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.8dBW	17.9dBW	17.6dBW
Both channels, 4ohm load	14.3dBW	15.1dBW	14.6dBW
One channel, 2ohms, pulsed	-dBW	15dBW	-dBW
Instantaneous peak current	+15A -15A		
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	-72dB	-84dB	-66dB
Intermodulation, 19/20kHz, rated power, aux input	-80dB		
Intermodulation, 19/20kHz, at 0dBW, disc (MM)	-85dB		
Noise			
Disc (MM) input (IHF, CCIR weighted)	-70dB		
Disc (MC) input (IHF, CCIR weighted)	-		
Aux/CD input (IHF, CCIR weighted)	-74dB		
Residual, unweighted (volume control at min)	-86dB		
DC output offset	left 64mV, right 66mV		
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	31.6dB	30.7dB	29.8dB
Aux/CD input (IHF)	>23dB	>23dB	>21dB
Stereo separation			
Disc input (MM)	57dB	65dB	42dB
Aux/CD input	63dB	65dB	40dB
Output impedance (damp)	0.08ohm	0.07ohm	0.03ohm
Volume balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.05dB	0.58dB	1.18dB
Input data	sensitivity loading		
Disc (MM) input	0.46mV	46kohms	600pF
Aux/CD input	27.6mV	27kohms	410pF
Output, preamp (tape)	10V max, 330ohms		
Disc equalisation error, 30Hz-15kHz	+0.3dB, -0.4dB		
Size (width, height, depth)	44x10.5x36cm		
Typical price inc VAT	£130		



MARANTZ PM-25

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



Though owned by Philips for a number of years now, Marantz has retained a good deal of autonomy. CD players apart the model range has remained quite distinct – indeed until very recently free of parental competition in the hi-fi separates marketplace where Marantz has steadily built up a significant share. While ownership and source of supply has varied during a long and illustrious history, there has been good continuity and consistency in the UK for a number of years now, to the point where products are subjectively 'tweaked' and tailored in much the way a small specialist manufacturer might.

Two amplifier issues back we tested the *PM45*; last issue it was the *PM35*. Now the budget *PM25* comes under scrutiny, a simple £125 integrated model that has been a major seller in this biggest sector of the market for some time. Presentation and production economies are inevitable at this sort of price level, but those made by Marantz are refreshingly well disguised beneath a fashionably chunky exterior set on even more trendy (even less useful) big shiny feet.

Though both chassis and wrap are metal, the whole affair is rather rattly, thanks partly to an odd inspection hatch in the base. Copper plated screws are used throughout. The fascia is a good quality moulding in genuine plastic. This is segmented horizontally, the larger, more forward top section carrying the largish volume and input selector rotaries and smallish bass and treble tone controls – so far so good. But rationality seems to have deserted the person responsible for the higgledy-piggledy order on the lower deck, with sloppy great pushbuttons providing variously power on/off, tone defeat, DAT/tape monitor and CD direct. There is also a tiny detent-action balance rotary.

Old habits die hard, and Marantz has never been known for styling subtlety. In this case the beholder is instructed regarding the LDPS linear drive power supply and the HR circuits, in the usual variety of typefaces. But to be fair, this is discreet stuff by Marantz's historical standards.

Inside it's pretty much the standard budget amplifier fare. The overall disposition of major sections is sensible, remote switching shortening signal paths, but the various

boards linked by ribbon cable are perhaps a bit haphazard in layout. The decent sized transformer with 2x4,700µF capacitors is shared between the class A/B complementary, direct coupled output stages, using one set of 25A transistors per channel. An op-amp is used for the vinyl disc stage (MM only), and the driver stage is also on a chip. Normal grade commercial components are used throughout – inevitable at this sort of price.

LAB REPORT

However, the modest price has not compromised the lab performance too severely. Power output is pretty healthy, with a good peak current capability by any standards, though there is some constriction at low frequencies into 40hm loading. The power supply modulation test also gave a poorish result, with the 100Hz component at only –60dB. The frequency responses are nice and flat through the midband and sensibly limited out-of-band, though the LF rolloff on the vinyl disc input does start a little early (–4dB, 20Hz).

The low frequency limitations are seen in the harmonic distortion figures too, but other distortions are all well controlled. Noise and DC offset figures are fine, input overload margins are ample, separation is much better than average and channel balance, volume/balance tracking and input sensitivities are all fine. LF apart, this is a pretty clean bill of health.

SOUND QUALITY

The sound quality is a little disappointing, considering Marantz's sonic pre-eminence in the CD player field. Not that the *25* sounds bad, but it does line up rather below today's average, at a 'fair' overall rating. There seems little difference between vinyl disc and CD sources, and in neither case is the sound unpleasant, merely rather uninspiring, with a softening of bass and dynamics.

Stereo images are rather vaguer than usual, with little real depth resolution and some narrowing of the soundstage. The overall tonal balance is good, and the bass does have some bounce. There's no unwelcome treble excess, but the sound here was described as a little 'fluffy' and 'fuzzy', with some

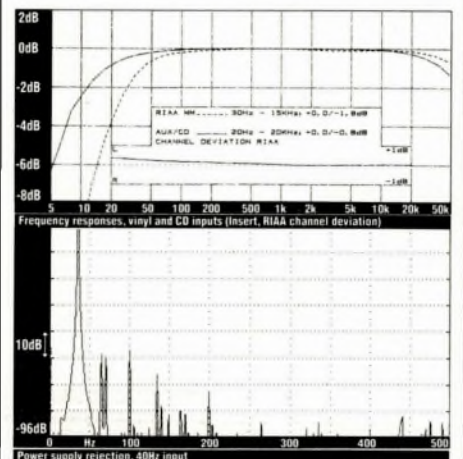
loss of detail and focus.

CONCLUSIONS

The *PM25* offers quite a lot of amplifier at its fairly modest price, but that perhaps is part of the problem. The lavish presentation and plentiful facilities do not make for the simplest layout, nor assist the sound quality. Though many ingredients are positive, the listening test results must rank as a disappointment in absolute terms. However, the sound quality is still good enough to pass muster in the less demanding systems such an amplifier is likely to partner, so an overall 'worth considering' ranking is appropriate.

TEST RESULTS

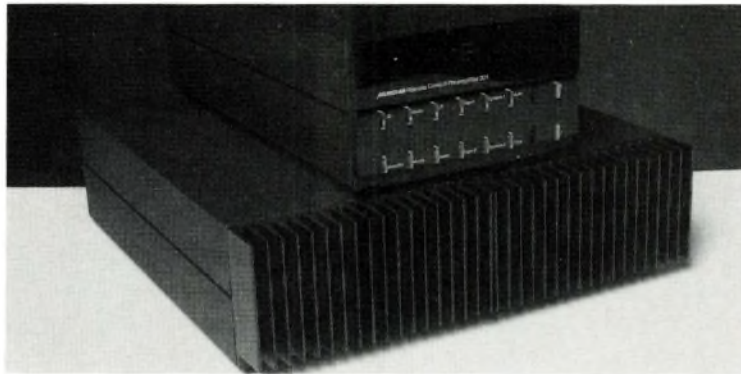
Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		35W (= 15.4dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	16.3dBW	16.7dBW	16.5dBW	
Both channels, 4ohm load	12.4dBW	14.0dBW	14.0dBW	
One channel, 2ohms, pulsed	–dBW	16dBW	–dBW	
Instantaneous peak current		+16A	–16A	
Distortion				
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz	
	–41dB	–83dB	–78dB	
Intermodulation, 19/20kHz, rated power, aux input			–74dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			–80dB	
Noise				
Disc (MM) input (IHF, CCIR weighted)			–74dB	
Aux/CD input (IHF, CCIR weighted)			–77dB	
Residual, unweighted (volume control at min)			–82dB	
DC output offset -			left 10mV, right 6mV	
DC offset, preamp			left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	34.5dB	30.8dB	26.4dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	60dB	80dB	60dB	
Aux/CD input	65dB	88dB	70dB	
Output impedance (damp)	0.19ohm	0.17ohm	0.19ohm	
Channel balance, disc, at 1kHz			–dB	
Volume/balance tracking				
Aux/CD input	0.10dB	0.38dB	0.18dB	
Input data				
	sensitivity	loading		
Disc (MM) input	0.43mV	49kohms	145pF	
Aux/CD input	25mV	47kohms	75pF	
Output, preamp (tape)		10V max, 220ohms		
Disc equalisation error, 30Hz-15kHz		+0dB, –1.8dB		
Size (width, height, depth)		42.1x11.6x29.2cm		
Typical price inc VAT		£125		



MERIDIAN 201/205

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

RECOMMENDED



This pre/power amplifier combination is part of Meridian's 200 series. The 201 is a full facility, remote ready preamplifier, joining a select but growing breed. The 205s are monoblok amplifiers rated at 100W with good load tolerance. They use 'class AA' non-switching output circuitry and are consequently 'cool' running.

Both units share the same basic extruded alloy case, formed from two U-shaped sections, joined together but electrically insulated from one another and styling is unfussy and attractive.

One end of the power amplifier contains the on/off switch, reset button, inputs and speaker connections, the other a finned heatsink. A thick optic fibre protruding from within the fins glows red on standby (automatically set when no input signal is present), and green when operational.

The 201 has a glass front panel behind which lie the LED display, the remote receiver, and operational LED flags. Small Perspex input select buttons glow to show operation. All the normal inputs are provided, and the remote access volume control has 64 steps. The back panel contains high quality phono sockets, for tape, 'aux', CD and vinyl disc, the latter switchable internally to either MM or MC sensitivity.

Each power amplifier has a 3000VA transformer and 2x10,000µF supply capacitors. Four high power output transistors are used, and internal construction is to a high standard. The preamplifier is also well built, using low noise *LT1028* operational amplifiers for disc input. The 'digital' volume control is based around individual switching FET and resistor arrays.

LAB REPORT

The 205 met its specified 80hm power output with a small margin, and held up quite well into both the 40hm static and 20hm pulsed tests. Peak current delivery was just about adequate, and the protection circuits worked without fuss. Harmonic distortion was reasonable at all frequencies and at both full power and 0dBW, and intermodulation distortion was well suppressed. Signal-to-noise ratios were just about satisfactory, and the DC offset was minimal. The measured fre-

quency response showed a high frequency rolloff from 5kHz, being 2dB down by 20kHz, but we understand this is being corrected.

The 201 exhibited an extended response on the line inputs, and the RIAA equalisation was held within reasonable limits - essentially flat in the midband, with a bass rolloff below 100Hz and with a visible but mild high frequency shelf. Above 20kHz the response of all inputs was sensibly rolled off, and channel deviation was negligible.

Distortion was low throughout, and all inputs were quiet. Overload margins were satisfactory, stereo separation very good, and output impedance low enough to drive long runs of cable (allowing the monoblok power amplifier to be placed close to its loudspeaker). Channel balance was near perfect over the entire volume range, and the input sensitivities and loadings were generally well chosen; however, the 10kohm line input impedance is on the low side.

SOUND QUALITY

The 201 preamplifier was the star performer of the pair. Assessed separately, the power amp returned a strong 'good' rating, but the preamp's score reached the 'very good' category and could easily partner a more ambitious power amplifier.

The 201 gave a consistently high performance via both the analogue disc and the CD inputs - incidentally, a comparable performance to the preamp section of the 207 16-bit CD player. Stereo focus was nicely stable, with good depth and ambience recovery from appropriate discs, and a generously wide soundstage. Tonally the midrange was close to neutral, comparisons with top references showing that bass was a mite curtailed and 'thumpy', and the treble had a hint of 'grain' and sibilance. Detail was good despite a trace of midband muddle on complex passages.

There was no doubt of the power amplifiers' superiority over earlier Meridian designs, but the standard of competition has also become fiercer in the past year. The 'fast', tuneful bass was a plus point, while stereo showed fairly good depth and clarity with very good focus, but midrange detail could have been better and the treble showed a little hash or grain.

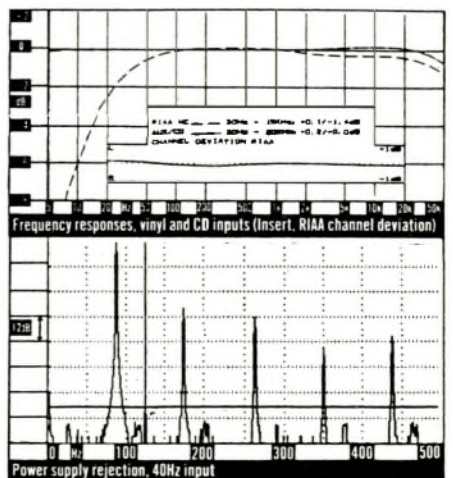
CONCLUSIONS

Though not top of the league for value, the 205's auto-music sensing confers 'fit and forget' convenience in a compact monoblok. The 201 stands as a fine separate preamplifier in its own right, worth firm recommendation even disregarding its unusual remote control feature (control panel extra). This attractive product deserves a wider exposure.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 80hms, maker's spec		100W (=20dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 80hm load	20.5dBW	21dBW	20.5dBW
Both channels, 40hm load	19.2dBW	19.8dBW	19.1dBW
One channel, 20hms, pulsed	-dBW	19.5dBW	-dBW
Instantaneous peak current		+20A	-18.5A
Distortion			
Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz
	-60dB	-62dB	-51dB
Intermodulation, 19/20kHz, rated power, aux input			-65dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-81dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-71dB
Noise			
Disc (MM) input (IHf, CCIR weighted)			-78dB
Disc (MC) input (IHf, CCIR weighted)			-73dB
Aux/CD input (IHf, CCIR weighted)			-85dB
Residual, unweighted (volume control at min)			<100dB
DC output offset			left 3mV, right 6mV
DC offset, preamp			left 2mV, right 4mV
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHf)	N/TdB	N/TdB	N/TdB
Disc (MC) input (IHf)	23.4dB	19.9dB	20.1dB
Aux/CD input (IHf)	>23dB	>22.5dB	>22.5dB
Stereo separation			
Disc input (MM)	90dB	87dB	78dB
Aux/CD input	116dB	116dB	95dB
Output impedance (damp)	0.22ohm	0.25ohm	0.5ohm
Channel balance, disc, at 1kHz			0.15dB
Volume balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.13dB	0.13dB	0.0dB
Input data			
	sensitivity	loading	
Disc (MM) input	0.9mV	47kohms	115pF
Disc (MC) input	0.059mV	200kohms	10nF
Aux/CD input	53mV	10kohms	70pF
Power amp	92mV	10kohms	1400pF
Output, preamp (tape)		9.3V max.	100ohms
Disc equalisation error, 30Hz-15kHz		+0.1dB, -1.4dB	
Size (width, height, depth)		16x10x36cm	
Typical price inc VAT		£550 + £790 (pair)	

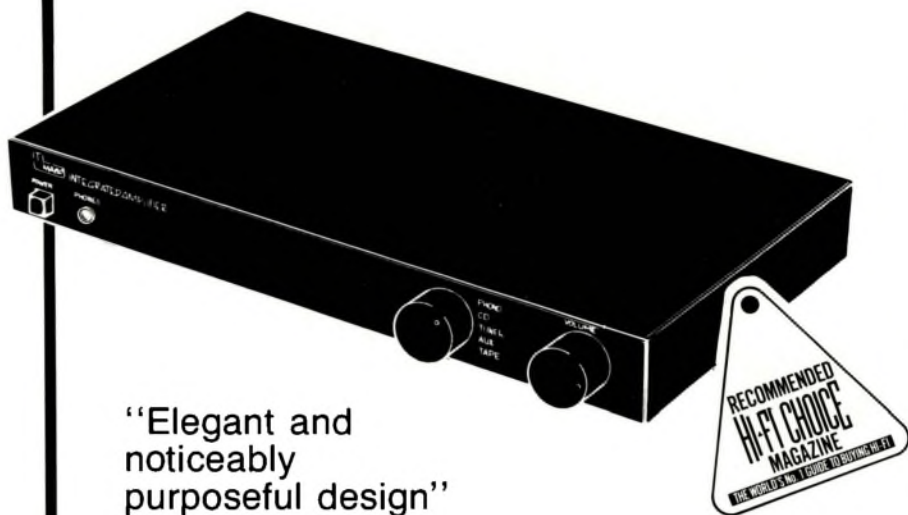
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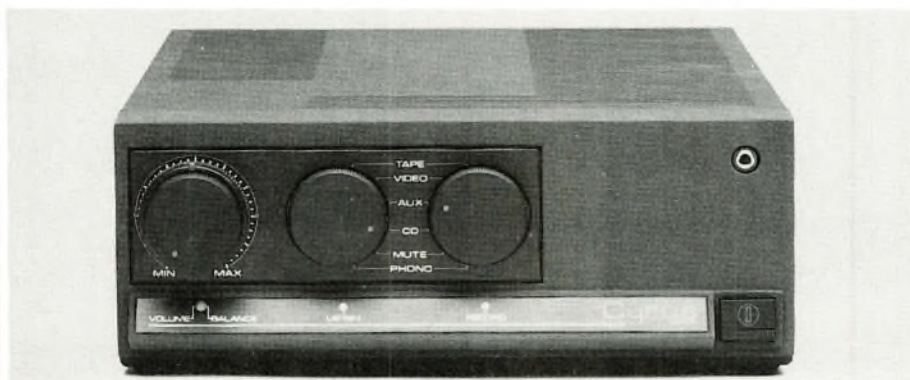
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MISSION CYRUS ONE SERIES II

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BEST BUY



The *Cyrus* range of amplifiers built a fine reputation for providing exceptional sound quality at a realistic price over the several years that the *Mk1* models were in production. Clever production engineering and aesthetics which are both pretty and compact turned these original models into something of a cult amongst young and design-literate enthusiasts.

The brand new £180 *Cyrus One* is distinguished by elaborate die-cast chassis incorporating an elegant heatsink chimney, which certainly improves the feel, appearance and the mechanical integrity of the units, and is bound to enhance reliability. The ventilated cover is now *Nextel* finished metal in place of the earlier plastic.

New red graphic highlights with power on illumination make the styling less discrete than before, preferred by some and not by others, but the ergonomics of the new model are certainly better. The input and (tape) output rotary switches are now properly labelled instead of initialled, and the controversial omission of a balance control from the original *One* has now been rectified by fitting a friction-locked concentric volume control. A 3.5mm headphone jack socket now forms an unsightly pustule on a previously uninfected area of the fascia, again in the interests of convenience.

The basics remain as before. Rated at 25W per channel, there is a choice of MC or MM cartridge matching via a switch beside the phonos on the conveniently horizontal socket panel. Phonos are also used for three line inputs plus the tape in/out set, and 4mm sockets drive a single set of loudspeakers – not muted by headphone socket insertion to avoid compromising the sound.

There are few significant changes to the internals for series *II*, so again the MC input is a bit of an afterthought. The vinyl disc input is based on a gain-switched 5534N IC with NS5532N RIAA equalisation and separately rectified supplies. High sensitivity of the class A/B DC complementary bi-polar amplifier section and the omission of tone controls enables the line level stage to be left out altogether, further assisting sonic transparency. New for series *II* is an inaudible electronic protection system supplementing

the internal quick-blow fuses.

LAB REPORT

Rather curiously, the rated and measured power output of series *II* is slightly less than the original, though it is still respectable enough, comfortably ahead of specification and – perhaps more important – rather better maintained across the bandwidth.

The significant drop into 4ohms with both channels driven is basically only a function of the single, shared power transformer, and the peak current capability is now increased to a very generous $\pm 17A$, so in fact the overall grunt delivery is actually significantly enhanced and low impedance loudspeakers will be driven with aplomb. And the power supply modulation spectrogram is now much cleaner than before.

The remaining measured performance parameters are all respectable enough, with only minor changes here and there over the series I *Cyrus One* – a little better S/N ratios at the expense of overload margins still leave the MC input a little marginal for some lower output cartridges. Stereo separation is significantly improved, as is the accuracy of the RIAA equalisation on the sensibly bandlimited vinyl disc input.

SOUND QUALITY

The original *Cyrus One* was already a market leader in sound quality terms, and series *II* simply reinforces the situation – in no-trumps. A comfortably 'good' overall rating at comfortably below £200 is simply a remarkable achievement. It sounds louder and stronger than a 25watt amplifier has any right to, yet delivers a clean, simple transparency and delicacy that is typical of more pretentious audiophile-oriented components.

Marginally lean and lightweight in balance terms, bass sounds impressively tuneful, firm and extended, the treble is sweet and clear. Detail resolution and stereo imaging are high class, with well developed spatial perspectives.

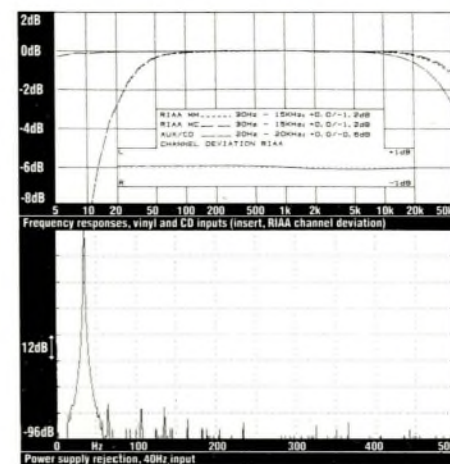
The *Cyrus One's* character remains pretty consistent on the various inputs, with some losses on the vinyl disc inputs, more so with MC than MM.

CONCLUSIONS

The original *Cyrus One* was already firmly established as a Best Buy amplifier, and series *II* merely improves our confidence and makes life that much tougher for the competition. With the exception perhaps of the styling, the new model represents a clear all round improvement which certainly justifies the extra £30 on the price. Mission particularly deserve congratulation for their foresight in uprating this model well before demand for its predecessor had shown any sign of slackening – showing decidedly un-British marketing perspicacity!

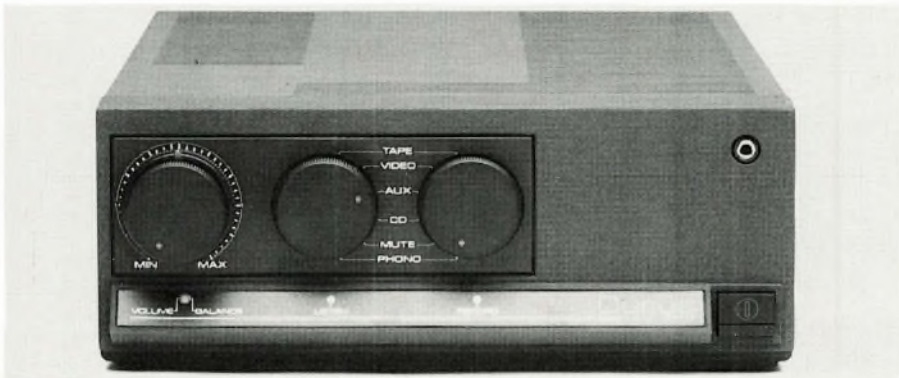
TEST RESULTS

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	25W (= 14.8dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.4dBW	15.7dBW	15.5dBW
Both channels, 4ohm load	12.1dBW	13.3dBW	13.3dBW
One channel, 2ohms, pulsed	-dBW	14.5dBW	-dBW
Instantaneous peak current	+17A -17A		
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	-75dB	-76dB	-67dB
Intermodulation, 19/20kHz, rated power, aux input	-86dB		
Intermodulation, 19/20kHz, at 0dBW, disc (MM)	-85dB		
Intermodulation, 19/20kHz, at 0dBW, disc (MC)	-70dB		
Noise			
Disc (MM) input (IHF, CCIR weighted)	-77dB		
Disc (MC) input (IHF, CCIR weighted)	-62dB		
Aux/CD input (IHF, CCIR weighted)	-87dB		
Residual, unweighted (volume control at min)	-89dB		
DC output offset	left 1mV, right 6mV		
DC offset, preamp	left 0mV, right 0mV		
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	27.8dB	24.8dB	24.5dB
Disc (MC) input (IHF)	27.9dB	24.8dB	24.5dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	60dB	55dB	45/51dB
Aux/CD input	64dB	65dB	51/59dB
Output impedance (damp)	0.085ohm	0.086ohm	0.096ohm
Channel balance, disc, at 1kHz	1.4dB		
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.03dB	0.31dB	2.0dB
Input data			
	sensitivity	loading	
Disc (MM) input	0.46mV	47kohms	250pF
Disc (MC) input	0.052mV	47ohms	250nF
Aux/CD input	67mV	12.9kohms	80pF
Output, preamp (tape)	12V max, 0ohms		
Disc equalisation error, 30Hz-15kHz	+0dB, -1.2dB		
Size (width, height, depth)	22x8.4x36.5cm		
Typical price inc VAT	£180		



MISSION CYRUS TWO SERIES II (& PSX)

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



The *Cyrus* name has hitherto been reserved for three Mission products, the *One*, *Two* and *FSX*. All are related to amplification and share the same compact 'half width' chassis – an all new die-casting for the series *II* components. The *One* is discussed on the preceding page, and the more powerful £300 *Two II* is the subject of this review, while the £200 *FSX* is a big power supply housed in the same case which can be used to upgrade the sound of either *Cyrus Two* or the Mission *PCM-II* CD player (or both together).

The new *Two* is distinguished by the elaborate die-cast chassis/fascia which incorporates elegant heatsinking, and feels really heavy despite the small size. This certainly improves the feel, appearance and mechanical integrity of the units, while Mission is conscious of the need to improve the reliability record of the new *Cyrus* series, and this new chassis will undoubtedly help.

As with the *Cyrus One*, the ergonomics of the new model are significantly better. The input and (tape) output rotary switches are now properly labelled instead of initialled, and the controversial omission of a balance control from the original *Two* has now been rectified by fitting a friction-locked concentric volume control.

The basics remain as before. Rated at 50W per channel – twice the power of the *One*, and theoretically 3dB louder, the *Two* also has a less compromised MC vinyl disc input than that used on the *One*, again selected via a switch beside the phonos on the conveniently horizontal socket panel. Phonos are also used for three line inputs plus the tape in/out set, and 4mm sockets drive a single set of loudspeakers – not muted by headphone insertion to avoid compromising the sound. There is also a special socket for external *FSX* connection.

Technical changes for series *II* include a new PCB layout to improve common mode rejection, improved IC op-amps in the preamplifier section, and single, specially designed higher power transistors in place of the pairs used in the original *Two*. That said, one set of these expired when expected to deliver maximum power at 20kHz 4ohms with *FSX* boost – an extreme condition which will never be replicated in normal use. The

high sensitivity of the power amplifier section (and the omission of tone controls) enables the line level stage to be left out altogether, further assisting sonic transparency.

LAB REPORT

The measured performance of the series *II Two* is virtually identical to its predecessor – and where there is a difference it is often in favour of the original. But there was nothing much wrong with *Cyrus Two* in the first place, so why change anything? Power output beats the spec, with reasonably good bandwidth and low impedance drive plus a very healthy 22A peak power capability, though the single transformer is something of a limiting factor, and *FSX* does offer some improvements here. The power supply modulation spectrogram is now much cleaner.

THD is acceptable, IM distortion low, noise figures pretty good on all inputs – note the 5dB MC cartridge input improvement over *Cyrus One*, along with 3dB better sensitivity here. Stereo separation is significantly improved over the original, as is the accuracy of the RIAA equalisation which now shows a very flat midband on a sensibly bandlimited vinyl disc input.

SOUND QUALITY

Somewhat contradicting Paul Miller's findings in last month's *System* review, Martin Colloms' panel found the new *Cyrus Two* a significant improvement over the original, while still maintaining a small lead over the latest *One*, though it is also true to say that the latter has gained more in the redesign. An interesting side issue is that the *FSX* add-on power supply has reasserted its own superiority in the *Cyrus* hierarchy with the introduction of the series *II* models, and it can also be used to upgrade Mission's *PCM-II* CD player.

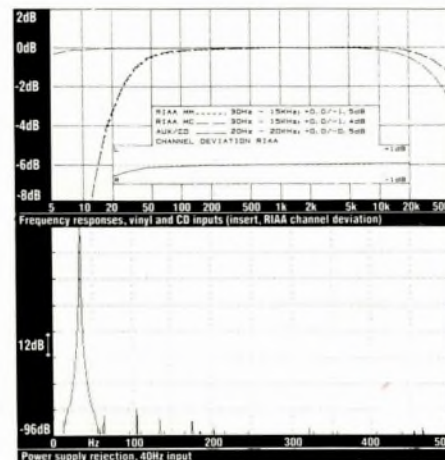
The new *Two* sounds sweeter, richer and more full-bodied than its predecessor, though it could still be accused of sounding a shade lightweight nonetheless. Stereo images have improved space and depth, bass is tuneful and dynamic, and treble is a shade forward, though essentially of good quality nonetheless.

CONCLUSIONS

While the improvement in *Cyrus Two* is less dramatic than with its baby brother, in this instance there is no price premium so the value for money improvement is comparable in degree, and the Best Buy rating is comfortably reinforced. Even setting aside its slightly better sound quality, the *Two* is in many senses the most complete *Cyrus* amplifier. The 'proper' MC vinyl disc input and 3dB power boost justify the step up from the *One* and offer the future option of the worthwhile *FSX* update besides.

TEST RESULTS

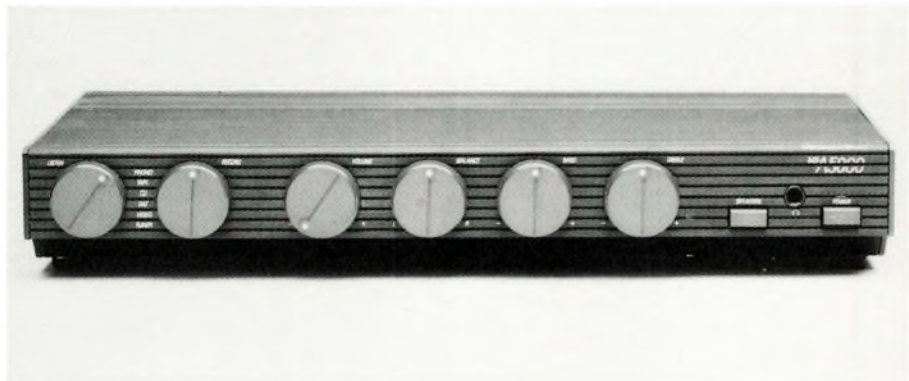
Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		50W (= 17dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	17.7dBW	17.9dBW	17.6dBW	
Both channels, 4ohm load	14.5dBW	15.2dBW	14.6dBW	
One channel, 2ohms, pulsed	-dBW	18dBW	-dBW	
Instantaneous peak current		+22A	-22A	
Distortion				
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz	
	-66dB	-75dB	-71dB	
Intermodulation, 19/20kHz, rated power, aux input				-90dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)				-94dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)				-90dB
Noise				
Disc (MM) input (IHF, CCIR weighted)				-75dB
Disc (MC) input (IHF, CCIR weighted)				-69dB
Aux/CD input (IHF, CCIR weighted)				-78dB
Residual, unweighted (volume control at min)				-79dB
DC output offset				left 10mV, right 6mV
DC offset, preamp				left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (IHF)	27.6dB	25dB	24.6dB	
Disc (MC) input (IHF)	25.5dB	22.7dB	22.1dB	
Aux/CD input (IHF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	53/58dB	55/59dB	42/51dB	
Aux/CD input	54/58dB	54/58dB	48/63dB	
Output impedance (damp)	0.12ohm	0.12ohm	0.12ohm	
Channel balance, disc, at 1kHz				1.74dB
Volume/balance tracking				
Aux/CD input	0.07dB	1.16dB	4.14dB	
Input noise				
Disc (MM) input	sensitivity	loading		
	0.36mV	47kohms	245pF	
Disc (MC) input	0.23mV	100ohms	—nF	
Aux/CD input	53mV	12.2kohms	100pF	
Output, preamp (tape)		11.95V max,	150ohms	
Disc equalisation error, 30Hz-15kHz				+0dB, -1.5dB
Size (width, height, depth)				21.4x8.4x36cm
Typical price inc VAT				Cyrus Two £300 PSX £200



MORDAUNT-SHORT A5000

MORDAUNT-SHORT, DURFORD MILL, PETERSFIELD, HAMPSHIRE, GU31 5AZ. TEL: (0730) 80721.

RECOMMENDED



After two decades devoted to the manufacture of loudspeakers, this small but highly respected manufacturer is spreading its wings a little and moving into the amplifier market. This somewhat surprising move perhaps makes more sense when taking into account the company's recent merger with Goodmans and Tannoy in the TGI group. All are highly regarded hi-fi brands, but Goodmans is increasingly aimed towards the general consumer electronics sector with in-car equipment, microwave cookers and so on; Tannoy has long been a major force in the professional audio market; so it's logical enough for Mordaunt-Short to continue expanding in the specialist hi-fi sector.

The A5000 is a 50W integrated amplifier with the sort of luxurious finish standards that justifies its £350 price tag. The smart grey alloy case is attractively styled and beautifully built.

The rear panel has gold-plated phonos throughout. A selector switch chooses either low or high output cartridges (MM/MC). There is an abundance of line inputs, labelled tape, CD, DAT, video (sound), tuner, but only one record output set, selected independently of the source. Three sets of 4mm loudspeaker sockets – one direct, two switchable in an unorthodox but self-explanatory red/white/black combination – allow the user to choose between fidelity or convenience.

The six pretty plastic knobs with pink position indicator blips look rather better than they feel, catering for input and record output selection, volume, balance and bass and treble tone, the last three with centre indent positions. The visual symmetry is appealing, but the lack of distinction doesn't correspond too closely to the actual switch positions, and the loudspeaker selector is an unlabelled suck and see lottery, but presumably one gets used to such foibles fairly quickly. A headphone socket is also provided.

The internals show a close family resemblance to earlier Musical Fidelity designs in terms of overall circuit configuration, though much of the detailing is clearly Mordaunt-Short's own. The direct coupled bi-polar output stage operates in class A/B, fed from a generous power supply with independent regulators feeding earlier stages.

LAB REPORT

The A5000 falls short of its 17dBW/50W rating at high frequencies, if only by a little. This HF problem aside, output is well maintained at low frequencies and into low impedances, and peak current capability is very satisfactory.

Distortion levels are reasonable enough apart from the IM test on the MC input; this gave below par results, which is not unexpected in view of the circuit topology, and is subjectively benign. Again satisfactory in practice, noise levels are all constrained to a modest -67dB because of the comparatively noisy tone control stage. Stereo separation figures are rather indifferent too, but input overload margins are fine and the supply modulation spectrogram is pretty clean.

The frequency responses look a little bumpy, with sensibly tailored bandwidths, though the LF rolloff via MC disc might be considered a little premature. There is also some channel imbalance, which might be due to tolerances in the tone control section – one wonders whether the overall measurement package might be upgraded by simply providing proper tone defeat switching.

SOUND QUALITY

This is another example of the paradox of amplifier reviewing, whereby subjective and objective performances seem to be inversely related. Despite its minor lab weaknesses the A5000 delivered a good overall sound quality rating. Not quite the best amongst the current crop of integrated amplifiers, the subjective performance is still more than good enough to justify its premium price and start building M-S's reputation in this new field.

The sound shows unusually good consistency between vinyl disc and CD sources, and is invariably sweet, musical and relaxing. That does not mean that the amplifier sounds in any way bland or soporific, however, merely that it is essentially civilised, delivering a lively and rhythmically entertaining performance, with good balance and detail, and clean tonality throughout the frequency range. Stereo images are well formed, with good width and depth, and fine vocal presentation. High level drive is achieved with aplomb, irrespective of the

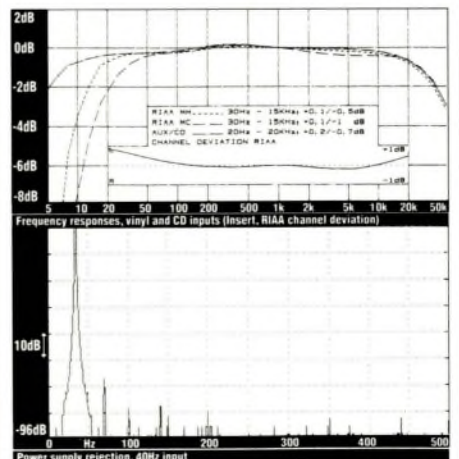
load characteristics of the speakers used.

CONCLUSIONS

Mordaunt-Short's successful first foray into amplifier manufacturing requires little qualification. The sound quality rating alone is sufficient to justify Recommendation at a price which is reasonable enough. The build and presentation – not to mention the company's fine reputation and longstanding stability – are very worthwhile plus points, while the slight lab weaknesses are not serious.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		50W (= 17dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	17.5dBW 17.7dBW 16.5dBW		
Both channels, 4ohm load	15.5dBW 15.9dBW 14.5dBW		
One channel, 2ohms, pulsed	-dBW 15.5dBW 26V		
Instantaneous peak current	+17A -17A		
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz 1kHz 20kHz		
	-76dB -72dB -60dB		
Intermodulation, 19/20kHz, rated power, aux input			-67dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-59dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-40dB
Noise			
Disc (MM) input (HF, CCIR weighted)			-67dB
Disc (MC) input (HF, CCIR weighted)			-65dB
Aux/CD input (HF, CCIR weighted)			-67dB
Residual, unweighted (volume control at min)			-67dB
DC output offset		left 0mV, right 2mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload		20Hz 1kHz 20kHz	
Disc (MM) input (HF)	26.9dB 25.8dB 25.8dB		
Disc (MC) input (HF)	28.7dB 26.0dB 23.0dB		
Aux/CD input (HF)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	50dB 62dB 44dB		
Aux/CD input	62dB 62dB 44dB		
Output impedance (damp)	0.23ohm 0.23ohm 0.26ohm		
Channel balance, disc, at 1kHz			0.36dB
Volume/balance tracking		0dB -20dB -60dB	
Aux/CD input	0.06dB 0.88dB 0.51dB		
Input data		sensitivity	loading
Disc (MM) input	0.715mV	47kohms	-pF
Disc (MC) input	0.0735mV	47ohms	-nF
Aux/CD input	26.3mV	47kohms	40pF
Output, preamp (tape)		8.5V max, n/aohms	
Disc equalisation error, 30Hz-15kHz		+0.1dB, -1.0dB	
Size (width, height, depth)		43.6x7x26.5cm	
Typical price inc VAT			£350



" IT CAN'T GO ON "

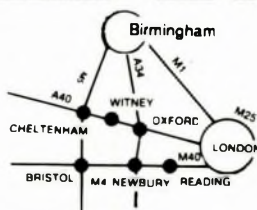
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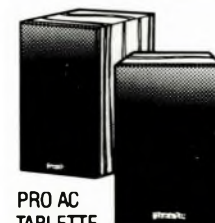
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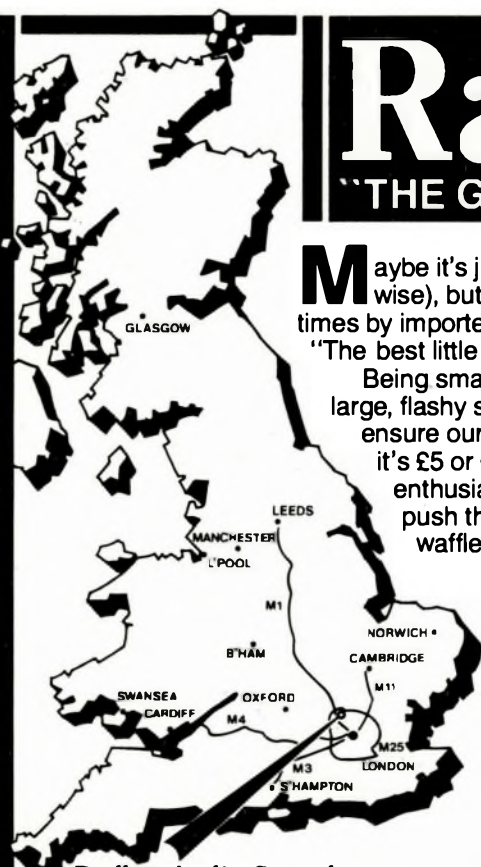
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MUSICAL FIDELITY B200

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BEST BUY



The *B200* is a £300 integrated amplifier that follows Musical Fidelity's standard formula of straight-line, no nonsense design, with only essential features in evidence. The case comes from the successful *A1*, the *B200* being visually identical apart from the name on the front panel.

Like the *A1*, the *B200* has only a volume control and rotary input selector plus a separate tape monitor switch. The top of the case consists of short rounded longitudinal fins forming a heatsink; although visually attractive they act as a dust trap. The back panel inputs and speaker connections include phono sockets for disc, CD, tuner, 'aux' and tape, plus one set of 4mm sockets for speaker connection. The heatsink and side panels overlap the back panel, so access is rather restricted. But this also means that all connections are physically protected and concealed from view.

Unlike the *A1*, the *B200* is not biased heavily into class A, and is therefore claimed to be relatively cool running and capable of providing far higher power. Rated at 60W per channel into 8ohms, the amplifier uses MF's familiar complementary Hitachi MOSFET class AB output stage, preceded by a *LM318* high speed integrated circuit with carefully designed power supply.

The disc preamplifier stage is identical to that used in the *A100* - low noise transistors and shunt regulation, together with a FET operational amplifier - and may be gain switched to suit moving coil or moving magnet cartridges. The power supply uses a fairly modest toroidal transformer followed by good quality smoothing capacitors.

Although the *B200* runs cooler than either the *A1* or the *A100*, it still manages to generate a fair amount of heat. When worked hard the top of the case gets distinctly warm.

LAB REPORT

Although rated at 18dBW, this unit managed a lusty 20.6dBW over the power bandwidth (one channel into 8ohms) but was marginally weaker at high frequencies. Output fell into 4ohms with both channels driven, but a respectable 17dBW was recorded on the 20hm pulse test and the peak current of $\pm 10A$ is satisfactory for a design which in all fair-

ness is not intended to drive difficult loads.

While not winning any prizes distortion figures were acceptable, and the noise levels on all inputs were adequately low. DC offset on all inputs were adequately low. DC offset was negligible and input overload margins were good. Stereo separation was fine through the midrange, falling slightly at higher frequencies but still maintaining a reasonable figure. Sensitivities were well chosen, but disc loading remained 47kohm whether set to moving magnet or moving coil sensitivity.

The supply modulation test showed up no problems, and the RIAA equalisation displays a reasonable bass and treble rolloff plus the usual Musical Fidelity treble shelf, which is not considered serious. Channel balance was excellent.

SOUND QUALITY

Given the usual warm up (all the test amps were pre-conditioned for at least one hour, and where instructed some were given 8 hours), the *B200* nonetheless gave us a very hard time. Not that we are complaining - rather, the high standard it attained complicated the ratings for so many of the other products in the issue, including some classy up-market separates. The results were very good on both vinyl and compact disc inputs, placing this model firmly in the 'budget audiophile' group. A consistent factor was the seemingly effortless power delivery - it sounded like a big amplifier with considerable reserve, good clipping characteristics and an ability to play loudly without fatigue.

The moving coil sound was clear and detailed, well controlled and articulate throughout the frequency range. Bass lines were strong and tuneful, the mid was tonally well balanced, revealing subtle musical information, and the treble was expressive and lively with only the mildest hint of sibilance and grit. Stereo images were well formed, showing strong focus plus fine depth and width. Sound stages had a good sense of space with plenty of ambience.

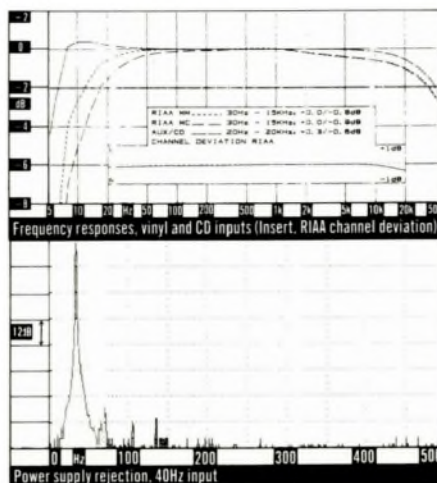
The CD input sounded slightly superior, with a little extra definition, speed and focus plus a tighter bass. Here it simply sounded like a good, decently sized separate power amplifier.

CONCLUSIONS

The *B200* is a well finished and distinctly styled integrated amplifier, simple to use and offering an ample 100W plus per channel. Priced at the quality end of the budget sector, it provided a musical standard of sound quality rather beyond the asking price. It could easily form the basis of a fine audio system, and handsomely qualifies for Best Buy rating.

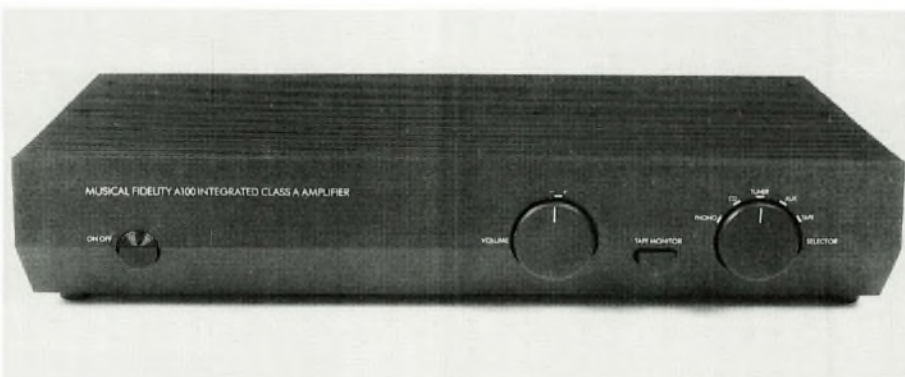
TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		60W (= 18dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.8dBW	21dBW	20.5dBW
Both channels, 4ohm load	15.8dBW	16.3dBW	15.8dBW
One channel, 2ohms, pulsed	-dBW	17dBW	-dBW
Instantaneous peak current		+10A	-10A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD in	-77dB	-65dB	-49dB
Intermodulation, 19/20kHz, rated power, aux input			-55dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-50dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-44dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-68dB
Disc (MC) input (IHF, CCIR weighted)			-64dB
Aux/CD input (IHF, CCIR weighted)			-70dB
Residual, unweighted (volume control at min)			-72dB
DC output offset		left 0mV, right 0.03mV	
DC offset, preamp		left n/a mV, right n/a mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	29.2dB	28.2dB	27.6dB
Disc (MC) input (IHF)	28.6dB	26.6dB	26.5dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (MM)	72dB	68dB	47dB
Aux/CD input	80dB	69dB	49dB
Output impedance (damp)	0.06ohm	0.07ohm	0.05ohm
Channel balance, disc, at 1kHz			0.21dB
Volume/balance tracking			
Aux/CD input	0.02dB	0.05dB	0.84dB
Input data		sensitivity	loading
Disc (MM) input	0.27mV	47kohms	30pF
Disc (MC) input	0.024mV	47kohms	n/a nF
Aux/CD input	18mV	44kohms	n/a pF
Power amp	18mV	44kohms	n/a pF
Output, preamp (tape)		7.5V max, 300ohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -0.9dB	
Size (width, height, depth)			41x6x25cm
Typical price inc VAT			£299
Reprinted from issue 56			



MUSICAL FIDELITY A100

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



The *A100* is an ultra-simple integrated amplifier that operates in class A over a substantial part of its dynamic range. Clearly based closely on the successful *A1*, it is only when the units are actually placed next to each other that the physical differences become apparent. Front-to-back shelf depth has been held the same, but the others have been expanded while keeping the same overall proportions – the *'100* being higher and wider, not to mention heavier, with slightly more than twice the power output (50W instead of 20W), and nearly double the price (£439 instead of £239).

Highlighted by bright blue legends, the intelligently sculptured case is fabricated in ribbed black alloy to help dissipate the substantial waste heat of class A operation: on our sample the fit of these sections could have been better. A permanent internal fan further assists cooling, and this is slightly audible in quiet environments. In current production earlier thermal trip problems have been solved by matching a stable output dissipation to revised trip settings. Notwithstanding these precautions, the high case temperature remains a matter of some concern, and the amplifier should be left uncovered at all times; rumour has it that eggs will cook slowly on the top surface!

Taking minimal facilities to its logical conclusion, *A100* even eliminates the (normally rather useful) balance control in the interests of simplifying the signal path. We are left with two large knobs for volume and input selection, plus pushbuttons for power on/off and tape monitoring, all of which are a little 'clunky' in operation. Phono sockets are used on the rear, internal switching selecting MC or MM cartridge sensitivities, while 4mm sockets provide for loudspeaker connection.

LAB REPORT

This is very much an extension of the *A1* design, but with a larger heatsink area and internal (gently audible) cooling fan. With a multi-transistor complementary low-noise MC disc input (IC) and high quality shunt/series regulation particularly in the preamp section, the power amplifier uses complementary bi-polar output transistors operating in class A at the lower end of its dynamic

range, crossing to B for the final few dB. The power supply has a toroidal transformer with substantial reservoir capacity.

The power characteristics look much more like a valve than a transistor amplifier. Meeting specification without problem into 8ohms, single channel, there was a substantial 5dB loss into 4ohms. Peak current delivery is restricted, so this design is clearly not ideally suited to awkward or lowish impedance loudspeaker capability. The power supply modulation spectrogram looks a little alarming, but in fact most of the lines refer to a generally high level of simple harmonic distortion rather than mains-related spurious.

The various distortion measurements all gave poor results, though the harmonic products dropped significantly at lower drive levels. Signal-to-noise ratios and input overload margins were both quite acceptable, and stereo separation was very good. Input sensitivities should be fine, though volume/balance tracking went a little awry at low levels. The RIAA equalisation showed tight low frequency bandlimiting particularly on moving coil.

SOUND QUALITY

The 1988 incarnation of the *A100* has been upgraded yet again, and showed a significant improvement in sound quality over earlier versions. Moving into the 'very good' class, the *A100* delivers a sound more normally associated with costly separates than moderately priced integrated models. Building further on the musical tonality of the *A1*, it has greater weight and authority, a more powerful and articulate bass, and a more open, clearer treble. With extra 'life' and 'drive' the stereo soundstage was well focused and showed good depth, a nice sense of space and ambience, and good stage width. As with the *A1*, however, loudspeakers below 8ohms nominal load are better avoided.

CONCLUSIONS

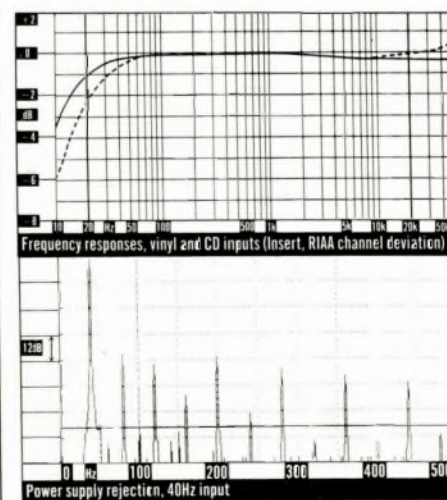
This semi-class A amplifier uniquely delivers a separates quality sound from a single box. Earlier reservations concerning bass drive and dynamics have been successfully resolved, so with a cautionary note regarding the high waste heat and the suggestion that

more awkward load loudspeakers should be avoided, this current *A100* deserves strong Recommendation.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		50W (= 17dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	17.8dBW 17.7dBW 17.1dBW		
Both channels, 4ohm load	13.4dBW 12.6dBW 12.0dBW		
One channel, 2ohms, pulsed	-dBW 12.0dBW -dBW		
Instantaneous peak current		+5A	-5A
Distortion			
Total harmonic distortion, at rated power, aux/CD in.	20Hz 1kHz	1kHz 20kHz	
Intermodulation, 19/20kHz, rated power, aux input	-36dB	-35dB	-34dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-46dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-40dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-76dB
Disc (MC) input (IHF, CCIR weighted)			-68dB
Aux/CD input (IHF, CCIR weighted)			-70dB
Residual, unweighted (volume control at min)			-80dB
DC output offset		left <20mV, right <20mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	31dB	29.5dB	29.5dB
Disc (MC) input (IHF)	34dB	27.5dB	28.5dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (MM)	68dB	75dB	67dB
Aux/CD input	70dB	93dB	76dB
Output impedance (damp)	0.4ohm	0.37ohm	0.42ohm
Channel balance, disc, at 1kHz			0.04dB
Volume/balance tracking			
Disc input	0dB	-20dB	-60dB
Aux/CD input	0.3dB	0.1dB	5dB
Input data			
Disc (MM) input	sensitivity 0.32mV	loading 47kohms	n/a pF
Disc (MC) input	0.027mV	47kohms	n/a nF
Aux/CD input	18mV	47kohms	20pF
Output, preamp (tape)		3.31V max, 980ohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -1dB	
Size (width, height, depth)			44x9x25cm
Typical price inc VAT			£439

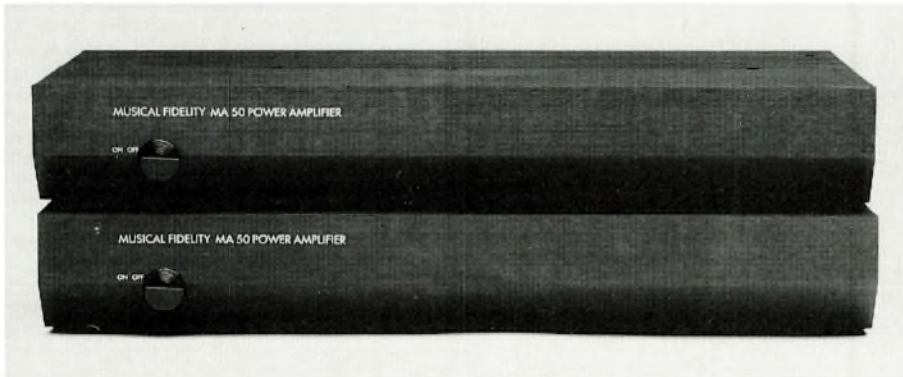
Reprinted from issue 56



MUSICAL FIDELITY MA-50

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

RECOMMENDED



The MA-50 is/are the latest and most upmarket model(s) in Musical Fidelity's A-series, consisting of a pair of monoblok power amplifiers retailing at around £850. Besides the purist engineering preference for keeping the power amplifiers in a stereo system completely separate, the monoblok approach also allows each driving amplifier to be sited next to its loudspeaker, so shortening the loudspeaker leads – albeit at the expense of the line level connections!

Being monobloks, there's precious little to discuss in the way of features and facilities. You put signal in one end and get a bigger version of the signal out of the other. Anything more is less, so to speak. Apart from the extra pair of loudspeaker sockets that is, which facilitate bi-wiring connection to the loudspeakers.

The attractive layout has an overhanging fascia that minimises the unit's visual impact. The other distinctive feature is a ribbed extrusion wrap that doubles as the heat-sink. This is very necessary, since all the A-series power amplifiers are biased significantly towards class A and so need plenty of cooling, especially when idling.

One unavoidable criticism of all A-series components hitherto has lain in the overall mechanical tolerancing of casework and switchgear. Such considerations have negligible effect upon performance, but do undoubtedly affect perceived value in some eyes. The MA-50 is no exception, and some carping is perhaps justified considering the £850 package price. A sharp lower lip to the fascia overhang, unsightly join and asymmetric disposition of top plate screw heads and a sloppily skewiff on/off pushbutton all come free of charge. However, the solid casework itself is notably non-resonant, nicely decorated with blue and white graphics if determinedly featureless apart from the illuminated on/off switch. The single input phono socket is gold-plated.

LAB REPORT

The inside is dominated by a toroid transformer and four (two per resistively decoupled rail) 6,800µF reservoir capacitors. The shunt feedback circuit uses discrete bi-polar transistors, and resembles a pair of modified

power stages from MF's A1 integrated amplifier running in parallel for greater current capability, with an increased rail voltage more than doubling the latter's 80hm power rating. Careful component selection is evident in strategic places.

The power output and current capability certainly do improve on the A1, though they're far from enticing in view of price level. In fact the pattern of delivery into 8ohms and the substantial constriction into 4ohms both resemble the performance of the larger integrated A100 amplifier. Although the MA-50 beats both integrated models comfortably on peak current output, it is not by any means a powerful amplifier – which is partly the price paid for operating in class A at lower output levels. Clearly the most sensible partnering speakers would combine a 'kind' 8ohm rated load with decent sensitivity.

Indeed lab performance has never been an A-series strength, and the MA-50 follows the same pattern. Harmonic and intermodulation distortion products are both unusually evident, the former deteriorating at high frequencies besides. The supply modulation spectrogram looks a trifle alarming, but in fact the components are simply a harmonic series of the 35Hz drive signal; mains harmonics that might indicate power supply stress are well suppressed.

SOUND QUALITY

Showing just how difficult it is to correlate the objective and subjective performance of amplifiers, our listeners rated the MA-50 very highly indeed, comfortably up in the top class at any price. Indeed, disregarding the giant and as yet untried A470, and accepting that this small monoblok does have limitations in power delivery, the MA-50 is the best sounding MF design yet, and within its power envelope provides tough sonic competition for any imported exoticia, at least under our listening conditions.

One is drawn into parallels with valve (tube) equipment, not merely because the amplifier gets hot and not loud, but also because the sonic transparency and harmonic timbral purity have much in common with top class thermionics. The treble is

exceptionally sweet and clear, almost grainless, yet also full of life, 'air' and 'sparkle', with fine detail resolution. There was a mild power loss in the bass when driving the amplifier hard, but this did not detract from decent 'slam' and very good subjective speed, precision and timing.

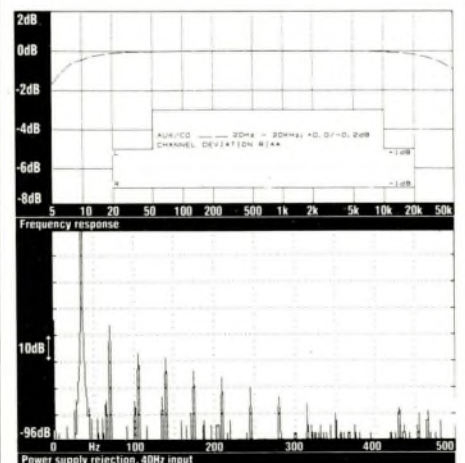
The qualitative difference between this small and subjectively highly refined design and the bigger 'muscle' amplifiers lies in the '50's more 'laid back' presentation. But this tends to be just a superficial impression, quickly dispelled as program dynamics take over.

CONCLUSIONS

Given that a stereo pair of MA-50s consist of rather less than two A1s, and given that the lab performance and power delivery are pretty indifferent, the £850 pricetag seems a little on the high side. But such carping pales into insignificance against a sound quality rating in the very top class. Like the other A-series products there is a degree of idiosyncrasy about this design, while the remarkable subjective performance demands strong Recommendation.

TEST RESULTS

Power output		Monoblok power amplifier	
Rated power into 8ohms, maker's spec		50W (= 17dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.9dBW	18.0dBW	14.6dBW
Both channels, 4ohm load	10.8dBW	11.5dBW	7dBW
One channel, 2ohms, pulsed	-dBW	14dBW	22V
Instantaneous peak current		+10A	-10A
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-42dB	-43dB	-33dB
Intermodulation, 19/20kHz, rated power, aux input	-57dB		
Noise			
Residual, unweighted (volume control at min)	-90dB		
DC output offset	12mV		
Stereo separation		(monoblok)	
Output impedance (damp)	0.27ohm	0.275ohm	0.32ohm
Input data		sensitivity loading	
Power amp	186mV	10.5kohms	600pF
Size (width, height, depth)	40.8x6.4x24.8cm		
Typical price inc VAT	£850/pair		



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The longest running success story in budget integrated hi-fi amplifiers is currently available in two versions, which share many of the same components (including a lucid instruction manual), yet differ in price and power output. The *e*-suffixed 'economy' model was fully tested in March and revisited during last month's separate systems reviews. £20 extrabuy the *PE* suffix, referring to a 'power envelope' treatment of the supply and output stage that NAD describes in a sort of 'turbocharger' analogy, able to generate much more short-term transient power than the standard model.

The overall concept of the original *3020* has been retained through a number of evolutionary changes, so this is still essentially the same – arguably the archetypal – simple design that seems to provide sound quality improvements through the careful omission of some of the 'frills'.

It is neatly presented with a logical control layout and 'camouflage' dark brown finish to high enough standards. The single large volume control is backed by rotaries for tone and balance, with no tone defeat switching, while the seven pushbuttons, in three groups, provide power on/off, input selection including tape monitoring, plus mono/stereo and –20dB muting (the telephone answering switch).

Rear panel connections are phonos throughout, the vinyl disc input accommodating moving magnet cartridges only. Speaker terminals are (still) cheap spring-loaded types, while small switches select optimum power matching to 4ohm (normal) or 8ohm loudspeaker load, and the optional 'soft clipping' circuitry which is recommended to provide a sweeter sound when driving at continuous high levels.

Using a conventional direct coupled complementary bi-polar output configuration, component layout benefits from a single board construction, but with rather untidy wiring looping around. The circuitry is all discrete and some care has clearly been taken over bandwidth noise suppression and stage matching.

LAB REPORT

Rated at only 20W steady state, the *PE* is also

purportedly capable of 55W peaks. This is confirmed by the lab tests, and comparison to the data for the *e* makes interesting reading. The low impedance and both channels drive capabilities were virtually identical. However, the *PE* does offer a worthwhile increase in peak current capability – up to 4A to a very generous +16/–15A – and an extra 2.5dBW (a near doubling) of the single channel 8ohm figure. The power supply modulation spectrogram is less clean than the *e*'s, but is pretty good nonetheless.

Distortions are all low and signal-to-noise ratios and overload margins are very good. However, stereo separation is notably asymmetric on our sample, suggesting mild sample misalignment or poor tolerancing. Volume tracking calibration and input sensitivities are also fine, while the RIAA equalisation curve shows sensible bandlimiting plus some mild 'bumpy' unevenness. The output impedance (related to damping factor) is a little on the high side too.

SOUND QUALITY

Respectable rather than exceptional, with CD preferred to vinyl in most respects, the 'fair' overall sound quality rating corresponds closely to that obtained for the cheaper *e*, but does not of course take account of the extra loudness capability of the *PE*. And notes drawing parallels with piledrivers emphasise the considerable wallop the *PE* 'expander' can deliver under practical real world conditions.

The midrange is the main strength of this model, sounding quite clear and informative if a touch 'thin'. The bass sounds slightly 'lumpy', lacking dynamics, slam and speed, while the treble could be cleaner and clearer. Though focus is pretty good, stereo depth and width are both curtailed and overall transparency and dynamics are both well short of the best.

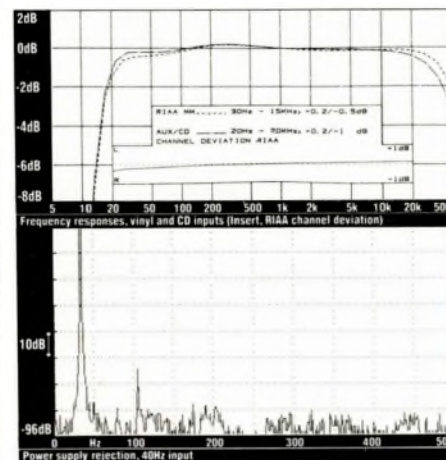
CONCLUSIONS

The *3220PE* is a logical partner for the *3020e*, providing identical features and a similar sound quality alongside a substantial and worthwhile increase in loudness capability. As such it succeeds, so the *PE* could well be a logical choice for power hungry headban-

gers (or people with large rooms and little loudspeakers), though the basic sonic capability of the breed is now beginning to show its age, and no longer stands out amongst its rivals.

TEST RESULTS

Power output		Integrated amplifier		
Rated power into 8ohms, maker's spec		20W (= 13dBW)		
Power output	20Hz	1kHz	20kHz	
One channel, 8ohm load	17.8dBW	18.2dBW	17.8dBW	
Both channels, 4ohm load	12.3dBW	13.8dBW	13.4dBW	
One channel, 2ohms, pulsed	–dBW	14dBW	–dBW	
Instantaneous peak current		+16A	–15A	
Distortion				
Total harmonic distortion,	20Hz	1kHz	20kHz	
at rated power, aux/CD input	–81dB	–82dB	–72dB	
Intermodulation, 19/20kHz, rated power, aux input			–80dB	
Intermodulation, 19/20kHz, at 0dB, disc (MM)			–72dB	
Noise				
Disc (MM) input (HF, CCIR weighted)			–77dB	
Aux/CD input (HF, CCIR weighted)			–82dB	
Residual, unweighted (volume control at min)			–85dB	
DC output offset			left 0mV, right 0mV	
DC offset, preamp			left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz	
Disc (MM) input (HF)	35dB	34 dB	32.5dB	
Aux/CD input (HF)	>23dB	>23dB	>23dB	
Stereo separation				
Disc input (MM)	32/68dB	30/65dB	26/46dB	
Aux/CD input	64dB	61dB	47dB	
Output impedance (damp)	–0.48ohm	–0.56ohm	–0.32ohm	
Channel balance, disc, at 1kHz			0.7dB	
Volume balance tracking				
Aux/CD input	0dB	–20dB	–60dB	
	0.75dB	1 dB	1.2dB	
Input data				
Disc (MM) input	sensitivity	loading		
Aux/CD input	0.53mV	47kohms	90pF	
	27mV	47kohms	90pF	
Output, preamp (tape)		14.8V max	15kohms	
Disc equalisation error, 30Hz–15kHz		+0.2dB	–0.5dB	
Size (width, height, depth)			42x9.3x27.5cm	
Typical price inc VAT			£140	



NAKAMICHI CA-5EII/PA-5E

B&W NAKAMICHI (UK) LTD., MARLBOROUGH ROAD, CHURCHILL IND. EST., LANCING, WEST SUSSEX. TEL: (0903) 750750.



Best known for cassette recorders that dominate tape's top price and performance league, Nakamichi has long produced other electronics components, though this has always been an area of secondary activity in the UK. Some years back Nakamichi took over the well known American amplifier specialist Threshold, particularly known for its *Stasis* power amplifier circuitry. This has added impetus to Nakamichi's electronics activity, and the *Stasis* design philosophy has been incorporated into the latest product range.

Six months ago (March '88) we assessed the extravagant (£4,200) CA-7/PA-7, a 200W powerhouse combination that delivered a respectable rather than inspiring sonic performance. Now it's the turn of the CA-5EII and FA-5 – still expensive, but at £1,900 only around half price of the bigger brethren.

Luxury finish is one characteristic of all Nakamichi products, even those towards the lower end of the price range. A fascinating example of the almost fanatical attention to detail here is the way the gold graphics used on the fascias match the shade of the plating used on the phono sockets!

CA-5 PREAMPLIFIER

Though designated a *MkII* version of the CA-5, this preamplifier is virtually all new (or was so when launched nearly a year ago), and in fact more closely resembles the 7E than its nomenclatic predecessor. Typically Nakamichi with its blacker than black finish, it feels very solidly built, with nice control mechanics.

Pretty smart and elegant with six identical rotaries along a split level fascia, control layout is consequently not particularly intuitive. The clearly labelled knobs cover volume, balance, input selection (disc plus 3 line) and tape monitoring/dubbing/source, plus bass and treble. Pushbuttons provide tone defeat and power on/off.

The casework has a lovely solid top and sides but is a bit sharp in the corners and the base is slightly rattly. Handsome gold-plated phono sockets are used throughout – two line outputs, three line-ins, two tape in/outs plus vinyl disc. This last is particularly flexible in terms of cartridge matching. Additional

switching provides a basic MM/MC sensitivity option along with variable capacitance or gain – MM cartridges may be loaded by 100, 200 or 300pF, MC offers 24, 30 or 36dB gain. Facilities for remote power on/off switching the power amplifier are provided on a non-standard DIN 3-pin socket.

Despite what by current audiophile standards is a fairly comprehensive range of facilities, Nakamichi refer to the 'excellence of simplicity' in the publicity leaflet. The circuitry resembles that used in the CA-7, with a differential FET input and bi-polars following. The power supply has multiple regulators feeding each stage of each channel independently. Power comes from a screened toroid, remote relay switching is used extensively and components throughout have been specifically chosen with good sound quality in mind – Cerafine capacitors, good quality Alps potentiometers, OFC wiring, selected resistors, special RIAA capacitors etc., etc. Internal build quality is superb and no costs have been spared to achieve the highest standards throughout.

PA-5 POWER AMPLIFIER

This macho style 100W power amplifier is quite big and very solidly built, if lacking some of the *je ne sais quoi* of big brother. The same width as the 7, the 5 is a little less deep and only two-thirds the height and only a little over half the weight (16kg nonetheless) – indeed the price/weight ratio remains approximately the same, which is probably as it should be.

All is metal and most panels are well damped and relatively free of rattle. The front panel is sculpted, for no apparent reason than this styling feature seems to be the current Japanese fashion, and has a huge and rather rattly on/off switch with matching bar light indicator, again presumably cosmetic. The otherwise featureless front has two tiny LED clipping indicators. The rear panel has an IEC mains and gold phono inputs, plus chunky 4mm socket/binders for the loudspeakers. The metalwork is a little sharp in places but not hazardously so.

Inside there is a large central screened toroid transformer and huge custom dual rail reservoirs. The *Stasis* pseudo class A output

stage is comparatively cool running so no fans are needed and the external finned heatsinks are sufficient to cope with the waste heat from ten powerful plastic output transistors per channel. Input is an all discrete low noise differential circuit. There's plenty of evidence of top quality components and workmanship in the carefully symmetrical layout.

LAB REPORT

Perhaps predictably, measured performance varies from the good to the superb more or less throughout. Power output is massive, beating the 100W (20dB) specification with all loads and right across the bandwidth. Peak current capability is a similarly generous 33A, and nicely symmetrical too, so loudspeaker choice should be quite immaterial. The power modulation spectrogram shows a few harmonic distortion components but mains frequency harmonics are entirely absent.

Distortions are reasonably low, though the high power intermodulation figure could have been better. Noise is very good, DC offset fine and stereo separation outstanding. Input overload margins vary on the MC disc input according to the chosen sensitivity, but are ample throughout. The various input sensitivities and impedances offer great versatility, though the 13.5kohm on the CD/aux input might have been a little higher.

Balance remains within 1dB across a full 60dB of the volume control range, which is evidence of the high quality components used. Tight tolerancing is also indicated by the exceptionally flat RIAA equalisation. Indeed all frequency responses are notably flat, if perhaps rather injudiciously extended at the frequency extremes.

SOUND QUALITY

The sound quality varied somewhat according to the configuration being assessed. Broad averaging placed both components in the good class, which is no disgrace but must also be regarded as a mild disappointment at the asking price. However, this judgement shows some consistency with the findings obtained with the CA-7/PA-7, which was rated just a little higher overall.

Assessed separately, the preamplifier is the best bit, and the best bit of the preamplifier is the CD/aux line level input, which was rated very good, delivering an open and lively sound with good focus. The treble has an attractive 'sparkle' and bass has some 'slam' and power. The soundstage is well developed spatially and dynamics are good, though the midband sounds a trifle thin.

However, the MC vinyl disc input falls significantly below this standard. Bass is fairly good and the midband smooth, but the treble region somehow sounds 'altered' and rather too obvious. Though image depth is fairly good, the soundstage is rather 'shut in', losing

scale and height, while the sense of excitement created by realistic dynamic 'slam' was somehow shortchanged.

The power amplifier alone created a good first impression, with a lively 'open' treble, fine depth and ambience and a smooth and relatively neutral midrange. But the initial hit flatters to deceive and some fatigue became apparent in due course.

CONCLUSIONS

Beautifully built on and below the surface, with great attention to detail and lavish component quality, the CA/FA-5 measures very impressively but auditions somewhat inconsistently, and rather below the level expected at this price level.

TEST RESULTS

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	100W (= 20dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	22.3dBW	22.3dBW	22.2dBW
Both channels, 4ohm load	20.9dBW	20.9dBW	20.7dBW
One channel, 2ohms, pulsed	-dBW	21.5dBW	50V
Instantaneous peak current	+33A	-33A	
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz

at rated power, aux/CD input -68dB -69dB -70dB
 Intermodulation, 19/20kHz, rated power, aux input -53dB
 Intermodulation, 19/20kHz, at 0dBW, disc (MM) -87dB
 Intermodulation, 19/20kHz, at 0dBW, disc (MC) -80dB

Noise

Disc (MM) input (IHF, CCIR weighted) -81dB
 Disc (MC) input (IHF, CCIR weighted) -76dB
 Aux/CD input (IHF, CCIR weighted) -94dB
 Residual, unweighted (volume control at min) -82dB
 DC output offset left 19mV, right 19mV
 DC offset, preamp left 0mV, right 0mV

Input overload 20Hz 1kHz 20kHz
 Disc (MM) input (IHF) 35.9dB 35.4dB 35.3dB
 Disc (MC) input (IHF) 27.2dB 26.3dB 25dB
 Aux/CD input (IHF) >23dB >23dB >23dB

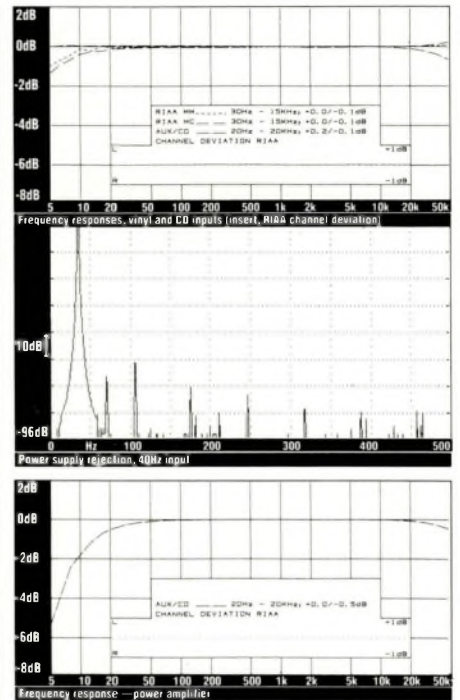
Stereo separation

Disc input (MM) 96dB 94dB 67dB
 Aux/CD input 97dB 92dB 71dB
 Output impedance (damp) 0.11ohm 0.11ohm 0.12ohm
 Channel balance, disc, at 1kHz 0.1dB
 Volume/balance tracking, Aux/CD input 0dB -20dB -60dB
 Aux/CD input 0.02dB 0.09dB 0.72dB

Input data

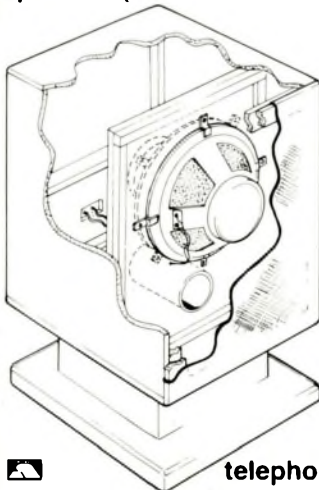
	sensitivity	loading	
Disc (MM) input	1.1mV	50kohms	340pF
Disc (MC) input	0.76mV	100kohms	100nF
	0.38mV		200pF
	0.19mV		300pF

Aux/CD input 40mV 13.5kohms 150pF
 Power amp 135mV 77kohms 340pF
 Output, preamp (tape) BV max, 560ohms
 Disc equalisation error, 30Hz-15kHz +0.0dB, -0.1dB
 Size (width, height, depth) Pre 43.5x7.5x32/Pow 43.5x13.7x39cm
 Typical price inc VAT £750 + £1,150



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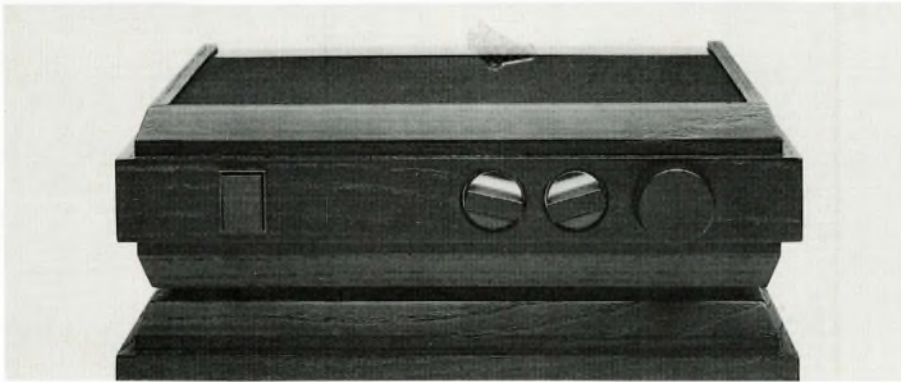
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PINK TRIANGLE PIP II

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

RECOMMENDED



Pink Triangle has made an unusual pre-amplifier christened *Pip* for some years now. It is built into a section of plinth moulding that matches the *PT TOO* turntable, providing a cleanly styled, understated companion. The original *Pip* retailed at around £360, but the new *Pip* sells for £2,765, which seems hard to justify at first sight as the only apparent addition is a separate power supply box. However, any doubts are dispelled on hearing what must certainly be regarded as a state of the art product.

Pip requires some getting used to, not least because of its bizarre yet elegant avoidance of any front panel legends or indicators, aside from the operate/stand-by switch and the angular position of the fluted selector knobs. However, a removable anodised cover plate slotted into the rear section of the top cover carries a control panel key on its upper face with the socket legends on the reverse.

This minimalist design has no tone controls or filters, and 'balance' is likewise absent. The first of two knobs selects from source and two tape monitors in either active or passive mode. Selection of vinyl disc (MC or MM via a small plug-in module) tuner, CD and tape dubbing is the responsibility of the second. Active mode provides 10 times (20dB) more gain than passive, so extreme care is required when switching from passive back to active – the volume must be turned down first.

All inputs and outputs have top quality gold plated phono sockets and the rear panel also has two special DIN-type sockets, one an auxiliary power outlet and the other the power input from the partnering power pack. It is essential to get the power supply modes switched correctly and this requires some study of the manual (P.T. recommend a stiff drink first!), and possibly some dealer advice.

P.T. always intended to add batteries to the original *Pip*, so the new model has 36V of high current lead acid batteries as standard, their charge rate managed by automatic monitoring circuitry. An isolated battery supply has many advantages, not least a complete absence of mains borne interference, noise and hum. It also represents a huge

reservoir capacitance of several hundred Farads compared with the 0.005F (5,000 μ F) which is typical of mains supplies.

From this superb source, divided stages within *Pip* are run from separately regulated supplies. Except for two DC servo loops, *Pip* is a zero feedback design, using discrete symmetrical bi-polar circuitry and passive RIAA equalisation. Selected audio components are used throughout and signal switches are remote gold contact vacuum-sealed glass reed relays. The circuitry is based on a transconductance gain cell, a voltage-to-current amplification mode which allows high linearity without need for overall negative feedback.

When running on charged batteries *Pip* operates in total isolation from the mains supply so eliminating many kinds of unwanted interference. Up to 12 hours of continuous listening is possible, and the unit then returns to the charge cycle automatically when the batteries are near discharge, and will continue to operate in 'charge' mode.

LAB REPORT

RIAA channel balance is very good, within 0.1dB 30Hz-15kHz range and with a slight lift at low frequencies (+0.35dB, 10Hz). Distortions are quite negligible, even via the MC input. Input noise levels are good, no d.c. offsets were observed, and the low 12ohm output impedance is excellent. Input overload margins are ample, stereo separation is much better than average despite some separation imbalance between channels, channel balance is excellent and was maintained at low volume settings. The MC vinyl disc input characteristics are fine, though the 10kohm line input impedance is on the low side – 20kohms or more would be preferable.

SOUND QUALITY

Pip is a truly outstanding preamplifier that can match or beat anything the *Choice* team has yet encountered. Varying slightly from active to passive settings, the rating is consistently excellent throughout, with an unexaggerated neutrality and lucid transparency that became increasingly beguiling as audi-

tioning continued.

The complete absence of hum from the battery power supply seems to help in setting new standards for low frequency accuracy and detail in particular, while the sweet, delicate and even treble ensures magnificent stereo scale, precise perspectives and remarkable definition.

CONCLUSIONS

The battery system is a minor operating inconvenience, and the cells will require replacement after about five years (costing approximately £100 with readily available components). But this is surely a minor point considering that the sound quality has established a new benchmark on our listening tests. Reportedly ten years under development, this new *Pip II* comfortably justifies its admittedly high price and deserves enthusiastic Recommendation. Pink may not have the most stable business track record, but certainly they have the knack of creating exceptional products.

TEST RESULTS

Distortion

Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-84dB	-87dB	-85dB
Intermodulation, 19/20kHz, rated power, aux input			-83dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-77dB

Noise

Disc (MC) input (IHf, CCIR weighted)			-72dB
Aux/CD input (IHf, CCIR weighted)			-86dB
Residual, unweighted (volume control at min)			-89dB
DC output offset			left 0mV, right 0mV
DC offset, preamp			left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz
Disc (MC) input (IHf)*	30.8dB	30.4dB	26dB
Aux/CD input (IHf)	>23dB	>23dB	>23dB

Stereo separation

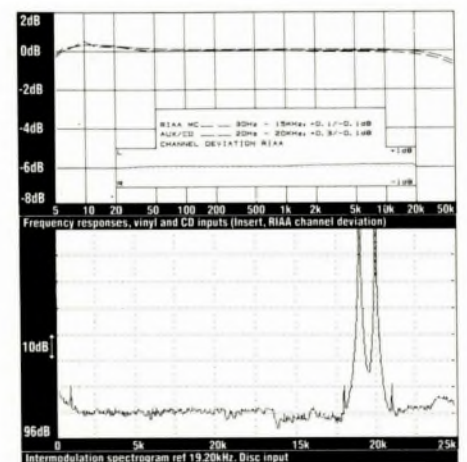
Disc input (MM)	>86dB	96/83dB	82/69dB
Aux/CD input	110/119dB	107/92dB	82/70dB
Output impedance (damp)	12ohm	12ohm	12ohm
Channel balance, disc, at 1kHz			-dB

Volume balance tracking

Aux/CD input	0dB	-20dB	-60dB
	0.04dB	0.08dB	0.56dB

Input data

Disc (MC) input*	sensitivity	loading	
	0.11mV	100ohms	—nF
Aux/CD input	53mV	10kohms	145pF
Output, preamp (tape)		0V max, 20kohms	
Disc equalisation error, 30Hz-15kHz		+0.1dB, -0.1dB	
Size (width, height, depth)		25x7.5x32cm times 2	
Typical price inc VAT			£2,765



PIONEER A-333

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



Possibly the most successful of the Japanese audio specialists, Pioneer is a volume manufacturer that competes directly and successfully with the consumer electronics giants. Best known for hi-fi separates, midi systems and upmarket in-car equipment in the UK, the company has been moving into TV and video and is expected to be a leading player in CD-Video come its Autumn launch.

The A-333 is a £150 integrated amplifier rated at 55W and basically conventional in layout and construction. There is also a similar 443 that adds £30 to the price, along with a 70W power rating, MC cartridge input, sub-sonic filter, -20dB mute switch and an extra kilo or so of mass.

The reassuringly heavy 333 has a chunky appearance with a stylistically split metal fascia and ventilated metal case, held together by copper plated screws. This is built onto an economy version of Pioneer's proprietary, rigid 'honeycomb' chassis, which in turn sits on silly, shiny and thoroughly ineffectual looking feet (such is fashion, and the need for mainstream manufacturers to make sure no-one mistakes their separates for low status one-piece systems).

The larger, slightly proud top section of the front carries the primary controls - the power switch, input and output switching and the prominent volume control. Pushbuttons permit either or both sets of speakers to be used, and two large rotary switches allow separate setting of input or record output. The lower, narrower and recessed section has a headphones socket, bass, treble and balance rotaries (still there but steadily shrinking!), plus pushbuttons for loudness and 'direct' (bypasses tone, balance and loudness).

The rear bristles with phono socketry, for vinyl disc (MM only unless you go for the 443), three line inputs, two tape recorder sets plus an adaptor in/out set for those who wish to insert graphic equalisers or other processors between pre- and power amplifier sections.

Internal build is decent enough, with good quality remote switching and ribbon cable jumpers, but the multi-board construction has a rather convoluted layout. A large transformer serves the split rail supply and the

class A/B complementary direct coupled output transistors - two large 25A devices per channel. The vinyl disc input is a simple op-amp.

LAB REPORT

Power delivery is generous for the price and comfortably ahead of specification. Despite some constriction at high and low frequencies, power is reasonably well maintained into various impedances. Peak current capability is exceptionally high, with more still available with some waveform breakup. THD echoes the power pattern at the bandwidth extremes but IMD is exceptionally low, and the power supply modulation spectrogram is exceptionally clean.

RIAA equalisation is accurate and frequency responses flat, rolling off gently at high frequencies but inherently flat and extended at LF. The other measured parameters are all pretty respectable - low noise, decent overload margins, low output impedance (= high damping factor) and close channel balance. Stereo separation shows some discrepancy at high frequencies.

SOUND QUALITY

The fair rating is quite respectable considering the price and power rating, the 333 falling short of more audiophile oriented models but holding up well against its mass market competitors.

Results were considered significantly better from CD than with vinyl disc, the latter sounding 'fat and lumpy' in the bass, with narrowed stereo. But from all sources the sound lacks somewhat in clarity, grip, drive and dynamics, and the stereo image is short on depth and focus. Though competent and basically unaggressive, this amplifier really needs rather more get up and go in musical terms, even though it's capable of going loud when required.

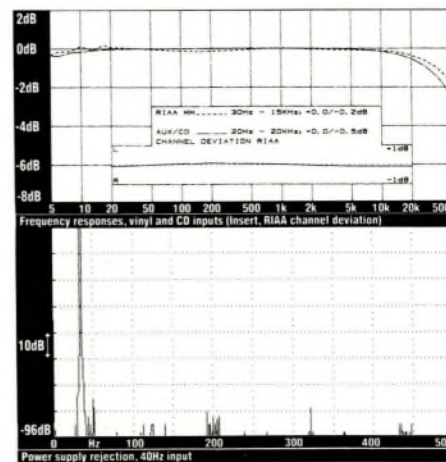
CONCLUSIONS

Although the sound quality rating is insufficient to merit formal Recommendation at the price, the 333 is still worth considering for its fine power output. More significant perhaps, it is also an encouraging sign of improving standards in the mainstream sec-

tor of the market, which can only be a hopeful portent for the future.

TEST RESULTS

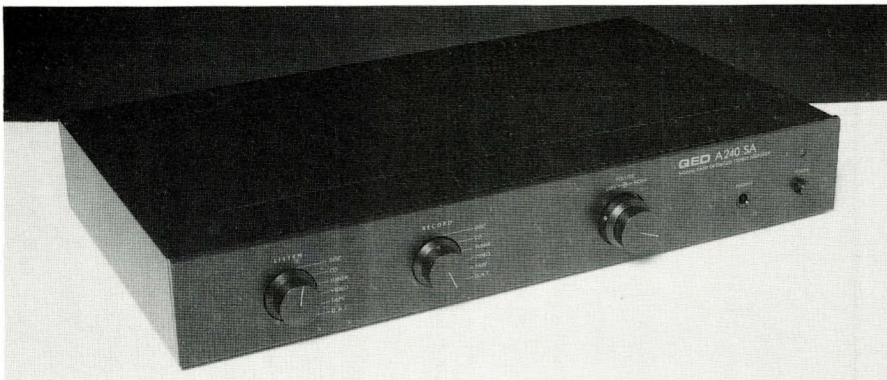
Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		55W (= 17.4dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	17.9dBW 18.2dBW 18.0dBW		
Both channels, 4ohm load	14.7dBW 16.0dBW 15.7dBW		
One channel, 2ohms, pulsed	-dBW 18dBW 28V		
Instantaneous peak current		+17A	-16A
Distortion			
Total harmonic distortion,	20Hz 1kHz 20kHz		
at rated power, aux/CD input	-64dB -83dB -66dB		
Intermodulation, 19/20kHz, rated power, aux input		-100dB	
Intermodulation, 19/20kHz, at 0dB, disc (MM)		-83dB	
Noise			
Disc (MM) input (IHF, CCIW weighted)		-74dB	
Aux/CD input (IHF, CCIW weighted)		-76dB	
Residual, unweighted (volume control at min)		-84dB	
DC output offset		left 10mV, right 6mV	
DC offset, preamp		left 0mV, right 6mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	31dB 30.4dB 26.5dB		
Aux/CD input (IHF)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	62dB 73dB 57/45dB		
Aux/CD input	62dB 74dB 61/48dB		
Output impedance (damp)	0.064ohm 0.046ohm 0.072ohm		
Channel balance, disc, at 1kHz		0.10dB	
Volume/balance tracking			
Aux/CD input	0dB -20dB -60dB		
Aux/CD input	0.04dB 0.20dB 1.04dB		
Input data			
	sensitivity	loading	
Disc (MM) input	0.39mV	47kohms 190pF	
Aux/CD input	24mV	62kohms 440pF	
Output, preamp (tape)		9.5V max, 2.2kohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -0.5dB	
Size (width, height, depth)		42x12.5x35cm	
Typical price inc VAT		£150	



QED A240 SA II/A240 CD II

QED AUDIO PRODUCTS LTD., UNIT 12, ASHFORD IND. EST., SHIELD ROAD, ASHFORD, MIDDX TW15 1AU. TEL: (07842) 46236.

BEST BUY



The SA ('Super Analogue') is the more expensive version of this amplifier as it comes complete with a high quality moving magnet/moving coil input module; the economy CD model has a simpler moving magnet input, but is otherwise the same.

Styling is neat, clean and conventional with a good quality all aluminium case. The front panel has three rotary controls which adjust volume/balance and input to listen and output to record. Available selections on both are disc, CD, tuner, video, tape, and DAT. A headphone socket is also provided.

Where appropriate, moving-coil or moving magnet are set by internal switches. Six 4mm sockets for loudspeaker connections allow optional automatic headphone muting.

Build and finish quality is high both inside and out. A substantial and very quiet toroidal transformer feeds on-board 4,700µF power supply capacitors. The class AB power amplifier uses discrete components and direct or switched output coupling. It has fairly high gain, so line level inputs are fed directly to the volume control, minimising the signal path. The SA option has an extra plug in board with regulated supplies; the whole of the disc input/IRAA equalisation is constructed around discrete components.

LAB REPORT

Exceeding the specified output throughout the audio bandwidth into an 8ohm load, output fell by 2.5dBW with both channels driven into 4ohms. 14dBW was delivered pulsed into 2ohms, and the instantaneous peak current recorded at ±13A. Total harmonic distortion was moderate, and the full level intermodulation result good. The disc stage IM figures were unexceptional, especially on the moving coil setting.

Noise figures were all adequate and power amplifier DC offset was held to low levels. Overload margins fell somewhat at high frequencies on the various vinyl disc inputs. The CD model's MM disc input gave comfortably the best IM figures of the three, but otherwise fell between the SA's MM and MC inputs on measurement. Stereo separation was good, especially in the midband, and volume/balance tracking was fine for a unit at this price level.

Sensitivities were well selected, as were the loadings on both disc inputs. However, the low 13kohm aux input loading could cause some sources trouble, so it's worth checking the compatibility of your ancillary equipment before purchase.

The auxiliary input exhibited a typically flat, bandlimited response. Where the CD was commendably flat, the SA's RIAA response at both gain settings showed some bass boost below 100Hz and very mild treble lift above 2kHz, with both subsonics and ultrasonics sensibly curtailed. The supply modulation test shows some harmonic signal distortion with 50Hz and 100Hz fundamental and harmonic breakthrough.

SOUND QUALITY

The sound quality of these two amplifiers was virtually identical when auditioned via the CD input, a solid 'good+' rating representing a fine result at the price. Clean, clear and tidy if tonally a touch lightweight, the bass had a crisp, articulate and well differentiated quality. Some mild treble grain was evident, though stereo focus and depth were both good. Drive to full level sounded quite pleasant at the clipping/overload point, and proved happy with some of the more difficult loudspeaker loads.

The 240CD gave a 'good' rating for the normal analogue disc input. The reproduced sound was smooth enough but had some mid-range muddle and less than precise stereo focus. Stereo depth was moderate but stage width was well up to scratch. The bass could have been a little 'faster', with more weight. The SA alternative uprated the score to 'good+'. Good midrange clarity and definition accompanied more than promising focus and depth. The overall sound was lively and informative.

CONCLUSIONS

When first launched these Mk II QED 240 models showed a significant advance in performance, and they maintain their strong competitive position. The SA version fully justifies its pricing, and the moving coil performance is commendable. For those with a less ambitious view of analogue replay the 240CD would be a wise choice, maintaining

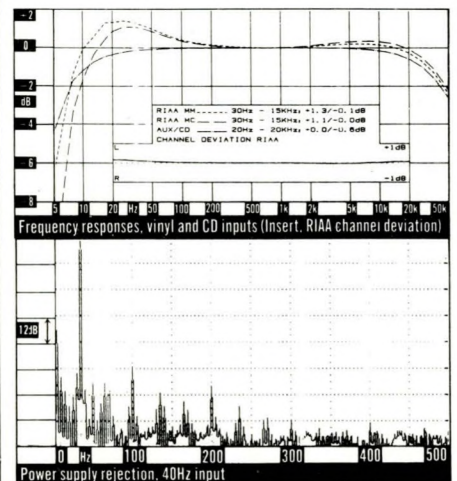
the fine CD performance and coming with a competent MM disc input.

The CD model may be upgraded by the subsequent addition of the plug-in SA disc board. Finish, build and performance of these British amplifiers are good, and both 240 models are firmly placed in the Best Buy category.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		40W (= 16dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	16.4dBW 17dBW 16.9dBW		
Both channels, 4ohm load	12.4dBW 14.4dBW 14.3dBW		
One channel, 2ohms, pulsed	-dBW 14dBW -dBW		
Instantaneous peak current	+13A -13A		
Distortion			
Total harmonic distortion, at rated power, aux/CD in.	20Hz -59dB 1kHz -60dB 20kHz -55dB		
Intermodulation, 19/20kHz, rated power, aux input	-75dB		
Intermodulation, 19/20kHz, at 0dBW, disc (MM)	50dB (-75dB)*		
Intermodulation, 19/20kHz, at 0dBW, disc (MC)	-28dB		
Noise			
Disc (MM) input (IHF, CCIR weighted)	-76dB (-71dB)*		
Disc (MC) input (IHF, CCIR weighted)	-64dB		
Aux/CD input (IHF, CCIR weighted)	-75dB		
Residual, unweighted (volume control at min)	-79dB		
DC output offset	left 4mV, right 15mV		
DC offset, preamp	left n/a mV, right n/a mV		
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	33.4dB 35.0dB 29.1dB		
Disc (MC) input (IHF)*	28dB 28.3dB 17.2dB		
Aux/CD input (IHF)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	62dB 76dB 55dB		
Aux/CD input	66dB 74dB 52dB		
Output impedance (damp)	0.1ohm 0.09ohm 0.12ohm		
Channel balance, disc, at 1kHz	0.36dB		
Volume/balance tracking			
Aux/CD input	0.06dB 0.43dB 1.28dB		
Input data			
	sensitivity	loading	
Disc (MM) input	0.59mV	55kohms	180pF
Disc (MC) input*	0.026	600ohms	n/a nF
Aux/CD input	39mV	12.9kohms	20pF
Output, preamp (tape)	10.0V max, 4.5kohms		
Size (width, height, depth)	43x6.4x26cm		
Typical price inc VAT	£160 CD; £219 SA		

*A240 SA - graphs below
Reprinted from issue 56



ROTEL RA-810A

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

BEST BUY



Few companies have been more successful than Rotel in tailoring products to the specific requirements of the UK specialist hi-fi separates market. The formula has been essentially to combine UK design skills with Far Eastern manufacturing competitiveness, resulting in keenly priced products that can offer serious sonic rivalry to models brewed entirely in the UK.

The 810A is a new integrated 'entry level' model, designed first and foremost with price in mind in order to be sold at 'under £100' – a figure significantly below what is now normally regarded as the minimum for serious hi-fi, yet still a magic price point in the mainstream audio market for budget separates.

Inevitably it is a very simple, basic design, built onto a metal chassis with metal wrap and plastic fascia. The front panel is dominated by the large volume control, with subsidiary rotary potentiometers for bass, treble and balance, plus two similar rotary selector switches for source (MM vinyl disc, CD tuner and AV/aux), plus tape/source monitoring. There's also a headphones socket. The rear panel uses phono sockets throughout for MM vinyl disc plus four line level signals that include one tape recorder set. Loudspeakers are connected using a single set of unswitched 4mm socket/binders.

Build quality and external finish is perfectly adequate, the unit being manufactured in Taiwan. Essentially a cost-pared version of the 820A II, using standard components with less stringent tolerancing, the circuitry is pretty straightforward. The discrete transistor class A/B complementary DC power stages share a decent sized transformer and 2x6,800µF power supply. The overall single-board layout is neat and tidy, and the vinyl disc input uses a simple, selected dual op-amp.

LAB REPORT

Only formally rated at 20W, the 810A in fact managed 35W into 8ohms with one channel driven, but the effects of the small, shared power supply may be seen in the significant drop when both channels are driving 4ohms. Nevertheless the peak current capability is a very generous 12A, so load tolerance should be very good. The supply modulation spectro-

gram does show some signs of stress, however, with the 100Hz component at only –50dB.

The frequency responses indicate a slightly 'forward' and bass light presentation, but are basically satisfactory. Noise, headroom and distortion figures are all good and the output impedance is impressively low, though the DC output offset is on the high side and high frequency separation could be improved. Volume/balance tracking deteriorates a little at low levels, but is very acceptable considering the price constraints.

SOUND QUALITY

A fair rating may not sound a remarkable achievement, but it is for a sub-£100 amplifier, where manufacturing, component and tolerancing constraints take an inevitable toll, and in fact the overall verdict came close to the good class, especially when using CD as source.

Vinyl disc sounds rhythmically 'boppy' and cheerful with a nice impression of dynamics and drive that maintains a family resemblance with the more grown up 820 models, albeit carrying rather less authority. Vocals in particular are tidy and clean, and limitations at the bandwidth extremes are comparatively minor.

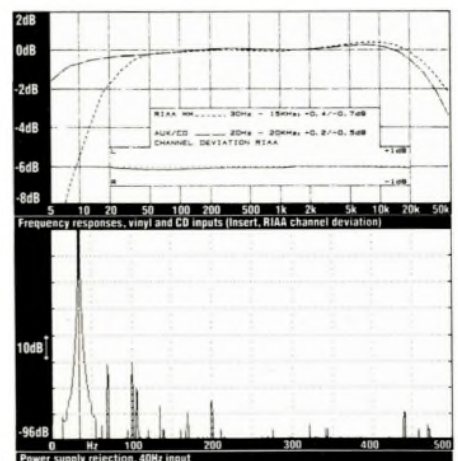
Compact disc revealed the basic power limitations in what is after all a pretty modest amplifier, but the sound remains coherent with ample scale and basically good dynamics and bass drive, plus **surprisingly** little hardness or 'grain' in the treble.

CONCLUSIONS

In many senses the 810A redefines the budget amplifier market, setting a subjective standard few will equal even for a few dollars more, and giving little away in terms of build or presentation. Maintaining much of the character of the more expensive 820 series Rotels, only a slight lack of refinement betrays the slacker component tolerancing which accounts for much of the cost savings, while the lab performance is at least adequate for most of the conditions it is likely to encounter. This is yet another obvious Best Buy for a brand which seems to collect such accolades as a matter of course these days.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		20W (= 13.5dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	14.9dBW 15.2dBW 15.1dBW		
Both channels, 4ohm load	11.5dBW 12.5dBW 12.3dBW		
One channel, 2ohms, pulsed	–dBW 13.5dBW 20V		
Instantaneous peak current	+12A –12A		
Distortion			
Total harmonic distortion,	20Hz 1kHz 20kHz		
at rated power, aux/CD input	–67dB –80dB –76dB		
Intermodulation, 19/20kHz, rated power, aux input		–85dB	
Intermodulation, 19/20kHz, at 0dBW, disc (MM)		–80dB	
Noise			
Disc (MM) input (IHF, CCIR weighted)		–73dB	
Aux/CD input (IHF, CCIR weighted)		–79dB	
Residual, unweighted (volume control at min)		–81dB	
DC output offset		left 51mV, right 72mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	34.9dB 33.0dB 27.0dB		
Aux/CD input (IHF)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	70dB 64dB 43dB		
Aux/CD input	72dB 63dB 45dB		
Output impedance (damp)	0.095ohm 0.09ohm 0.096ohm		
Channel balance, disc, at 1kHz		–dB	
Volume/balance tracking	0dB –20dB –60dB		
Aux/CD input	0.14dB 0.06dB 3.04dB		
Input data		sensitivity loading	
Disc (MM) input	0.46mV 46kohms 130pF		
Aux/CD input	29.3mV 46kohms 80pF		
Output, preamp (tape)		13.4V max, 2kohms	
Disc equalisation error, 30Hz–15kHz		+0.2dB, –0.5dB	
Size (width, height, depth)		44.5x8.6x30.0cm	
Typical price inc VAT		£100	



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ROTEL RC/RB 850

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BEST BUY



This is Rotel's £260 separates amplifier system and uses the considerable experience of their successful UK design team.

The cleanly designed preamplifier is finished in satin black and not overburdened with an excessive number of rarely used functions. Bass and treble controls are provided but may be bypassed, and a mono switch is also available.

The back panel contains gold plated phono sockets with inputs for disc (moving magnet and moving coil), CD, tuner, two tape machines, and 2 'aux/AV' inputs, plus one input and output offering the facility to route a video signal through the preamplifier.

The 50W per channel (17dBW) power amplifier is a plain uncluttered box with only an on/off switch on the front. A switch on the back panel engages bridged mono operation, which increases power output to 150W.

Internal inspection of RC850 reveals the single board construction and short signal paths wherever possible. All gain stages are based around selected 5534 operational amplifiers, and the disc stage is gain switched for MM or MC operation. Some of the capacitors have been chosen on sound quality grounds, and other passive components considered less important are good commercial grade. The mains transformer is encased in steel to control hum fields.

The RB is a dual mono, two transformer, symmetric design of single board construction, using discrete components. Generous 2x10,000µF power supply capacitors per channel are mounted on the main amplifier board. Minimal internal wiring allows a very tidy and high standard of construction. Separate internal heat sinks are provided for each set of 4 robust output transistors, and the only protection is supply line fuses.

LAB REPORT

The power amplifier was well up to specification, achieving 18dBW. It held up well into lower impedances thanks to the very generous peak current capacity; ±25A is greater than many amps with much higher specified output ratings. In bridged mode into 8ohms 23dBW (200W) was available.

The measured harmonic distortion and intermodulation results were very good and

the signal-to-noise ratios were up with the best. Separation was quite good, balance was perfect, and the DC offset was low. Bandwidth was rolled off very slightly at the bass end, some 0.5dB down at 20Hz, but was well extended at high frequencies. The power supply spectrogram was fairly clean, albeit with some 100Hz and 200Hz breakthrough

The preamp's total harmonic and intermodulation distortion figures were very good, and the noise on all inputs adequately low. Overload margins were all fine and stereo separation was also good. Channel balance was generally good, except that a 4dB error was noted at low volume settings. The RIAA was very accurate, exhibiting a sensible bass rolloff. RIAA channel deviation was negligible, and the line input response was flat within +0/-0.1dB limits, 20Hz to 20kHz

SOUND QUALITY

This preamplifier returned a very respectable score considering its modest price, rating 'good' for the MC cartridge input and rather better via the CD input. Very neutral with a pleasant tonal quality and an unfatiguing quality via moving coil, the bass was competent, even and extended, and the treble unobtrusive. Some loss of subtle detail was noted in the midrange and treble, while the soundstage seemed a little flat, the stereo lacking full depth and clarity. 'Bland' was one of the comments used, yet the good sonic rating speaks for itself. A small improvement was apparent via the MM disc input

The CD input's rating improved considerably, rivalling established preamplifiers at several times the price. The bass was clean and deep with good articulation, the treble only slightly dulled with a mild loss of detail.

The power amplifier sounded exceptional for its price category, pointing to considerable potential for use with more expensive preamps, or in multiple amplifier active loudspeakers. Clarity and instrumental separation was good, while a mildly 'lean', 'pinched' effect in the midband did not appear to detract from decent stereo staging with good depth and focus. Some 'grain' and 'edge' was audible in the treble, but was not considered too serious, while the bass was

strong with good speed and drive.

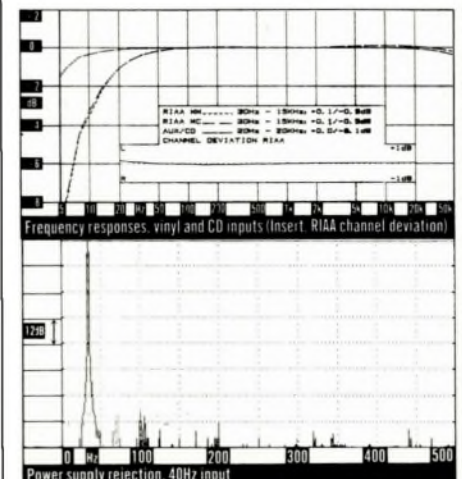
CONCLUSIONS

The RC850 is remarkably good for the price, makes a worthy 'budget separates' combination with the RB850, and clearly merits Recommendation. The RB850 could also partner a superior preamp, though it is hard to think of one at a similar price. The RB850 and the combination of the two obviously merit Best Buy ratings.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		50W (= 17dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	18.0dBW 18.1dBW 18.0dBW		
Both channels, 4ohm load	16.5dBW 16.9dBW 16.7dBW		
One channel, 2ohms, pulsed	-dBW 16.5dBW -dBW		
Instantaneous peak current	+25A -25A		
Distortion			
Total harmonic distortion, at rated power, aux/CD in.	20Hz 1kHz 20kHz		
	-80dB -84dB -72dB		
Intermodulation, 19/20kHz, rated power, aux input			-85dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-77dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-77dB
Noise			
Disc (mm) input (IH, CCIR weighted)			-78dB
Disc (MC) input (IH, CCIR weighted)			-65dB
Aux/CD input (IH, CCIR weighted)			-88dB
Residual, unweighted (volume control at min)			-90dB
DC output offset		left 10mV, right 6mV	
DC offset, preamp		left n/a mV, right n/a mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IH)	34.5dB 32.9dB 32.1dB		
Disc (MC) input (IH)	36.0dB 34.3dB 30.2dB		
Aux/CD input (IH)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	75dB 74dB 57dB		
Aux/CD input	75dB 74dB 57dB		
Output impedance (damp)	0.02ohm 0.025ohm 0.028ohm		
Channel balance, disc, at 1kHz			0.01dB
Volume balance tracking	0dB -20dB -60dB		
Aux/CD input	0.02dB 0.17dB 4.1dB		
Input data			
Disc (MM) input	sensitivity loading		
	1.22mV 47kohms 110pF		
Disc (MC) input	0.147mV 190ohms n/a nF		
Aux/CD input	79mV 45ohms 140pF		
Power amp	137mV 28ohms 150pF		
Output, preamp (tape)	12.5V max, 100ohms		
Disc equalisation error, 30Hz-15kHz	+0.1dB, -0.5dB		
Size (width, height, depth)	RC 44.4x6.6x28.5		
	RB 44.4x8.6x33.6cm		
Typical price inc VAT	£119 + £140		

Reprinted from issue 56



Dynavector M.C. Cartridge

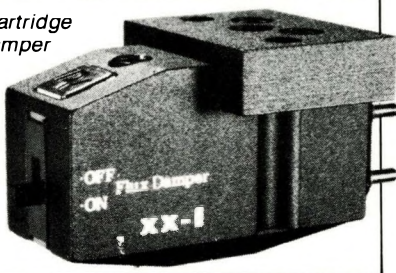
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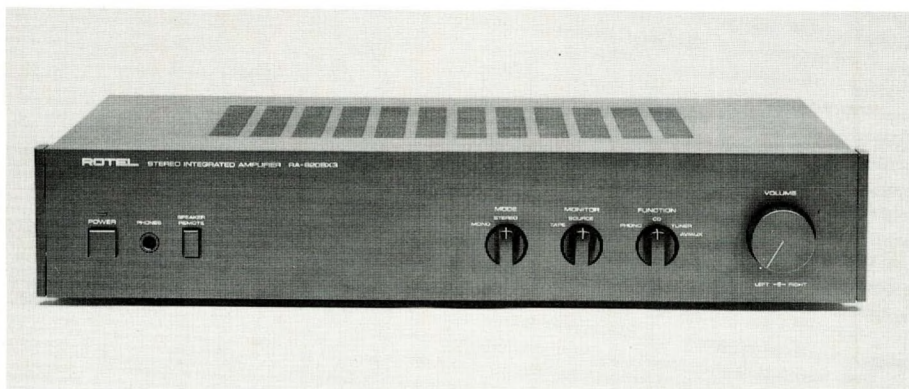
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ROTEL RA-820BX3

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BEST BUY



The one area where Rotel have consistently excelled for a number of years has been in budget amplifiers – fortunately so, given that amplifiers have shown the healthiest sales short of CD players themselves in this digital age. The original 820 integrated amplifier has formed the foundation of a series of models at different price points, allowing Rotel a number of alternative bites across a £100-160 range, first through the ‘stripped down’ BX series and more recently with the ‘economy’ 810A variant (also tested in this group).

The formula for success has been to combine UK design skills with Far Eastern manufacturing competitiveness, resulting in keenly priced products that can offer serious sonic rivalry to models brewed entirely in the UK. With typical typographical inconsistency, the 820 evolved into a BX, then a BX2 and has now become the £160 BX3 – which is less evolutionary and more of a complete underskin revamp.

Severely simple in a singleminded quest of maximum sound quality, tone controls are omitted but a MM/MC (high/low output) cartridge option is available on one pair of gold-plated sockets, with selection on the rear. (The CD player input is also precious plated.) Two sets of 4mm binding posts cater for loudspeaker selection, one labelled direct, the other remote switchable from the front panel. This configuration allows the purist to avoid switching in the loudspeaker signal path.

Basic build is all metal, with a ventilated and somewhat rattly case. The fascia is nicely finished with rounded end pieces to avoid savaging the fleshy bits of the soft machine. The large main volume control is backed up by three smaller rotary switches, covering mono/stereo mode, tape source/monitor and input selection for phono, CD, tuner and AV/aux. Pushbuttons select the switched loudspeaker set and power on/off, with a green indicator LED and a headphone socket.

Under the skin a substantial, screened toroidal transformer with two 50V 10,000µF Rubycon capacitors is shared between the two channels. All is mounted on a single high quality SRBP board, with good physical separation between different sections. Four 25A complementary transistors per channel

operate in class A/B mode, while the two-stage vinyl disc input uses selected NE5534 op-amps and good quality capacitors.

LAB REPORT

Though differences in circuitry are great enough to render comparison invalid in any strict sense, it is nonetheless interesting to note the way the BX3's measured performance improves on the 810A, particularly in terms of the power output delivery pattern and frequency response accuracy.

The 30W rating is generously exceeded, and the power supply has ample capacity to maintain output into low impedances and across a wide bandwidth. Peak current capability is a substantial 19A, ensuring fine tolerance of difficult loudspeaker loads. However, the supply modulation spectrogram is a little disappointing, the 100Hz component showing up at only -45dB.

Distortion and noise are acceptable, input sensitivities appropriate and overload margins ample. Stereo separation deteriorated somewhat at high frequencies, with some asymmetry. DC offsets are acceptable, output impedance is low, but volume/balance tracking deteriorated at low frequencies. Frequency responses are accurately tailored and sensibly curtailed at low frequencies, though with no attempt to roll off the HF, and showing a minor vinyl disc channel imbalance at low frequencies.

SOUND QUALITY

We have become accustomed to steadily improving sound quality with successive Rotel 820 suffixes, but the BX3 represents a mild disappointment or minor hiccup along the way, inasmuch as the improvement over the BX2 seems largely mythical. However, it still managed a good overall rating without difficulty, which is excellent considering the near budget price, and remains a strong contender in this fiercely competitive sector of the market.

Somewhat preferred using compact disc as the source, due to improved control under these conditions, the sound is consistently neutral and dynamic with tight bass and good speed, focus and stage width. The limiting factor seems to be a certain lack of atmos-

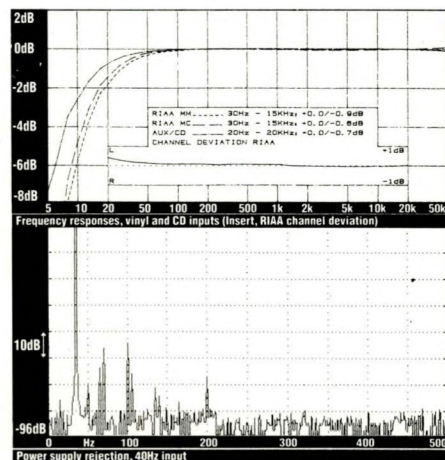
phere and ‘air’, with less depth and transparency than might have been anticipated from the genealogy. However, it does go impressively loud, irrespective of the loudspeakers used.

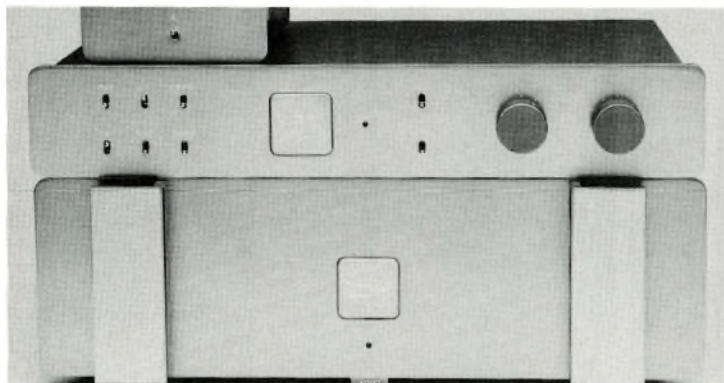
CONCLUSIONS

Just failing to make pole position, the BX3 nonetheless lines up strongly on the front row of the grid. It is a fine amplifier sonically, capable of driving any loudspeaker loads and with only minor technical weaknesses, and is sold at a very realistic price, ensuring fine value for money and a Best Buy rating.

TEST RESULTS

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		30W (= 14.75dBW)	
Power output	20Hz 1kHz 20kHz		
One channel, 8ohm load	16.1dBW 16.3dBW 16.1dBW		
Both channels, 4ohm load	15.0dBW 15.3dBW 15.0dBW		
One channel, 2ohms, pulsed	-dBW 15.5dBW 25V		
Instantaneous peak current	+19A -19A		
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz 1kHz 20kHz		
	-63dB -64dB -48dB		
Intermodulation, 19/20kHz, rated power, aux input			-68dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-72dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-71dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-68dB
Disc (MC) input (IHF, CCIR weighted)			-63dB
Aux/CD input (IHF, CCIR weighted)			-70dB
Residual, unweighted (volume control at min)			-70dB
DC output offset		left 35mV, right 48mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz 1kHz 20kHz		
Disc (MM) input (IHF)	33.7dB 32.2dB 31.8dB		
Disc (MC) input (IHF)	34.7dB 33.2dB 32.8dB		
Aux/CD input (IHF)	>23dB >23dB >23dB		
Stereo separation			
Disc input (MM)	63dB 80/67dB 63/43dB		
Aux/CD input	65dB 80/67dB 59/42dB		
Output impedance (damp)	0.096ohm 0.1ohm 0.12ohm		
Channel balance, disc, at 1kHz			0.09dB
Volume/balance tracking			
Disc (MC) input	0dB -20dB -60dB		
Aux/CD input	0.02dB 0.18dB 5.3dB		
Input data		sensitivity	loading
Disc (MM) input	0.7mV	47kohms	160pF
Disc (MC) input	0.077mV	180ohms	—nF
Aux/CD input	43.5mV	20kohms	85pF
Output, preamp (tape)		12V max,	—ohms
Disc equalisation error, 30Hz-15kHz		+0dB, -0.9dB	
Size (width, height, depth)		44.5x8.6x34.5cm	
Typical price inc VAT		£160	





Although the majority of exotic audiophile components available internationally originate in the United States, an increasing number of such components are appearing from European sources. There's YBA and Jadis from France, Goldmund from Switzerland, Burmester from Germany and Primare from Denmark, not to mention a fair scattering of UK product.

The common factor seems to be a remarkably high standard of external finish, taken to particular extremes by the French. To some this is over the top – it is certainly expensive and functionally unnecessary. But these components are not intended for those seeking the ultimate in cost-effectiveness. Instead they strive to represent perfection itself, and consequently seek to establish the highest standards of excellence throughout. Psychology of course plays an important part. The customer who might be persuaded to part with £6,000 for a virtually featureless stereo amplifier system expects visual and tactile as well as sonic beauty as reassurance – to him/herself and in the eyes of friends.

The YBA 1 pre- and power amplifiers that are the subject of this review fit this stereotype precisely. Each item costs nearly £3,000, which is nearly twice the price of YBA's model 2 'cheapies' that *Choice* reviewed in March '88. The product is manufactured by Phlox Electronique, but the YBA stands for Yves-Bernard André, one of the better known enfants terribles of the French high-end, with a number of interesting products to his credit, including the Vecteur cables and MC transformer, a variation of which is an integral part of this design.

Both pre- and power units have an attractive gunmetal silver/blue/grey fascia finish, with slightly darker casework (and volume controls). A large gold coloured, engraved metal badge with designer logo, stylishly offset to one side, dominates each front panel. There is also a curious metal tripod foot arrangement, presumably to provide a measure of control over shelf-borne vibration. Topping the preentiousness stakes, the large front foot is unashamedly engraved with the serial number of the unit; antiques fanciers can cop out with rubber-tipped alternatives.

Pre-amplifier functions are controlled by separate channel volume knobs and eight tiny chrome-plated toggle switches. Very discretely labelled (engraved of course), six of these select from the vinyl disc, four line and one tape monitor inputs. The remaining two provide absolute phase inversion and a 'direct' switch for the vinyl and CD inputs that minimises the internal connections and stages.

There are no tone controls or filters of course, and considerable attention has been paid to choosing components with the best sonic characteristics. There is no mains on/off switch either, in order to encourage the practice of leaving the unit permanently on, and so fully warmed, charged and stabilised – a not uncommon practice at the high end of audiophilia. Power is taken from a separate supply unit that can be tucked away out of sight if preferred.

A supplied, detachable variation of the Vecteur transformer provides 26dB extra boost for low output MC cartridges without noise impairment. Transformer boost is the alternative to an electronic 'head amp' step-up device; usually the more expensive route, it is the preferred choice of some audiophiles, and particularly favoured by valve amplifier fans.

The somewhat larger power amplifier features the same exquisite build quality and design flair. Utterly featureless, one can spend a long time looking for the on/off switch, only to discover it cunningly concealed behind the beefy and beautifully sculpted carrying handles. All is in the best possible taste, including the nicely radiused heatsinks, and the case is largely rattle-free. Rear panel connections consist of IEC mains in plus gold plated 4mm and phono sockets for loudspeaker and signal; there is also a test probe socket for each channel.

Internal inspection shows clearly where at least some of the money goes. Much attention is directed towards avoiding the use of magnetic materials, and the very best components are used throughout, including Vecteur mains and single-strand signal cables. Construction of both units is determinedly double mono, with generous power supply arrangements. The cool-running power

amplifier has six TQ3 output devices per channel, and an unusual transformer-coupled feedback arrangement.

LAB REPORT

The 1 shows a similar power delivery pattern to that of the 2 tested previously, and with very little actual power increase – the specs. are 70 and 85W respectively, and each has a dBW or two in hand. Delivery was fine with single channel 8ohm drive, but a slew limiting effect reduced the distortion-linked power available at high frequencies into 4ohms.

High frequencies aside, the 100W/20dBW rating was handsomely met under all (other) test conditions, particularly at low frequencies, and an ample +34/–30A peak current capability should ensure good tolerance of any awkward loudspeaker loads. The power supply modulation spectrogram is entirely free of mains-related artefacts, with just the expected harmonic distortion products visible.

Being a low feedback design the 1 returns relatively poor harmonic distortion figures – a full one per cent at full power, 20kHz, 8ohms. At a more normal 0dBW level this reduces to a more normal 0.15 per cent, and is better than 0.03 per cent at lower frequencies. Again the IM distortion was a quite high –45dB at full rated power, reducing to a more acceptable –65dB at 0dBW.

Output impedance is low, reducing still further at high frequencies, and DC offsets are negligible. The input impedance is a moderate 28kohm and this power amplifier requires a healthy 1.4V input to achieve full power output. S/N ratios and channel balance are fine, though stereo separation showed mild interchannel asymmetry. Bandwidth is extended virtually to DC at low frequencies, and the response is then ruler flat through the audio band with a gentle tailing off at high frequencies (–0.5dB, 35kHz).

The pre-amplifier harmonic distortion is quite satisfactory, but IM distortion is marginal through the MC disc input. This may be partly the result of the high gain provided from the transformer step-up, and in practice much lower distortion can be expected.

S/N ratios are satisfactory, though not low enough to encourage the practice of connecting an MC cartridge directly into the MM input in this case. Input overload margins are again adequate though not inspiring, and stereo separation is a surprisingly poor 37dB average – curious considering the elaborate pains taken in construction. Frequency responses are accurate through the majority of the frequency range, with rather early low frequency curtailment on the MC vinyl disc input.

SOUND QUALITY

The YBA 1s are yet another example of that amplifier paradox whereby subjective and

objective evaluation show poor correlation. The measured performance may be pretty indifferent, but the sound quality is superb. The two units are sonically complementary and seem able to deliver the sort of fundamental musicality that is more usually associated with valve components.

The midrange is the most exceptional aspect, combining neutrality with a sweetness only available from the very best subjectively 'grain-free' components. The treble draws no attention to itself, and is delicate, unforced and revealing, although the bass seems a shade lacking in authority, despite delivering good speed and extension. Stereo images are first rate, with fine depth and transparency.

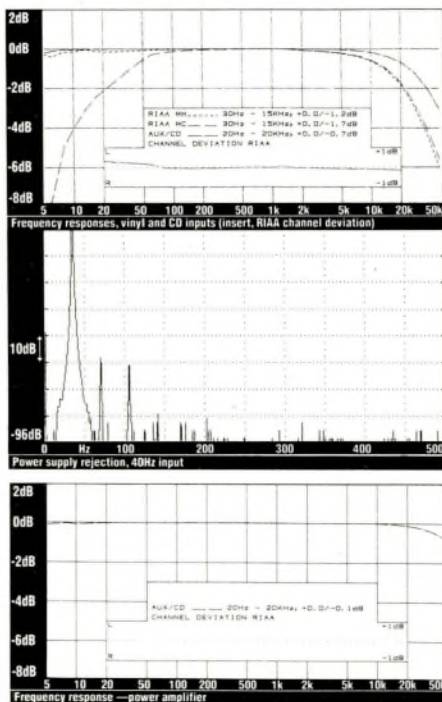
The CD input of the preamplifier is slightly better than the vinyl disc stage, and the MC transformer boost adds its own, very mild extra degradation – some MC cartridges may have sufficient output to drive the MM input directly.

The power amplifier rates just a little behind the preamplifier, though it is still one of the very best around nonetheless. Again the midrange and treble sound superbly pure and transparent, and again the bass seems to be the area of weakness, sounding somewhat underdamped – even a touch 'flabby' – compared to some other exotics at still higher prices. This particular combination of strengths and weaknesses seemed rather better suited to classical music than the heavier rock material.

CONCLUSIONS

The only aspect of the *Is* that is decidedly

unspecial is the lab performance, and it is interesting to speculate whether improvements here would improve or degrade the already very fine sound quality. This decidedly expensive combination sufficiently justifies its price sonically to merit Recommendation, even though it is perhaps a little less good value than the half-price YBA2. It's also superbly built, with a standard of finish that is decidedly ostentatious in its studied understatement.



TEST RESULTS

Power output		Separate pre- and power amplifier	
Rated power into 8ohms, maker's spec		85W (= 19.3dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	21dBW	21dBW	19.4dBW
Both channels, 4ohm load	20.4dBW	20.4dBW	13.5dBW
One channel, 2ohms, pulsed	-dBW	20.5dBW	-dBW
Instantaneous peak current		+34A	-30A
Distortion			
Total harmonic distortion, at rated power, aux/CD input	20Hz	1kHz	20kHz
	-64dB	-65dB	-65dB
Intermodulation, 19/20kHz, rated power, aux input			-55dB
Intermodulation, 19/20kHz, at 0dBW, disc (MM)			-44dB
Intermodulation, 19/20kHz, at 0dBW, disc (MC)			-39dB
Noise			
Disc (MM) input (IHF, CCIR weighted)			-66dB
Disc (MC) input (IHF, CCIR weighted)			-64dB
Aux/CD input (IHF, CCIR weighted)			-74dB
Residual, unweighted (volume control at min)			-79dB
DC output offset		left 0.06mV, right 0.01mV	
DC offset, preamp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (MM) input (IHF)	22.0dB	24.5dB	25.8dB
Disc (MC) input (IHF)	-dB	16.9dB	19.8dB
Aux/CD input (IHF)	21.4dB	21.4dB	21.5dB
Stereo separation			
Disc input (MM)	38dB	38dB	32dB
Aux/CD input	36dB	36dB	31dB
Output impedance (damp)	0.07ohm	0.06ohm	0.03ohm
Channel balance, disc, at 1kHz			-dB
Volume balance tracking			
Aux/CD input	n/adB	n/adB	n/adB
Distortion			
	sensitivity	loading	
Disc (MM) input	1.85mV	55kohms	85pF
Disc (MC) input	0.097mV	50ohms	nF
Aux/CD input	90.5mV	188kohms	480pF
Power amp	1.4mV	28kohms	275pF
Output, preamp (tape)		11.3V max, 40ohms	
Disc equalisation error, 30Hz-15kHz		+0dB, -1.5dB	
Size (width, height, depth)		43x8.9x41.5cm	
Typical price inc VAT		£2,895, £2,995	

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RC850 STEREO CONTROL AMPLIFIER



RB850 50W STEREO POWER AMPLIFIER

The connoisseur's choice. Incorporating much of the UK technology of the famous "BX" series amplifiers: Large well engineered power supplies ● High current capability ● Selected close tolerance high quality components ● Low noise integrated circuits ● Dual mono construction of the power amplifier ● Direct speaker wiring ● No degrading protection circuitry ● High quality phono stages ● Direct signal paths.

Technical features which combine to give music a sense of weight and effortlessness that smaller amplifiers can only aspire to. The twin box construction offers enormous flexibility in system building and the ability to run two power amplifiers either in bridged mode (150W per ch.) or to 81-amp loudspeakers. Higher power requirements can be achieved with Rotel's new RB870BX 100W and RB890 160W power amplifiers which are also bridgeable to provide 300W or 480W per ch. respectively.



RT850AL LW.MW.FM STEREO TUNER

The definitive tuner is its class. UK designed to provide very high standards of radio performance and music quality with the convenience of push button tuning and 16 preset stations. Winner of the "Best Buy" Award from Hi-Fi Choice and now winner of What Hi-Fi?'s prestigious Award for Best Tuner of 1988, the RT850L has now been restyled to match Rotel's new appearance design and also now features LED station indicators. Also available is the more affordable RT830AL Analogue Tuner, offering the same performance.



RCD820BX2 DIGITAL STEREO COMPACT DISC PLAYER

The very latest 16 bit 4 times oversampling technology combine with Rotel's own UK product development expertise to provide a C.D. signal source of fine resolution, definition and musical performance. With full numeric remote control, programming and full feature display the RCD820BX2 offers fine value. This special "BX" version incorporates additional UK designed circuitry and separate regulated power supplies effectively removing the digital hash from the audio circuits resulting in a cleaner audio signal with much improved dynamics and definition.

These fine components are but a small selection from Rotel's award winning range of real Hi-Fi products which offer very high standards of technical performance and musical enjoyment. All are based upon Rotel's UK balanced design concept which ensures that within the resources available, each aspect of the products design has been optimised. To find out why Rotel has now received What Hi-Fi?'s prestigious awards for 1988 for Best Turntable, Best Radio Tuner, Best Loudspeaker and Best Hi-Fi System (amplifier - Tuner - C.D. Player - Loudspeakers) call Rotel for details of your nearest dealer.

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SOUNDSTYLE



AMPLIFIERS TECH TALK

Here we explain the methods and relevance of the various lab tests and approach used in the subjective assessment.

LABORATORY TESTS

In general the tests conform to IHF A202 practice which makes comparison between units straightforward. Where possible, dB rather than percent of linear scaling is used, which again makes comparison of performance rather easier.

OUTPUT POWER AND CURRENT

Output power is referred to output level, on the basis that a good amplifier represents a voltage source. Zero reference, 0dB, is equal to 1W, that is 2.83V across the standard 8ohm load. The scaling of level is not adjusted in power terms to account for the various load regimes, however. The objective is to explore the 'stiffness' or load tolerance of the amplifiers, and the theoretically correct addition of 3dB for 4ohms and a further 3dB for 2ohms only serves to confuse this fact.

Accordingly, the output level was examined for 8ohms, one channel driven to less than 1 per cent clipping distortion, as well as with 4ohms into both channels driven and into 2ohms pulsed, 20Hz to 20kHz.

A further test served to explore momentary peak, current capability and its symmetry. To achieve this a 1ohm (or when necessary 0.5ohm), load was used. Short pulses of 1kHz repetition rate are used here, current excursion being read from an oscilloscope trace. The peak current figures should be judged with some discretion since the required capability must logically depend on the available power rating as well.

TOTAL HARMONIC DISTORTION

The figures recorded for total harmonic distortion include the noise within the measuring bandwidth of 400Hz to 80kHz, and for the 20Hz results they also include hum. The amplifier is set with one channel driving 8ohms to rated output, and the results provide a check on sample quality and give a general idea of linearity.

INTERMODULATION DISTORTION

This is a more sensitive indicator of performance. The test is carried out with 19kHz and 20kHz input frequencies, the sum of the difference tones being recorded using an *HP3561A* spectrum analyser with a resolution of 11.5dB. Where no products were visible the result is given as better than 110dB. Via auxiliary input the peak composite input level was 1V, via moving magnet 200mV, and via moving coil 20mV. These are strong signals but are within the normal expected dynamic range.

SUPPLY MODULATION

This test assesses the supply rejection of the amplifiers under load. Run at two-thirds of their rated output level, with a 4ohm load, a spectral analysis was made from 0-500Hz to assess the degree of supply hum modulation and breakthrough to give a sort of 'mud' index.

NOISE

An average of left and right channels was recorded, with the input appropriately loaded – for example, with equivalent cartridge sources for MM and MC (200ohms, 100ohms). The noise contribution of the termination has been deducted, leaving weighted CCIR/ARM readings. Residual noise was also noted over a 20Hz to 20kHz bandwidth, with the volume control at zero.

DC OFFSET

This was measured with inputs terminated and when the equipment was well warmed up.

INPUT OVERLOADS

These referred to 1HF input levels of 0.5mV for MC, 5mV for MM and 500mV aux at 1kHz. Note that for practical purposes the maximum recorded disc modulation remains pretty constant above a few kHz. In consequence an amplifier does not require a much increased disc input overload at high frequencies. More than 15dB at 20kHz will be ample for disc headroom.

Input overload for auxiliary/

line input was also checked; if it exceeded 20dB (5V) >20dB figure is recorded.

CHANNEL SEPARATION

Using a sensitive spectrometer, stereo channel separation was measured with the inputs terminated.

OUTPUT RESISTANCE (DAMPING FACTOR)

At 0dBW a 2ohm load was applied and the drop from open circuit output voltage noted. This loss represents the amplifier output resistance and is converted to ohms. The notion of damping factor is considered irrelevant in the light of cable and loudspeaker resistance.

DISC SENSITIVITY

This and the other sensitivities were measured using a computer DVM to compare input and output voltage at a decent signal-to-noise ratio, providing the voltage gain. This is converted to 1HF sensitivity for a rated 0.5V in the case of a preamp, or to a 0dBW output for a complete amplifier.

INPUT IMPEDANCE

In general these were checked using an automatic RLC bridge, but where the input conditions (biasing, overload etc) gave erroneous results, the loss produced via 600ohms source resistance was computed to a loading factor for 1kHz and 20kHz.

DISC EQUALISATION

For moving magnet this was measured using an *HP200* computer via reference to a table of exact RIAA equalisation values which were then used to plot the final curve. A 600ohm source impedance generator (6ohm MC) was employed, representative of a cartridge source; hence some high frequency loss would be experienced in the response where substantial input capacitance was present, as the case with a real cartridge.

GENERAL APPRAISAL

In addition to the above lab tests where practical the products

were opened up for an engineering design appraisal as well as an assessment of safety and constructional quality.

LISTENING TESTS

A two-tier system of listening tests was employed, whereby the procedure was divided into two parts. A/B full blind listening was found to be impractical for all the models in such a large scale project. Instead, using listening techniques developed by the author and his assistant, the products were carefully assessed on an individual basis. Many of the products were subjected to repeat assessments, and a number were monitored under blind conditions to ensure that the panelists were not subject to significant errors or prejudice.

Key factors involved in arriving at satisfactory judgements included the author's personal experience of over 200 models over the past two years; the use of an acoustically controlled and neutral listening room; ancillary equipment of good accuracy, and the use of both analogue and digital programme. Typical listening levels were around 95dBa, which was within the compass of the smaller models. Following analytical auditioning via the disc inputs, (both MM and MC where applicable) and the auxiliary input, the amplifier's volume was increased to the onset of audible distortion under two conditions, namely on '8ohm' speaker load and a '3ohm' simulated speaker load. Peak programme power levels were also monitored to assess the adverse load capacity.

The latest 1988 auditioning mainly involved using special bi-wired Celestion *SL700s* on Celestion stands, with various exotic van den Hul cables. Sources were Pink Triangle *PT Too*, SME *Series V* and van den Hul *MC One*, Cambridge Audio *CDI* and Goldmund *Studio/Koetsu Red Signature*. Reference amplification included Cello *Audio Suite* (premium), Musical Fidelity *MX*, Krell *KMA100 II*, Goldmund *Mimesis 3*, and a broad range of material, from Grandmaster Flash to Vivaldi.



AMPLIFIERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Martin Colloms sums up the best of a continually improving range of amplifiers.

In the last *Amplifiers* issue, (March '88) we explained the difficulty encountered when trying to integrate the new results with earlier data. The growing power of CD was considered to be a major factor, providing a new and more critical edge for assessing sonic differences between power amplifiers and line/aux inputs. At that time, the amplifiers section of the *Directory* was revised as extensively as possible, and higher standards applied. However, once again new products have forced the pace, with the result that this section would have been overwhelmed with recommendations had we not raised test standards. After much soul searching, we decided that the whole amplifier directory needed to be re-rated, reflecting just how competitive the amplifier field is at present.

Best Buys are listed up to £400, above which ceiling top performing models are automatically Recommended. Models are listed in ascending price order and the list includes amplifiers from both this and past issues.

INTEGRATED AMPLIFIERS

BEST BUYS

Rotel's RA810A (£100) is an eminently successful attempt to produce quality sound at a rock bottom price and it joins the **Rotel 820A II** (£130) which is just that bit better all round. Both come with tone controls and have a healthy power output. The undoubted class winner is the **Mission Cyrus One II** (£180) which set a cracking pace for sound quality, engineering and load driving muscle. Other strong performers included the new **Creek CAS 4040/II** (£160), a worthy partner to the **4140** (£219).

Acoustic Research have a new Best Buy in the shape of their **AR-04** (£160), a well equipped and powerful model in the 'Rotel' load driving mould. Rotel's classic **RA 820BX3** (£160) is not

as competitive on sound quality grounds as it was, but it still achieves Best Buy status, now enhanced by a moving coil facility. A strong performer, especially with CD sources, is the **Cambridge Audio P40** (£200), its high rating confirmed for this issue. We also include the **QED 240 series** (£170-£220) as fine all rounders.

Moving into higher price territory, **Cambridge Audio** have another success with their **P55** (£290), a heavyweight version of the **P40**, packing considerable punch. **Musical Fidelity's A1** (£250), though on the small side in power terms and with limited load tolerance, is well on the way to becoming a classic, offering an exceptionally musical sound for the price. **Mission's Cyrus Two II** (£300) may not be as radically improved as the **One**, (£180) but

Best priced in this group is the **NAD 3020E** (£110) still offering strong value and surprisingly powerful as well. **Kenwood's** latest **KA550D** (£130) now deletes the MC input in return for a more dynamic sound, and a healthy output capacity. A worthy newcomer is the **ITL MA80** (£150) with an exceptional CD sound which was let down by a weaker MC performance.

A big price jump to the £300 plus range kicks off with the **Naim Nait** (£322) recently revised but as yet untested by *Choice*. Interested readers may care to check it out. The **Audiolab 8000A** (£350) was tested in its latest '88/89 guise and acquitted itself well, with a highly dependable all-round performance particularly with regard to versatile matching, both input and output. The **Rotel**

The sonic standard achieved threatens many higher priced separates.

Finally, the **Mission Cyrus Two II/PSX** (£500) can be recommended. In *Series II* form, the *FSX* auxiliary power supply once again provides the required enhancement for the *Cyrus Two* and will also upgrade the *PCM II* CD player into the bargain.

WORTH CONSIDERING

The respectable designs which fall short of a high value Recommendation are listed in price ascending order.

Yamaha AX-300 (£120)
Denon PMA 250 II (£125)
Marantz PM25 (£125)
NAD 3220PE (£140)
Sansui AU-GIIX (£140)
Pioneer A333 (£149)
A&R Arcam Alpha (£150)
Marantz PM35 (£170)
Marantz PM45 (£200)
Sansui AU-G30X (£200)
Yamaha AX500 (£200)
Harman Kardon 640Vxi (£225)
A&R Arcam Delta 60 (£250)
Harman Kardon 645Vxi (£299)
Harman Kardon 655 Vxi (£450)

SEPARATES

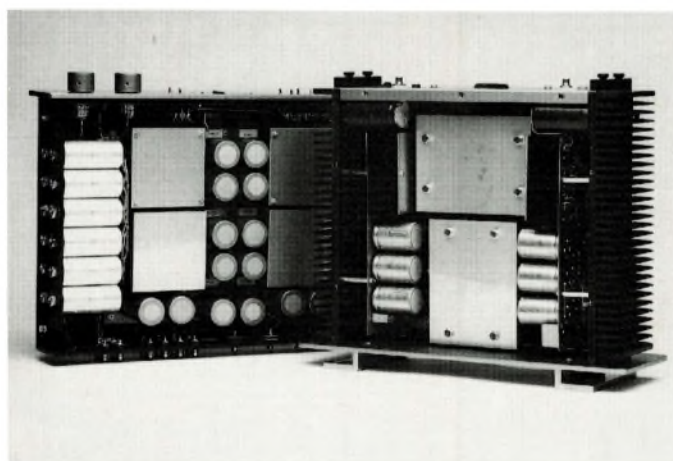
The following have been chosen on grounds of sound quality, engineering and value, the performance usually but not necessarily increasing with price.

BEST BUYS

Almost budget separates are available from **Rotel**. The **RC850** (£120) preamp and the **RB850** (£140) make a fine combination at a low enough price to merit Best Buy rating, the latter a particular bargain comparable to many much more expensive alternatives.

RECOMMENDED

Three British transistor systems provide middle market contrast. The **Audiolab 8000C/P** (£325/£495) gives traditional facilities, good transparency and generous power output. The **Cambridge Audio C75/A75** (£279/£299) is exceptional value for money having a simple, good quality preamp and generous power



Cost no object? The French-made YBA 1 combo (£5,890) is first-class, inside and out.

the high standard it achieves is unmistakable, and confirms the Best Buy rating. Finally, **Musical Fidelity** weigh in with their **B200** (£300) a high power alternative to the *A1*. Load tolerance is unexceptional, but the output power is high and MC input exceptional for the price.

RECOMMENDED

Falling short of our very demanding Best Buy standards for value and performance the following Recommended models still represent a good buy.

RA870 BX (£325) remains a strong contender - powerful, versatile and with a fine sound on CD. **Orell** remain listed with the **SA-040** (£360) together with the CD biased **Inca Tech Claymore** (£345). The **Mordaunt Short MS-A5000** (£350) is a well balanced newcomer, with an easy, unfatiguing sound.

The sound quality heavyweight in this category is the hot running **Musical Fidelity A100** (£440) with a very fine MC and CD performance, but limited low impedance load tolerance.

output at a quite modest price.

The **Musical Fidelity** separates range is increasingly extensive, and is strongly recommended in isolation or combination. The **Preamp 3** (£300) and **MVT III** (£1,200) continue to set a high standard at their respective price points. The **P140** (£299), **P270** (£1,200) and **A370** (£2,200) are 'double mono' power amplifiers moving steadily up the power and quality scale. Also recommended from MF are the **P170** (£499) and the fabulous **MXV** preamp (£2,000). Their best sounding power amp so far, the new **MA50** monoblok (£875/pr) is an audiophile bargain.

In contrast, the **Naim Audio** separates range should only be used in combination and carefully matched systems. **NAC 32-5** and **42-5** preamps (£425/£262) with **SNAPS** or **HICAP** supplies (£212/£285), plus **NAP140**, **NAP250** and **NAP135** power amplifiers (£414, £959, £966) have a distinctly 'different' sound quality which is not to all tastes but has many loyal adherents, with logical consistency and upgrading paths within the range.

The **Albarry 408II** monoblok power amplifiers (£649 per pair) made a welcome return recently scoring respectably in the tests and looking distinctive to boot. The **Meridian 201** preamp (£550) sets a very competitively high standard for the price, and may also be remotely controlled via an optional system handset. The French **Plenitude** (£795) power amp is favoured, though the matching preamp is not as highly rated.

At higher prices our findings on the **DNM** preamplifiers (from £1,000) are rather out of date; despite being a little expensive, recommendation presumably remains appropriate.

At the top end of the transistor price spectrum the **YBA 2** separates pair (£1,400/£1,700) did very well in auditioning and is now joined by the equally worthy **I** combination (£2,895/£2,995). Another new entry is the **PIP II** (£2,670) from **Pink Triangle** which justifiably claims to be the world's finest preamplifier. The **Deltec DPA100S** (£1,900) is an expensive but fine power amplifier from Wales; also recommended are the **Denon POA 660** monobloks (£1,000/pr), the **Sumo Nine** (£1,200), and the **LFD** preamp (£2,995). And in a price group all on its own, the **Cello Audio Suite** is a

totally flexible and extravagant preamplifier system that provided a fine reference point throughout the tests.

VALVE AMPLIFIERS

The ladder starts with a variety of UK items. The **Croft Super Micro/Series IVS** (£250/£730) is a typically sweet-sounding combination. Recommended power amplifiers are the **Radford STA25 Renaissance** (£897) and **MA75** (£776).

The £1,495/pr US monoblok **Quicksilver** power amplifiers remain recommended, along with **Vacuum State FVD** preamp (£999), **Grant G60AMS** monobloks (£948/pr) and the highly exotic **Jadis JP30/A30** combination (£6,790).

The **Audio Research** range from the US is under revision, with firm approval for **SP9** (£1,700) and **SP11/II** (£5,350) preamplifiers and for the **M300** (£9,000) monobloks. We await a sample of the new **D120** which is said to comfortably outperform our previously recommended **D115 II**.

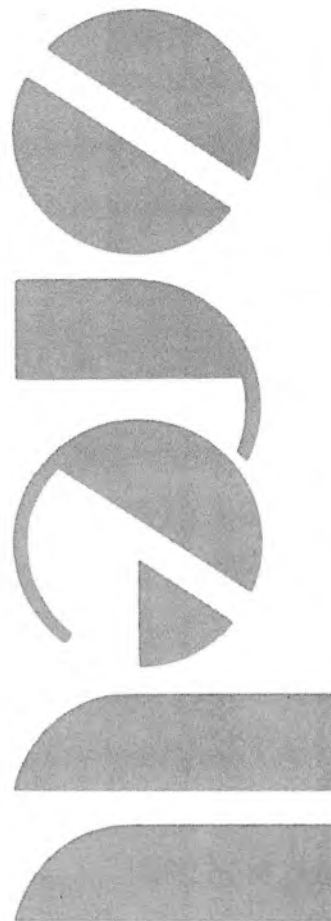
The **Conrad Johnson** **Premiere Three** (£3,775) and **Motif MC8** (£2,500) are both recommended although there is currently no UK distributor for CJ products.

WORTH CONSIDERING

Besides those mentioned above, many other separates remain worth considering. In many cases these are derived from older reviews and assume that the product has not changed significantly, whereas in practice many manufacturers follow a policy of continual improvement, so some may well have merited full recommendation had our experience been more up to date.

Availability has been assumed, but may be limited in some cases. Again, they are presented here in price ascending order:

Quad 34/405 (£600)
Kelvin Labs Junior/J30 (£595)
Exposure VII/VIII (£700)
Counterpoint SA7 (£747)
Linn LK1/LK2 (£900)
Nuance (£799)
Robertson Forty Ten (£987)
Beard P506 (£1,195)
Krell PAM-5 (£1,589)
Beard M70 (£1,995/pr)
Tannoy SR840 (£1,713)
Magnum A100 (£1,995)
Audio Research SP8/II (£1,998)
Goldmund Mimesis 6 (£2,500)
Krell KSA50 (£2,540)



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SUGGESTED SYSTEMS

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

SPEAKERS
All prices include the cost of the Dual CS503/1

AMPS

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MISSION 701 £109.95

MISSION 700LE £139.95

MISSION 707 £179.95

MISSION 737 £249.95

MISSION 770F £399.95

M/Short MS10 II Goldmans Mann II W/ Dale Delta 30 Toshiba S533M	W/ Dale Diamond III A/Research A888X Mission 701L	A/Research R1188X Mission 100LE Nad 8024 M/Short MS25a II	Research D3.4 I JPM P1-H/Book P1.5 Rotel RL850 Tannoy Eclipse	B&W DM110 imp M/Audio Q232V Tannoy Mercur S JPM AP2	Hytronik HB1 Mission 707 Cable Durrant Celestion DL8 II* (* add £15)	M/Audio R352 Mission 737R B&W DM230 imp										
Rotel RA820A	Rotel RA820BK3	Nad 3020E	Nad 3130	Rotel RA840BK3	Magnat PM35	QED A240SA II	QED A240KD II	Yamaha AX300	A&R Alpha+	Rotel RA870BK	Yamaha AA400	Nad 3220PE	Magnat PM45	Nemrod KA500	Denon PMA250	Cambridge 940
274.95	309.95	284.95	319.95	274.95	284.95	319.95	309.95	319.95	274.95	284.95	319.95	274.95	309.95	284.95	319.95	274.95
269.95	299.95	359.95	319.95	359.95	269.95	299.95	449.95	299.95	289.95	339.95	279.95	279.95	354.95	289.95	364.95	284.95
314.95	369.95	329.95	344.95	399.95	349.95	299.95	349.95	309.95	489.95	324.95	314.95	369.95	314.95	309.95	379.95	319.95
374.95	359.95	334.95	359.95	414.95	374.95	339.95	374.95	399.95	374.95	334.95	359.95	334.95	334.95	339.95	374.95	334.95
399.95	424.95	399.95	429.95	494.95	399.95	434.95	399.95	344.95	489.95	334.95	359.95	334.95	334.95	339.95	374.95	334.95
429.95	459.95	489.95	434.95	434.95	399.95	344.95	374.95	364.95	414.95	359.95	349.95	374.95	364.95	349.95	414.95	374.95
569.95	434.95	434.95	434.95	434.95	399.95	344.95	374.95	364.95	414.95	359.95	349.95	374.95	364.95	349.95	414.95	374.95
474.95	409.95	474.95	419.95	409.95	474.95	409.95	474.95	409.95	474.95	409.95	474.95	409.95	474.95	409.95	474.95	409.95

FREE

Cartridge supplied with these systems.
Carriage provided with these systems.
all systems in excess of £250 (UK mainland only).

OPTIONS

The following Compact Disc Players/Turntables may be ordered instead of the Dual CS503/1 in the above systems.

CDs

- Denon DD0000
- Denon DD0000
- Denon DD0000
- Denon DD1500/2
- Denon DD07100
- Magnat CD851
- Magnat CD851
- Magnat CD851
- Nad 5240
- Nad 5240
- Philips CD371
- Philips CD471
- Philips CD472
- Philips CD373

- add £90
- add £130
- add £130
- add £130
- add £120
- add £180
- add £110
- add £110
- add £110
- add £110
- add £110
- add £110
- add £110

TURNTABLES

- Dual CS503-3
- Nad 520
- Rotel RP830
- Reveler black inc. arm
- Magnat inc. arm (w)
- Systema inc. arm
- Ariston (2) Deck
- Sansui SR22 MW

- add £120
- add £500
- add £100
- add £150
- add £80
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- add £90
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SAVE

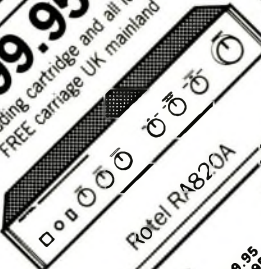
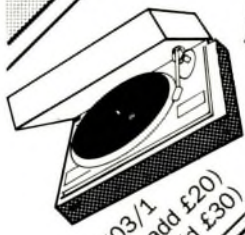
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Monitor Audio R252V
or Acoustic Research 183X
or B & W DM110imp.

Dual CS503/1
or (Ariston Q deck add £20)
or (Dual CS505/3 add £30)

Amplifiers

- Audiob 5000A £224.95
- Audiob 5000C £248.95
- Audiob 5000E £248.95
- Audiob 5000F £248.95
- Audiob 5000G £248.95
- Audiob 5000H £248.95
- Audiob 5000I £248.95
- Audiob 5000J £248.95
- Audiob 5000K £248.95
- Audiob 5000L £248.95
- Audiob 5000M £248.95
- Audiob 5000N £248.95
- Audiob 5000O £248.95
- Audiob 5000P £248.95
- Audiob 5000Q £248.95
- Audiob 5000R £248.95
- Audiob 5000S £248.95
- Audiob 5000T £248.95
- Audiob 5000U £248.95
- Audiob 5000V £248.95
- Audiob 5000W £248.95
- Audiob 5000X £248.95
- Audiob 5000Y £248.95
- Audiob 5000Z £248.95

Tuner Amps

- Denon DA25L £129.95
- Denon DA25E £129.95
- Denon DA25F £129.95
- Denon DA25G £129.95
- Denon DA25H £129.95
- Denon DA25I £129.95
- Denon DA25J £129.95
- Denon DA25K £129.95
- Denon DA25L £129.95
- Denon DA25M £129.95
- Denon DA25N £129.95
- Denon DA25O £129.95
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- Denon DA25R £129.95
- Denon DA25S £129.95
- Denon DA25T £129.95
- Denon DA25U £129.95
- Denon DA25V £129.95
- Denon DA25W £129.95
- Denon DA25X £129.95
- Denon DA25Y £129.95
- Denon DA25Z £129.95

Speakers

- Acoustic Research £99.95
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Mid Systems

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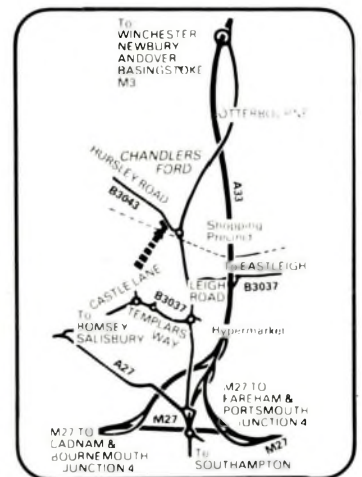
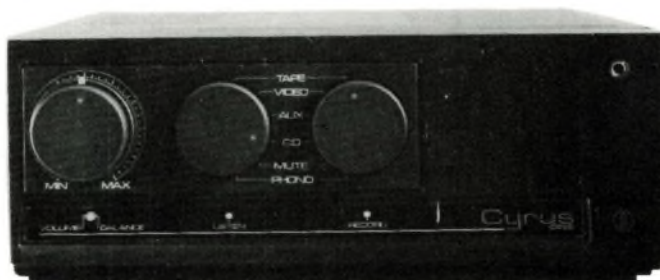
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CHOOSING AND USING . . . IN-CAR ENTERTAINMENT

Isn't it about time you changed the factory fitted Motorola for something more musically entertaining? Jason Kennedy examines the market.

Many of us spend as much time listening to car radios and tape players as domestic hi-fi systems, but do we apply the same criteria when selecting in-car equipment, or just stick with what is already there?

The way we listen to music in the car is probably less intense, less critical and even perhaps more relaxed than the domestic hi-fi experience. Because of the need to concentrate on the driving, music becomes more a backdrop than the total entertainment. But it nevertheless seems able to alter moods, sometimes to the extent of affecting the way one drives (or is that only me?) I find tracks from bands like AC/DC or the Clash fill me with rebellious bravado, so I'm inclined to drive in the same spirit, whereas something like John Martyn makes me feel relaxed. But both extremes stop me getting annoyed in traffic jams, which can't be a bad thing.

Sceptics point to the noise level inside the car, questioning whether it is worth having a refined and subtle in-car system if half the information is going to be blocked out by wind, motor and road noise. I suspect that this is largely irrelevant, especially of course for those fortunate enough to own comparatively quiet cars. Extra Watts is of course one way of getting more sound to the ears, if perhaps a rather crude solution; well placed speakers with accurately balanced crossovers would seem more effective – such as dash mounted tweeters and rear shelf mounted mid/bass units.

In extremis, a new breed of hi-fi oriented ICE (in-car entertainment) specialist has evolved. Like Mike Wells, for example, the distributor for Nakamichi's in-car range, who kits out vehicles with multi-speaker, multi-amp systems using high quality speaker and interconnect cables. The approach seems close to the

'more is better' philosophy, one extreme example being a Porsche 911 fitted with 16 individual drive units and amplification to match. Needless to say, such installations cost a lot more than the average domestic hi-fi system. Whether they sound better is another question.

So, is there any point in replacing the factory-fitted Motorola with something costing as much as a good budget amplifier? We decided to try to find out, and so have tested a selection of integrated cassette receivers from £100-£250, including examples from both specialist in-car manufacturers as well as those familiar to the audio world.

The machines under scrutiny are all integrated units consisting of a cassette player, FM/AM tuner and amplifier. Most are capable of driving two pairs of loudspeakers, and a few of the costlier examples are fitted with line output sockets for optional additional power amplifiers.

A nominal power rating of 20watts per channel seems to be the highest one can expect of this particular price range, which isn't bad considering the size and voltage constraints at work. Facilities don't vary enormously, so rated power appears to be directly related to price and street credibility. However, as technical/radio consultants Norman McLeod points out in *Tech Talk* on page 103, the maximum power delivered from a 12volt DC supply into a 4ohm load is 10watts, so some manufacturers would seem to be optimistic.

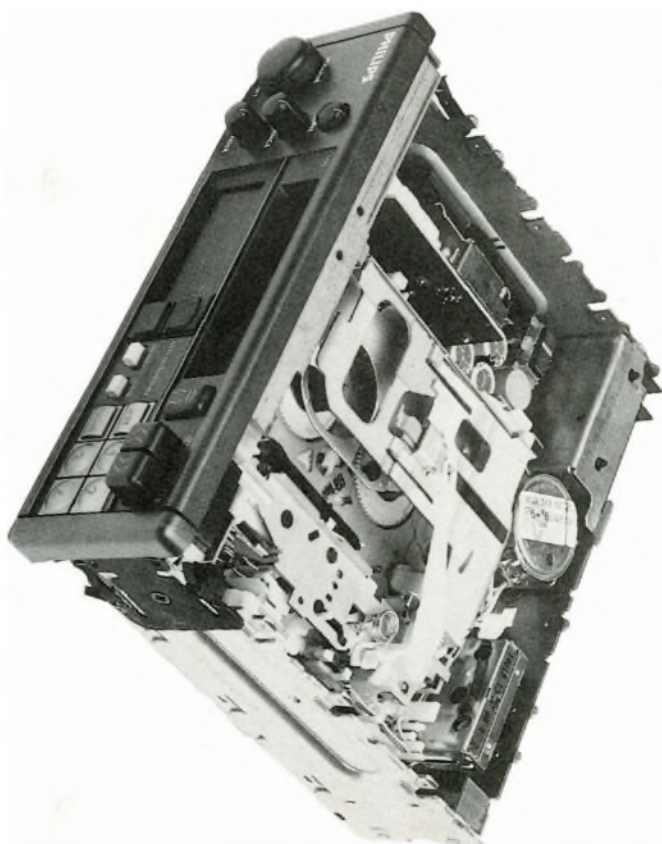
OUR LISTENING TESTS

To take advantage of the high current capability and low voltage restrictions of 12volt car batteries, in-car machinery is designed to drive 4ohm loudspeakers. For the purposes of the listening tests therefore, a pair of KEF 104.2 speakers was used. These have the unusual

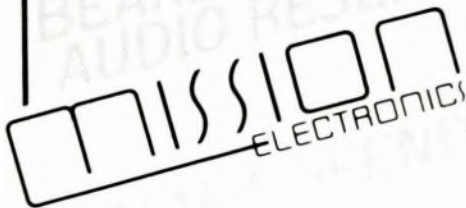
characteristic of presenting a constant 4ohm load regardless of frequency variations, while they are also fine quality monitors and more than adequate for the job. However, the KEFs have very healthy low frequency extension which tended to make most of the units sound bass heavy, this part of the frequency range obviously being boosted to compensate for the average in-car transducer. For maximum information transfer we used Audionote speaker cable from Audio by Design which, although expensive for in-car use, creates a neutral bridge between amp and speaker. There is no reason why audio speaker cables shouldn't be used in the car as even the most modest installations are likely to benefit from something half decent.

The listening tests were carried out in JK's usual listening room with the units powered by a 12 volt car battery. Radio waves were picked up with a basic car aerial clamped to a suitable piece of furniture. Admittedly this is not typical of the in-car listening experience, nonetheless the set-up proved quite capable of revealing the differences between machines. Both home-made tapes and prerecorded musicassettes were used including Strauss' Oboe concerto in D – a merciless revealer of transport instability – and Talk Talk's *The Colour Cf Spring* – a well made album.

Thanks are due to Alvin Gold who lent the facilities for the cassette player lab tests. His patience and cups of coffee were greatly appreciated.



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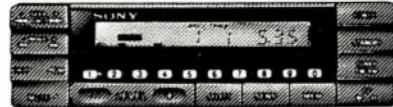


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RECOMMENDED



The Aiwa 3500 looks remarkably sophisticated for the £199 asking price, but also adopts the unusual approach of hiding its pretty face behind an innocuous cover, so as to deter theft. An optional flip down lid presents a plain black surface to the world, camouflaging the desirable fascia beneath. Whether this will work will depend on the would be thief.

The ergonomics win points on neatness of layout, but the appealing white rubbery buttons are quite small and cannot be differentiated by feel. Legends likewise are neat, but perhaps too small to read under certain circumstances. The backlighting is seductive enough, but quite why the name and description of the machine has to glow so rosy I cannot tell.

The smallish volume knob is hampered by the front/rear fader collar that sits behind it, and which could have been more discreet. However, there is a separate balance knob which makes a welcome change. And there's also a clock, which at the press of a button will temporarily replace the radio frequency on the display – or vice versa as the clock can be on permanently if required.

RECEIVER

The 3500 amplifier section is equipped to drive two pairs of speakers with front/rear fading, and sprouts a line output for driving an extra slave power amp. The controls are pretty standard and include coaxial treble and bass knobs, the former being easier to adjust.

The tuner is far from lacking in features and can store six presets on each band – FM, MW and LW. Such luxuries as local/distance sensitivity, seek tuning in both directions and mono/stereo switching are also included.

Soundwise this Aiwa has a powerful and warm feel when coupled to the KEF monitors. The midrange is pleasing with fair definition and spaciousness, but once again the frequency extremes were on the woolly side. However, the upper bass had some impact and was well suited to soul and rock music. *Radio Three* was plagued by higher than usual hiss levels, while the stronger *Radio Two* signal suffered from vocal lispyness. Fair to good FM sound quality was com-

promised by the high background noise.

Medium wave wasn't too noisy, but sound quality was only about par – ie compressed in most respects (which to be fair is a trait of all AM broadcasts). *Radio Four* on LW was reasonably good if a little noisy though again this could be attributed to the signal itself.

CASSETTE

The autoreverse cassette deck from the company that specialises in this market features Dolby and 120/70µs tape equalisation, but nothing save appearance distinguishes it from other players made by less specialist companies.

Sound quality didn't exactly set it apart either. Some extra speed and a not altogether tight bottom end was noted on the Talk Talk track, but all was not lost as the midrange was clean enough to reveal the integrity and depth in the music.

Classical music on commercial cassettes fared rather worse, sounding thin and strained with some lack of pitch constancy. Inevitably the least revealing music type proved the most listenable – in this case *Spy in the House of Love* by Was Not Was, a funky little track if ever there was, with a solid synth bass line and killer rhythm.

LAB REPORT

The FM section of this set was remarkably undistinguished: although distortion was low and ultimate noise satisfactory, a full quarter of a millivolt was needed to push the stereo noise floor down to an acceptable level – something other receivers can manage with little more than a tenth of this signal strength.

However, the set checked out extraordinarily well on AM: the frequency tilt 2-5kHz is exactly right, and the set recovers more audio at 10kHz than most receivers can manage an octave below. It's a shame that modern broadcasts can't do justice to this beautiful bandwidth, because on our local lab signals the AM sound quality was truly astonishing. The only problem is that no 9kHz notch means loud whistles at night – fitting a whistle notch would turn this from a very good AM radio into a great one.

The cassette wow and flutter figures are

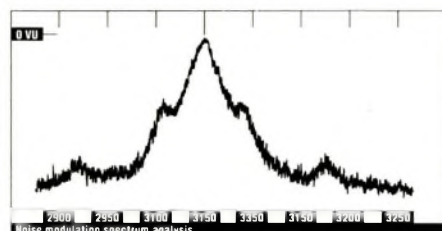
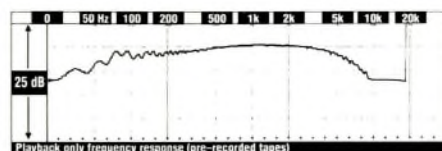
really quite ordinary, representing the group average if one omits the exceptional Nakamichi. The one per cent fast speed error is acceptable, albeit noticeable on audition. The frequency response is reasonably healthy but the noise spectrum gives the game away – this ain't no rough diamond.

CONCLUSIONS

The CT-Z3500 turned out to be one of the few players of which Norman thought the world while I was a bit disappointed. Its major strength is AM reception, which was so good that Norman wants to buy one. Sharp looks also stand it in good stead, and overall it deserves Recommendation.

TEST RESULTS

Amplifier		
Power output (4ohms, 13.8V)		8.4W/9.2dBW
Noise (residual)		-52dB (775mV)
Radio		
	AM	stereo FM (mono)
Distortion	2%/2%	(0.6%)
AGC range/overload point	70dB/105dB/µV	n/a
Signal/noise (ultimate)	50dB	52dB/(57dB)
Sensitivity (40dB/50dB S/N)	90µV	250µV/(16µV)
Frequency response (corrected):		
AM (rel 2x50µS):	2.2kHz: -1.1dB; 4.7kHz: -1.2dB;	
	9kHz: -35dB	
FM (rel 1x50µS):	2.2kHz: +0.1dB; 4.7kHz: -1.6dB;	
	10kHz: -4.1dB	
Cassette		
Wow & Flutter (pk. DIN wtd.)		0.34%
Wow/Flutter (pk. DIN wtd.)		0.22%/0.44%
Speed error		+1%
Typical Retail Price		£199



BLAUPUNKT PARIS SQM 48

ROBERT BOSCH UK LTD., PO BOX 98, BROADWATER PARK, DENHAM, UXBRIDGE, MIDDX. TEL: (0895) 833633.



Blaupunkt's *Paris* bears a striking resemblance to the *Windsor*, and costs a mere \$22 less, but if you look closely there is one major difference and a few minor ones. First, *Paris* is one of few players at this price to have a uni-directional tape transport. Secondly it has separate bass and treble controls and boasts a 20W amplifier. These factors could all help make it a better sounding machine than the *Windsor*, one might think.

Finish is gunmetal grey with white inscriptions making it marginally less expensive looking than the *Windsor's* combination of black and cream – a shrewd marketing step perhaps, but I prefer the grey.

Control layout is fairly straightforward, except that the volume knob handles four functions in addition to the front/rear fader collar, and the unusual auto/manual tuning rocker with inset mode switch. The machine is ergonomically very practical with a large LCD display and clearly named switches and buttons. The illumination is discreet and doesn't emphasise function but does give an idea of layout at night. The two minor rotary controls aren't circular, which makes them that much more fiddly to use; perhaps this break with tradition might have been better avoided.

RECEIVER

The amplifier claims an output of 20 watts per channel, which seems a bit ambitious (see *Lab Results*). The controls include front-to-rear fading for two sets of loudspeakers, balance and separate bass and treble tone controls.

The tuner will store five preset frequencies on each band and tuning is either manual or automatic (search), determined by the rocker switch. This function works well and could find three versions each of *Radio Two*, *Three* and *Four*. It even does quite well with more obscure FM stations, albeit presenting them in mono with the FM beacon on as is often the way with inexpensive radios. Featuring last station memory (a system of holding the last tuned frequency on each bandwidth whether preset or not), it even remembers the preset frequencies when power is completely cut off, which is pretty uncommon.

All these gizmos are worth little unless the sound is of adequate quality, but happily this does seem to be the case. The sound is coherent and well sorted out with good stereo separation and reasonable image width and depth. There is a slightly veiled quality, and one gets the impression that high frequencies are being held back, even when bass was necessarily attenuated when using the KEFs.

CASSETTE

This is one straightforward cassette deck: No Dolby, no autoreverse, no music search; just fast forward, rewind and eject. Another uncommon element is the way the transport mechanism moves up to the cassette rather than vice versa.

The sound with a variety of tapes seemed devoid of the effects of transport instability and was well controlled. However, it did seem to make the music sound particularly boring. The reason one listens to music is generally for enjoyment, and equipment that makes software sound listless and dull is hard to recommend. In hi-fi speak *Paris* sounds very constrained, thick and shut-in, with absolutely no joie de vivre.

LAB REPORT

The claimed twenty watts is probably true, but with about equal amounts of signal and distortion: confining levels to those without audible distress, we get almost twelve watts into four ohms – which is rather more than most bridged stages manage. The noise floor is also very good.

FM performance is fairly cheap and cheerful, the rolled-off treble making sensitivity look better than it really is. Watch out for the fact that the set will detune 50kHz without telling you as much on the display – we initially measured 5 per cent FM distortion on our test signal until finding that we had tuned 50kHz too high without noticing. AM has high distortion and nothing else to commend it, save that strong and weak signals are at least equally distorted.

Apart from flutter alone this transport turned in reasonably healthy performance figures, so the unusual mechanism must be fairly effective. The speed error especially was the best of the bunch at only 0.2 per cent

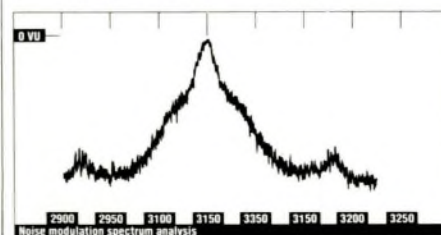
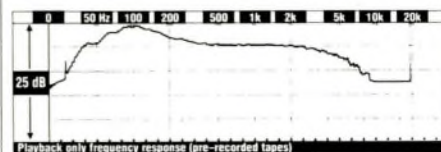
slow. However, the noise modulation trace tells a less positive story and is more indicative of the actual sound quality. The frequency response is likewise not a pretty picture, revealing a lower midrange hump which colours the overall sound.

CONCLUSIONS

Although cheaper than the *Windsor*, the *Paris* is clearly a more powerful machine, but this is of little use if the source material isn't up to scratch. This unfortunately is the case with the uni-directional cassette deck, so despite a reasonable radio the *Paris* falls short of Recommendation.

TEST RESULTS

Amplifier	
Power output (4ohms, 13.8V)	11.5W/10.6dBW
Noise (residual)	-64dB (775mV)
Radio	
	AM Stereo FM (mono)
Distortion	2.5%/10% (2%)
AGC range/overload point	74dB/100dB/ μ V n/a
Signal/noise (ultimate)	50dB 50dB/(58dB)
Sensitivity (40dB/50dB S/N)	50 μ V 250 μ V/(25 μ V)
Frequency response (corrected):	
AM (rel 2x50 μ S): 2.2kHz: -1.4dB, 4.7kHz: -15dB, 9kHz: -80dB	
FM (rel 1x50 μ S): 2.2kHz: -1.7dB, 4.7kHz: -3.0dB, 10kHz: -6.1dB	
Cassette	
Wow & Flutter (pk. DIN wtd.)	0.29%
Wow/Flutter (pk. DIN wtd.)	0.19%/0.46%
Speed error	+0.2%
Typical Retail Price	£253



BLAUPUNKT WINDSOR SQR 38

ROBERT BOSCH LTD., PO BOX 98, BROADWATER PARK, DENHAM, UXBRIDGE, MIDD. TEL: (0895) 833633.



Blaupunkt seem to have generated an almost Quad-like reputation in the car hi-fi field, probably through conservative styling and solid (if in this case German) build. The *Windsor* is a very bland looking piece of machinery that's devoid of novelties and retails for £275. This is a bit above the budget set for this review, but it's what they sent; so it goes.

Control layout, graphics and finish could be described as sensible, plain or even Germanic (with apologies to Dieter Rams of Braun fame). However, function doesn't necessarily follow form here, and there are also a couple of unusual controls, notably the auto/manual tuning rocker with inset switch to select between the two tuning modes.

Ergonomically well laid out with one of the clearest displays in the business, most of the controls are easy to adjust, although the tone knob (one of the most ineffective so far) is a little too close to the volume control, especially if you have larger than average fingers – a possibility which most in-car manufacturers conveniently ignore. Looking at the slot it's not too obvious which way round the cassette should go in, but subtle tapering won't let you get it wrong.

RECEIVER

Unlike Japanese counterparts this machine doesn't sprout a bunch of wires out the back but has DIN speaker sockets and standard 6/3mm tags for power input and earthing. Another omission is a line output, though this will be no great loss under most circumstances.

The tuner can store five preset stations on each bandwidth, and tune in either automatic or manual mode using the rocker switch which scans in both directions. This system is quite practical and logical to use, making station searching a simple affair. It will also automatically store the last station to have been selected on each waveband even when switched off, which is very handy.

The sound on stronger signals was lively enough, if a little veiled. Stereo on such stations was also good, but deteriorated significantly on weaker stations even when the beacon still came on. Weak stations tended to sound noisier than on the better sets

tested, and using the mono button didn't seem to have a particularly positive effect. Stronger stations could sound a bit ragged at high frequencies and lacked extension in the bass, but the midrange proved quite revealing, and listening was rewarding when the right material came along.

CASSETTE

The *Windsor* cassette player is an autoreverse affair with the bare minimum of controls – just rewind, fast forward, direction change and eject, on three mechanical buttons. The sound quality seemed a little bit dull and lifeless, manifest as a softened feel and a lack of vibrancy and drive on rock material. This was no doubt partly due to the slow transport, but only half a per cent is no big deal.

Classical music didn't suffer too badly from the lack of noise reduction, and sounded well controlled with reasonable depth and a good balance. However, it did lack information, and instrumental timbre was poorly resolved.

LAB REPORT

At a mere three watts output, this set clearly has only a single-ended output stage. This is very quiet, and would suit an external power amp nicely had a line output been provided.

FM sensitivity falls 10dB short of the best, but the section is well-behaved and the frequency response as accurate as one ever expects from this grade of machinery. The RF department of the AM section is very capable too, but the audio coming out suffers from the usual handicaps of truncated treble and high distortion.

The wow and flutter results were quite healthy overall, the combined figure being superior to all the £250 decks in this group. Graphically the transport looks reasonable but not outstanding, while the frequency response shows a remarkably heavy bass and an unusually flat and extended treble – a workable combination in the right circumstances.

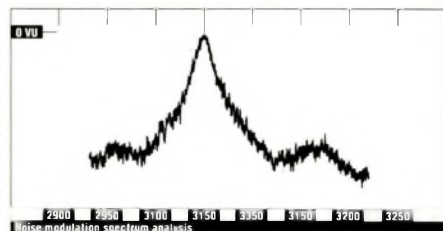
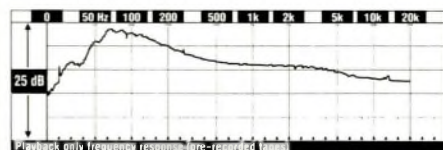
CONCLUSIONS

The *Windsor* is a sensible and practically designed machine. A little underpowered for

the price and lacking any particular sonic distinction, the good build quality and potential longevity suggest it's worth consideration.

TEST RESULTS

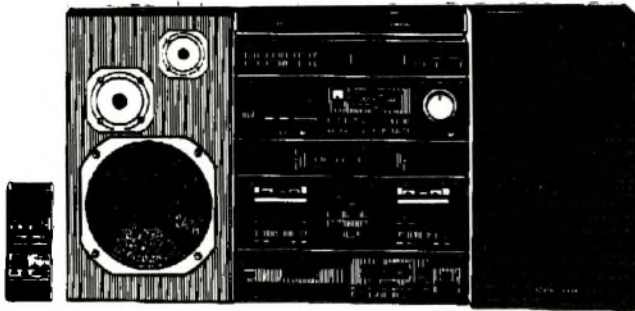
Amplifier	
Power output (4ohms, 13.8V)	3.1W/4.9dBW
Noise (residual)	-69dB (775mV)
Radio	
	AM stereo FM (mono)
Distortion	12.5%/3% (1.2%)
AGC range/overload point	90dB/107dB/ μ V n/a
Signal/noise (ultimate)	48dB 51dB/157dB
Sensitivity (40dB/50dB S/N)	40 μ V 300 μ V/(30 μ V)
Frequency response (corrected):	
AM (rel 2x50 μ S): 2.2kHz: -1.6dB; 4.7kHz: -14.9dB; 9.0kHz: -80dB	
FM (rel 1x50 μ S): 2.2kHz: -0.9dB; 4.7kHz: -1.4dB; 10.0kHz: -3.8dB	
Cassette	
Wow & Flutter (pk. DIN wtd.)	0.28%
Wow/Flutter (pk. DIN wtd.)	0.21%/0.38%
Speed error	-0.56%
Typical Retail Price	£275



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HITACHI CSK-402E

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RECOMMENDED



Hitachi's 402E is a \$250 ICEbox with a difference – it has plenty of features but doesn't make a dog's dinner out of presenting them. Consequently the fascia is a remarkably tidy affair that is logical and straightforward to use.

It also gives aural feedback (an electronic peep) when a button (any button) is pushed – something that will irritate some users perhaps, but quite nifty in my opinion.

Other novelties include a switchable clock which can be continuously displayed instead of frequency, and a security code system. This is basically a self-set code number which must be keyed in whenever power to the machine is completely cut off – ie if it's removed. Without this number the machine is as good as useless. If the wrong number is tried five times, the manual suggests "the unit will not operate", which sounds rather ominous for would-be thieves and those with poor memories.

The black-on-orange LCD display is nice and large and is divided up into boxes that indicate the likes of radio frequency, time and the tape functions that are in use.

RECEIVER

The amplifier side of the 402E caters for the usual front and rear speakers, with the option of taking the rear signal out to a separate power amplifier if you want more bass from your boot! The controls are pretty minimalist, just two knobs covering the basics, plus separate bass and treble on one slightly tricky push and turn knob.

The 3-band tuner features six presets per wavelength, which isn't all that generous on the FM side, though probably adequate for most users. Tuning in 25kHz steps (FM) can be carried out using the upwards only seek function or manually in either direction. If tapes are being rewound the tuner will automatically cut in for the time it takes, which seems like a good idea.

FM sound quality was hard to criticise, being very smooth and even with a frequency response that rolls off gently at the top – a very 'FM/AOR' type of sound. This didn't seem a particularly powerful machine, but remained in reasonable control when pushed. Sensitivity didn't seem that good and

it wasn't possible to get *Radio One* or *Capitol* on FM at the test site, which other tuners managed.

Medium wave seemed quite plausible and Sweet's *Blockbuster* on *Caroline* lost none of its glam charm. According to the seek function LW was deserted!

CASSETTE

The autoreverse tape player has a healthy complement of processing devices, including Dolby NR, chrome/metal EQ, loudness and music search. The latter detects five second or longer gaps in the music which helps if searching for a specific track, but is less useful with music that includes low level passages.

The sound quality from cassettes was similar to the radio – smooth and slightly soft at the edges. Tempi are a little fast with critical material, but the sound on the whole was most pleasant and well suited to the type of loudspeakers usually encountered in cars.

Classical music suffered slightly under the heavy-handed Dolby circuitry and did reveal a bit of transport instability, but was again quite fluent and enjoyable overall.

LAB REPORT

The 402's rather feeble power and noise figures from the audio stage contrast with a notably quiet and apparently sensitive FM tuner. The tuner has a marked HF roll-off, with 10kHz coming in nearly 10dB below the bass hump. As on many sets channel blending tends to mask stereo noise by effectively removing most of the stereo separation on weak signals. This makes meaningful measurement of stereo noise particularly difficult.

AM in-band responses were about average (the average being dreadful), and shocking on simultaneous strong signals with heavy bass. But this is a sensitive AM set, and the 9kHz inter-station whistle was notably well suppressed for interference-free night-time reception.

The wow and flutter results aren't all that inspiring. They just about improve on the average, but not by much, and it's not much of an average anyway. The speed error is acceptable and the graphs just about pre-

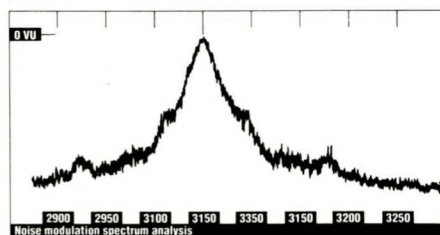
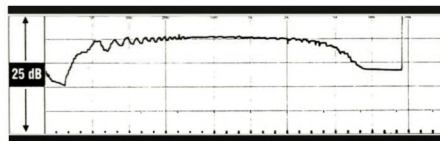
sentable – in fact the frequency response for prerecorded cassettes is reasonably accurate, up to a point.

CONCLUSIONS

The 402 is neatly laid out and the sound quality on both radio and cassette is remarkably pleasant and enjoyable. It even has a security system which may help you hang onto it; definitely worth Recommendation.

TEST RESULTS

Amplifier		
Power output (4ohms, 13.8V)		7.4W/8.7dBW
Noise (residual)		-52dB (775mV)
Radio		
	AM	stereo FM (mono)
Distortion	12.5%/4%	(0.5%)
AGC range/overload point	69dB/104dB/μV	n/a
Signal/noise (ultimate)	52dB	59dB/(58dB)
Sensitivity (40dB/50dB S/N)	28μV	100μV/(10μV)
Frequency response (corrected):		
AM (rel 2x50μS): 2.2kHz: -1.2dB; 4.7kHz: -14.3dB;		
9.0kHz: -80dB		
FM (rel 1x50μS): 2.2kHz: -3.9dB; 4.7kHz: -5.8dB;		
10.0kHz: -8.5dB		
Cassette		
Wow & Flutter (pk. DIN wtd.)		0.32%
Wow/Flutter (pk. DIN wtd.)		0.21%/0.46%
Speed error		+0.8%
Typical Retail Price		£250

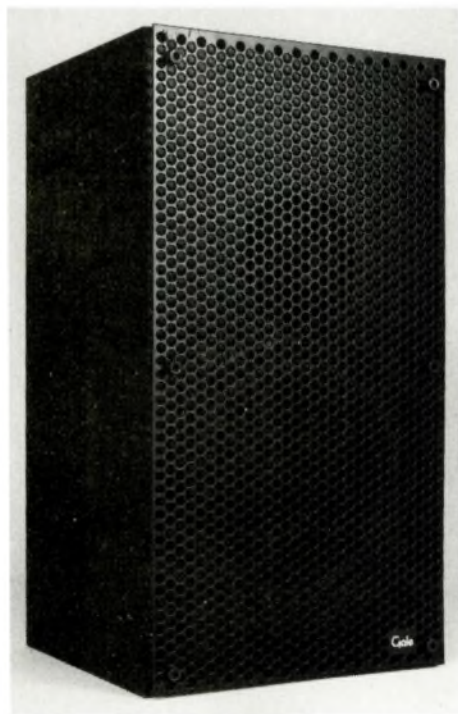


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JVC RX-318

JVC (UK) LTD., 12 PRIESTLEY WAY, ELDONWALL TRADING EST., STAPLES CORNER, LONDON NW2 7AF. TEL: (01) 450 3282.

RECOMMENDED



The £200 JVC RX-318 has been designed in the same slick style as the more costly 418 model (also tested). The matt and glossy black fascia owes something to the style of more expensive midi systems. It just about avoids tackiness and would sit equally happily in an Escort or a Sierra, though I suspect fans are more likely to come from the former camp.

The 318 employs my favourite anti-theft device – it slides out, and has its own carrying handle. This allows you to take it into the pub with you and have it nicked there! Layout is generally inclined towards ease of use though certain buttons are pretty small. The seek and scan buttons have a nice tactile identification touch – hard to describe but basically a quarter circle indent with illumination to match.

Backlighting is a bit of a speciality with these JVCs, this one having back-lit preset buttons and circles around the rotary controls; it even has a dimmer for those long late-night motorway trips. Other user friendly features include the pull-out balance adjust function of the volume knob, which actually stays pulled out on its own, plus what can only be described as a nipple on the bottom centre preset for a bit of geographical feedback.

RECEIVER

From the rat's nest of wires sprouting out of the back of this machine it's possible to make out leads for front and rear speakers and a line output for the rear only. On our tests, incidentally, the front pair are used on all players. Amplifier controls include separate bass and treble and a front/rear fader.

The 'digital synthesiser tuner' will remember five preset stations on each band and has seek, scan and manual tuning to help find the signal of choice. Less thrilling but also useful are preset scan and mono buttons. In use the seek function picked up no less than eight FM frequencies for Radio Four, and only a few less on Three and Two which is somewhat unusual; admittedly these gave varying standards of reception but the fact is impressive nonetheless.

Soundwise the 318 has a heavy balance, but managed to sound smooth and open with

good depth and plenty of power with the bass turned right down – perhaps not the most subtle presentation but definitely worth while.

CASSETTE

The cassette player is a fairly basic affair with autoreverse its only feature: Dolby could have been useful and should really have been included at the price, but there you go.

For the listening tests the tone controls needed to be adjusted to give the best balance with the speakers, but this is not unusual. The Talk Talk and Was Not Was tracks sounded good with fair dynamic range and plenty of life and energy in the sound, partly due perhaps to the speed error.

Classical music cassettes fared less well, however, and suffered from the lack of noise reduction. The speed error was highlighted by a slightly 'edgy' and too high pitched treble, but the midrange seemed comparatively smooth and controlled. Acoustic guitar also sounded a bit fast but had good depth and feel.

LAB REPORT

Much less noise and marginally more audio output characterise the 318's amplifier, driven from a far better FM section than the other JVC model. FM sensitivity figures approach state-of-the-art, but are artificially assisted by the odd, very bass-heavy frequency response. A very pleasant muting action helps suppress incorrectly-tuned FM stations – something rarely well implemented on receivers.

Like its brother, this JVC set has impressive AM sensitivity for those whose idea of a car aerial is a bent coathanger, but on the audio side it is about as bassy and dull as it could be.

Looking at the wow and flutter figures, it's surprising that this player sounded as good as it did. Flutter in particular is up there with personal stereos. Once again the noise modulation trace gives a better overall idea of the state-of-the-art in this instance, which isn't so bad. Only half a per cent fast, the speed error seemed quite respectable, but was noticeable on audition. The Type I frequency

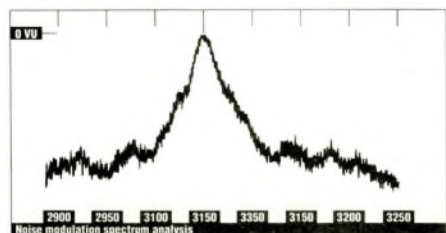
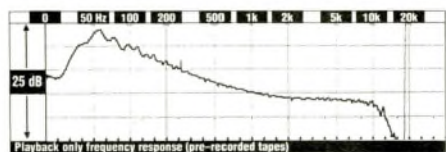
response gives some idea of the tonal balance encountered with the controls centred: need I say more?

CONCLUSIONS

Despite rather unappealing cassette test results this JVC sounds quite enjoyable and gave impressive FM performance. I'd say it warrants Recommendation.

TEST RESULTS

Amplifier		
Power output (4ohms, 13.8V)		8.8W/9.4cBW
Noise (residual)		-64dB (775mV)
Radio		
	AM	stereo FM (mono)
Distortion	3%/1.2%	(1.0%)
AGC range/overload point	63dB/105dB/μV	n/z
Signal/noise (ultimate)	59dB	59dB/162dB
Sensitivity (40dB/50dB S/M)	30μV	30μV/13μV
Frequency response (corrected):		
AM (rel 2x50μS): 2.2kHz: -7.0dB, 4.7kHz: -20dB, 9.0kHz: 66dB		
FM (rel 1x50μS): 2.2kHz: -5.2dB, 4.7kHz: -6.3dB, 10.0kHz: -6.0dB		
Cassette		
Wow & Flutter (pk. DIN wtd.)		0.22%
Wow/Flutter (pk. DIN wtd.)		0.26%/0.48%
Speed error		+0.5%
Typical Retail Price		£200



JVC RX-418

JVC (UK) LTD., 12 PRIESTLEY WAY, ELDONWALL TRADING EST., STAPLES CORNER, LONDON NW2 7AF. TEL: (01) 450 3282.



It is hardly surprising that a broad based audio and video company such as JVC should produce a range of in car machines. The £250 *RX418* is the more expensive of two units included in this test; apparently similar in appearance, a couple of extra features differentiate it from the *318*. The most notable of these is an auxiliary socket on the fascia – something which I have not come across before and potentially useful, for example to plug in a personal CD player.

Fascia design reflects the hi-fi background, being black and fairly innocuous until illuminated. The important radio functions have fairly tasteful backlit legends which helps location at night. General layout could perhaps be a bit simpler, and buttons like scan and seek could have been larger; as it is they are a centimetre square and can be differentiated by feel due to radiused indents. Ergonomics are pretty run of the mill with no obvious problems in use, which with hindsight is slightly better than the norm.

It's a slot in machine and features a metal handle for this purpose. This is arguably the most effective anti-theft system around – bearing in mind that if you forget or are too lazy to remove it then it's that much easier for someone else to do so.

RECEIVER

The *RX418* amplifier is designed to drive two pairs of loudspeakers and has the usual fader control to adjust front-to-rear balance. There is also a phono socket line output lead designated 'rear' for adding extra power amplification. Controls include separate treble and bass knobs, dimmable LCD display and the aforementioned 'aux' (3.5mm jack) socket.

The 4 band 5-preset tuner can store ten FM frequencies. Both seek and scan tuning are fitted, but unlike other machines at this price these work upwards only.

After listening to *Radio Three* for a while in glorious mono and thinking it was a bit dull, the penny dropped and I switched into the 3-D world of stereo. On the classical station reception was not that clean and sounded somewhat muffled; I may have hit a duff broadcast, but the sound certainly seemed to lack clarity, although it was

reasonably subtle in presentation.

Radio One had a similar midrange and bass dominance, and some tone control tweaking was necessary to produce a more even balance with the KEF monitor loudspeakers.

I played an ancient domestic CD player through the 'aux' input in place of the personal that could be used in the car. Frequency response was far from flat and clarity still not too hot, but sound quality was a definite improvement over the on-board alternatives.

CASSETTE

The cassette player has autoreverse and includes switchable Dolby noise reduction and chrome/metal equalisation.

Replay sound quality with home made rock tapes was OK, if rather mediocre; bass seemed ill defined though quite powerful and treble was slightly distorted. Alignment was obviously set up for music cassettes (as should be the case), which sounded a lot better. Classical tapes worked especially well which is indicative of reasonable transport stability. There was still a slight edginess at the top end, however, and a general lack of depth in the music.

LAB REPORT

Considering the bridged output stage, power yield was a meagre 8.9dBW, and background hiss was unusually high. AM performance is quite handsome (output level remains constant over an 84dB input range, for instance), save for the frequency response, which is very curtailed at HF – over 20dB lower than it should be at 4.7kHz.

We gave up trying to measure stereo FM signal-to-noise. Signals over 500µV produced unpleasant whine well above the noise floor, rendering sensible measurement impossible. The FM frequency response shows 2-3dB of bass heaviness, but is basically sound. A much stronger than usual signal was needed to obtain noise-free mono.

The *418* turned in rather uninspiring wow and flutter test results – wow alone being the worst in the test group. However, flutter and speed error are acceptable, as is the wide based but at least even noise modulation

graph. The frequency response is a classic ski slope affair, which clearly best suited loudspeakers with nasty top ends.

CONCLUSIONS

This JVC is an attractively designed machine with a fair selection of features – there's even an auxiliary socket for your personal CD player. Sound quality, however, doesn't really make the grade at this price, so recommendation isn't really appropriate.

TEST RESULTS

Amplifier

Power output (4ohms, 13.8V) 7.7W/8.9dBW
Noise (residual) -50dB (775mV)

Radio

Distortion 3%/0.7% (1.4%)
AGC range/overload point 84dB/115dB/µV n/a
Signal/noise (ultimate) 54dB *dB/(53dB)
Sensitivity (40dB/50dB S/N) 20µV *µV/(63µV)

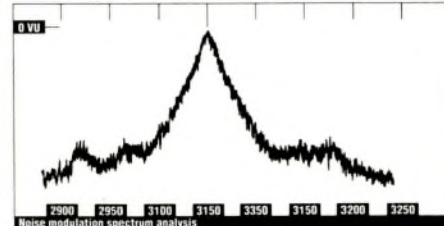
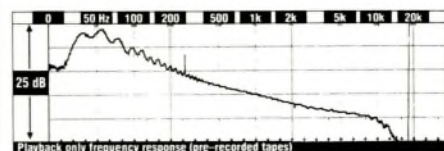
Frequency response (corrected):

AM (rel 2x50µS): 2.2kHz: -5.1dB, 4.7kHz: -22dB;
9.0kHz: 73dB
FM (rel 1x50µS): 2.2kHz: -2.8dB, 4.7kHz: -2.3dB,
10.0kHz: -1.2dB

Cassette

Wow & Flutter (pk. DIN wtd.) 0.36%
Wow/Flutter (pk. DIN wtd.) 0.29%/0.38%
Speed error +0.9%
Typical Retail Price £250

*Synthesiser whine predominates



NAKAMICHI TD-400E/PA-300 II

CAR AUDIO CONSULTANTS, 141 GREYHOUND ROAD, LONDON W6 8NJ. TEL: (01) 381 5174.

RECOMMENDED



In order to find out what can be achieved if a more ambitious budget is available, we decided to include this little combo from Nakamichi, the company which dominates the high end cassette deck market.

Nakamichi doesn't make integrated units, so this system comprises the *TD-400E* head unit (the cheapest model at £450) and the *FA-300 II* power amplifier (a snip at £275). Obviously no bargain compared to the other units on test, if sound quality is important then it could still be a good investment.

Styling and finish is typical of Nakamichi products – very black with neat buttons and an unusual but attractive layout. White legends stand out well and most of the switches are easy to use, though some of those beneath the cassette slot are quite close together.

As you might expect at the price it looks and feels a lot slicker and more professional than most other ICE units. The power amplifier is a particularly well made and chunky beast; neither is it all that small, requiring a reasonable amount of space under a front seat.

RECEIVER

The heavily heatsinked *FA-300 II* power amp is designed to drive one pair of speakers only in true hi-fi tradition (although the *TD-400* has outputs for two). It has direct and low cut inputs (for non-Nakamichi head units which might leak DC) and also adjustable sensitivity. Unfortunately space does not allow the more detailed assessment required to give a good idea of this unit's capabilities.

On/off switching is done at the head unit, which features the usual bass and treble tone controls and a fader for when you've saved up for a second power amp.

The tuner has five presets for each bandwidth, DX/local sensitivity and something called an 'auto noise canceller' which cuts out noise on FM broadcasts (though in effect it's a bit like Dolby can be on personal stereos, ie a low pass filter). There's nothing too extravagant on the tuning front, just upwards only seek.

You don't buy a Nakamichi for the features, you buy one for its sound, and here it didn't disappoint. The sound quality was a

substantial improvement over any of the other units tested, being natural and open with serious three dimensional stereo presentation. Noise levels were lower than average, although in the case of *Radio Three* high enough to be a nuisance on some material. Never had the strength of signals been more apparent; *Radio Four* sounded incredibly quiet, with a sound quality on a par with the better budget audio tuners.

CASSETTE

The *raison d'être* of the *TD-400E* is of course the tape player, which in Nakamichi tradition is a unidirectional type with optional 70µs or 120µs equalisation and the choice of Dolby B or C noise reduction. Except for the electronic eject the transport controls are much as found on any in-car player. The sound quality is not.

This machine was nothing short of a revelation after what I'd been listening to for the previous week. The music on over-familiar tapes took on a whole new dimension. Primarily instruments and voices sounded natural and unprocessed; subtleties of timbre and tone were suddenly apparent. What's more, loads of ambient information gave the music substance and depth. The word here is information, but others such as coherence, tightness and scale also come to mind.

LAB REPORT

The devastating output from this power amplifier exceeded 50W before tripping out on continuous tone, so the 75W programme rating seems well in order. More than 40 volts of signal is available.

The FM radio is clearly a high grade device too. In context the audio responses can be said to be ruler-flat. The stereo blending was so efficient that meaningful noise and sensitivity measurements were not possible. Even the AM shows evidence of much more than usual thought and engineering care, although bass distortion is too high, and there are receivers with better AGC range and overload handling.

The difference between this and the rest of the test group is quite obvious in the recorded wow and flutter figures, most of

which are less than half the group average. The speed error (oddly not obvious on audition) is quite poor, however. Both the graphs back up the subjective results effectively, the frequency response especially being firmly in the hi-fi category.

CONCLUSIONS

This Nakamichi combination gives an idea of the standard of sound quality that can be achieved with in-car machines. If you want your in-car entertainment to match your domestic system sonically, this equipment is an obvious place to start.

TEST RESULTS

Amplifier

Power output (4ohms, 13.8V) >50W/17dBW

Noise (residual) -66dB (775mV)

Radio AM stereo FM (mono)

Distortion 4.5%/0.6% (0.8%)

AGC range/overload point 70dB/105dB/µV n/a

Signal/noise (ultimate) 58dB n/adB(157dB)

Sensitivity (40dB/50dB S/N) 30µV n/aµV/(3µV)

Frequency response (corrected):

AM (rel 2x50µS): 2.2kHz: -0.5dB; 4.7kHz: -6.3dB;

9.0kHz: 76dB

FM (rel 1x50µS): 2.2kHz: +0.4dB; 4.7kHz: 0.0dB;

10.0kHz: -2.4dB

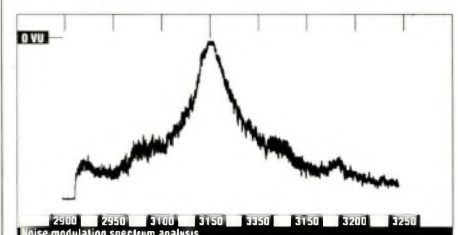
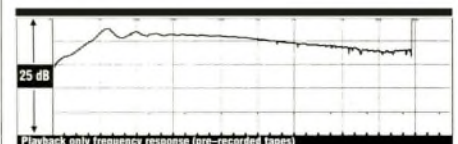
Cassette

Wow & Flutter (pk. DIN wtd.) 0.15%

Wow/Flutter (pk. DIN wtd.) 0.10%/0.36%

Speed error +1.46%

Typical Retail Price £450 + £275



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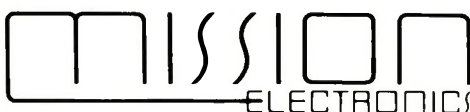
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PANASONIC CQ-497

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



The £117 Panasonic CQ-497 is the least expensive unit encountered so far and makes a few fairly blatant concessions in search of cost savings. The most obvious is the conventional dial and cursor tuning scale – a hitherto missing presumed dead style in this price range.

However, it isn't that similar to conventional machines as both tuning and volume knobs are located to the left of the dial instead of on either side. This seems like a sensible layout, especially for the majority of the world who drive on the wrong side of the road; the UK argument is less convincing. More important, there don't appear to be any preset buttons, not even mechanical ones.

There is definitely something to be said for analogue tuning (and analogue music reproduction for that matter). Using a knob and dial is not a whole lot slower or more difficult than a seek button, and in fact in many respects it's easier to one who has grown up with this system. Layout is utilitarian, although identifying the various waveband and tape signal processing buttons in daylight isn't that easy.

Styling and finish are what might be expected at the price, that is pretty tacky and not in the least bit desirable compared to the rest of the bunch on test.

RECEIVER

The amplifier, which claims a dubious 40W (widgets?) on the fascia, will drive two pairs of speakers and is equipped with a front/rear fader for this purpose. The controls are pretty basic but include concentric bass and treble knobs.

The tuner caters for the three basic wavebands, FM plus MW and LW AM, and has a mono button and stereo beacon but that's it.

To its credit the CQ-497 managed to pull in a fair selection of radio stations, although reception of the more distant stations wasn't so hot. The sound quality produced with good signals was quite lively and vibrant but a little ragged at high frequencies and lacking subtlety. The balance is better suited to rock than classical music, but is still a bit raw for the sort of levels one might want to use in practise. MW and LW both sounded OK, the former even listenable from certain stations,

CASSETTE

The cassette player is more in line with the other machines in this test, having auto-reverse with noise reduction, loudness and chrome/metal equalisation. Oddly enough the NR has an effect on the tuner as well – sometimes to advantage.

However, the 497 isn't the most delightful music machine. It has a poorly defined and shallow bottom end, acceptable/endurable midrange and a painful treble. Presentation is reasonably wide with some depth, and one gets an average dose of information off the tape.

Rock tracks sounded quite open apart from a woolly bottom end that was anything but nimble. Acoustic guitar on metal tape sounded a bit hard, metallic and even fragile in the upper registers, and the limited quality transport was fairly apparent. The noise reduction worked well enough and some classical tracks were surprisingly listenable.

LAB REPORT

The absence of microprocessors and synthesisers means that two major sources of background buzz and whine are absent, and both AM and FM noise were not only good, but exemplary. Distortion on both bands was very presentable.

The AM section on this set has a 'soft' AGC characteristic, no doubt responsible for the relatively low distortion. The AGC range doesn't look good, but the overload point was beyond the limit of measurement, although sensitivity was poor so an effective aerial is needed (no coathangers, please). This set can be detuned manually to perk up the AM treble, which even centre-tuned is a lot better than most.

The 497 turned in a fairly poor set of wow and flutter figures, though flutter alone was an improvement on the group average. The speed error was also reasonably acceptable at only half a per cent slow. The graphs give a slightly better account still, the frequency response especially is remarkably flat across the midrange, rolling off quite sharply in the treble (5dB down at 9kHz).

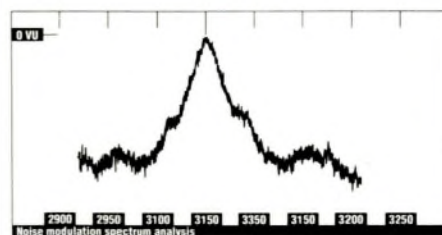
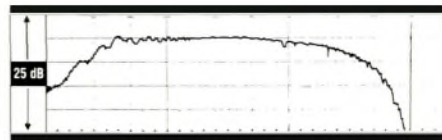
CONCLUSIONS

Norman and I both enthused about the ana-

logue tuning system which is essentially a lot easier to use than its digital counterpart. Unfortunately sound quality is a bit on the ragged side from both sources, though AM's not bad.

TEST RESULTS

Amplifier		
Power output (4ohms, 13.8V)		7W/8.5dBW
Noise (residual)		-59dB (775mV)
Radio		
Distortion	AM 4%/2% stereo FM (mono) (1%)	
AGC range/overload point	40dB/>120dB/ μ V	n/a
Signal/noise (ultimate)	62dB	57dB (60dB)
Sensitivity (40dB/50dB S/N)	220 μ V	125 μ V (25 μ V)
Frequency response (corrected):		
AM (rel 2x50 μ S): 2.2kHz: -4.9dB; 4.7kHz: -11.6dB; 9.0kHz: 60dB		
FM (rel 1x50 μ S): 2.2kHz: -0.2dB; 4.7kHz: -1.1dB; 10.0kHz: -3.1dB		
Cassette		
Wow & Flutter (pk. DIN wtd.)		0.36%
Wow/Flutter (pk. DIN wtd.)		0.25%/0.40%
Speed error		-0.56%
Typical Retail Price		£117



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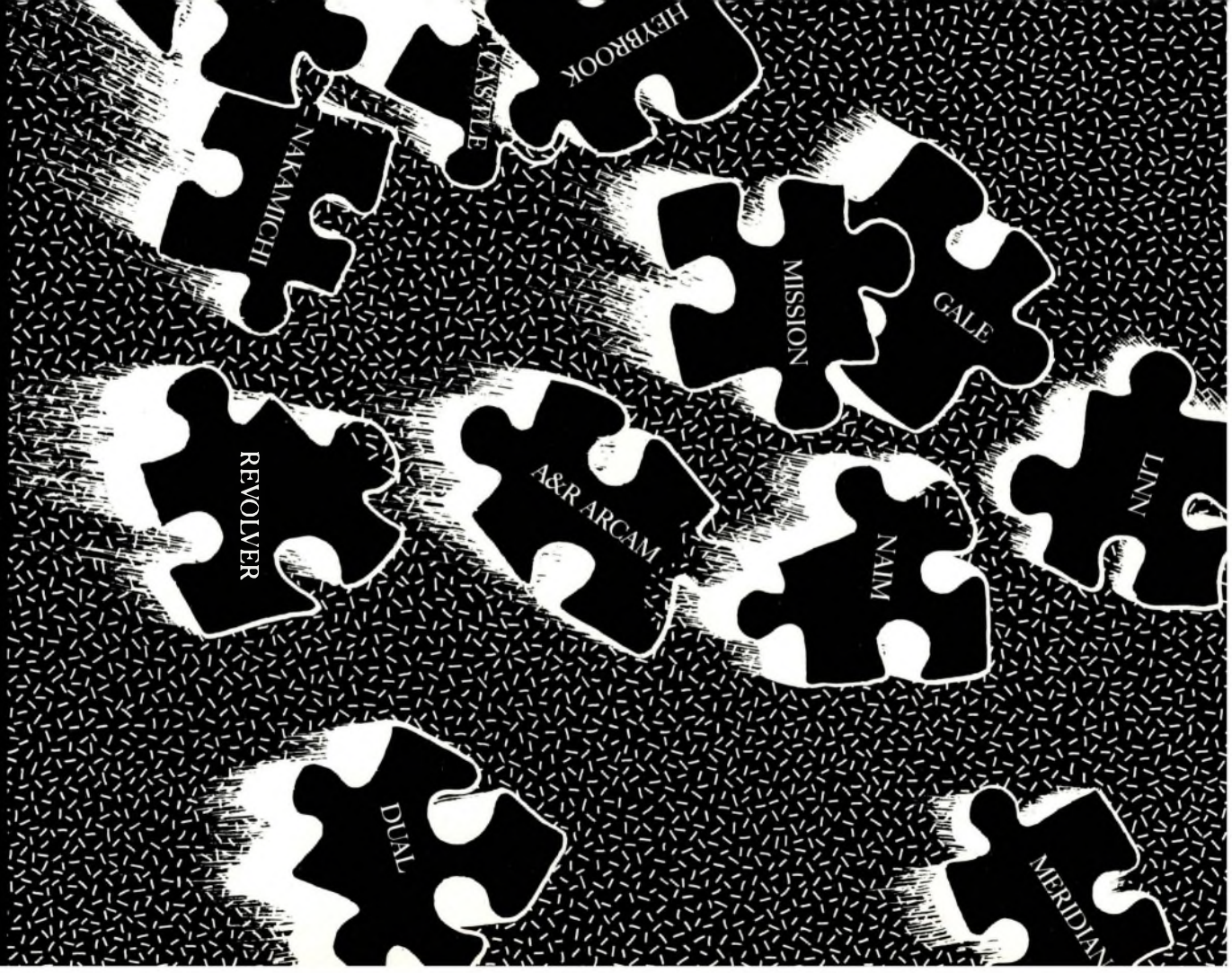
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SHARP RG-F816E

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



As one might be able to assess from the pic, this one is for the boys – it's the sort of thing that Harry Enfield's *Loadsamoney persona* would be proud of if it were more expensive. As it is it costs two hundred quid and should be a standard fixture on all *XR3is*.

There is no shortage of novelties, the most noticeable being a colourful sticker bearing the legend 'spectrum analyser', under very low light conditions this gives the impression of flickering lights – not exactly spectrum analysis, more of a low key disco effect.

Another unusual feature is a variation on the theft proof theme, whereby the control panel alone can be removed, supposedly rendering the machine useless. Just don't drop the panel down a drain when you're getting out of the car.

The ergonomics are basically fine, but a bit remiss on a few functions. Cassette controls, volume and fading controls are all standard enough, but the tuning switches are poorly differentiated, with the exception of the DX/local switch. The inevitable graphic equaliser has rather tiny sliders but can be subtly adjusted with a practised fingernail. The volume knob doubles as a preset station selector, which means station access isn't as quick as normal but is quite simple nonetheless.

RECEIVER

The *816's* amplifier with its unlikely 25W power rating will drive two pairs of speakers via DIN sockets on the back panel. Apart from the usual balance and fading controls there is one 4-band graphic to play with, which does indeed go some way towards balancing tonal coloration to taste.

The tuner has a generous eight presets per band, but as previously mentioned these cannot be accessed in the normal fashion. Seek tuning is possible if one depresses the up or down manual tuning button for a second or two. Also there is an automatic station programming function which runs through the band and memorises the first eight stations it comes across – obviously useful when travelling long distances. The slight drawback is that even in local mode it has logged up eight signals before getting halfway across the FM or MW bands.

FM sound quality is inherently quite clean and open with good tonal balance, but this is spoiled by high noise levels on several stations. Some harp music on *Radio Three* sounded quite realistic, but listening at appropriate levels was blighted by background noise which could only be cleared by reverting to mono. MW was much of a muchness, sounding constrained and boxy as is usually the case.

CASSETTE

The autoreverse cassette player also features a music search system and Dolby noise reduction. The sound quality with most material is obviously hampered by the less than stable transport, showed up by vocals and acoustic instruments. Being essentially listenable even at highish volume is a good start, but it lacks clarity and musical coherence compared to others at the price. With neutral speakers it could sound a bit soft especially in the bass, but would nevertheless probably suit many in car speakers.

LAB REPORT

This receiver produced just over ten watts per channel before distortion set in. FM has very good mono sensitivity but comes badly unstuck in stereo with microprocessor whine messing up the noise floor. One very bad feature of the FM section was astonishing microphony: merely tapping the set produced great clunks, and there is almost the prospect of acoustic feedback on ever so quiet *Radio Three* passages with the volume turned up.

There was nothing about the AM section which excited: bass distortion was particularly poor, though by no means the worst, the frequency response had little to recommend it.

The wow and flutter results are none too exciting and represent a par for the course transport. However, the noise modulation graph looks a bit better, with no obvious sidebands, and in fact is a lot more acceptable than that taken with the more expensive Sharp tested. The frequency response backs up the shallow bottom end discovered on listening, and indeed a general disdain for any thing but midrange. The most impressive

figure was a speed error a mere 0.3 per cent slow – nearly the best in the bunch.

CONCLUSIONS

The Sharp *816* is nothing if not novel, but unfortunately it was found lacking in the purpose it was theoretically created to fill, ie entertainment – or the quality thereof to be more accurate.

TEST RESULTS

Amplifier

Power output (4ohms, 13.8V) 10.9W/10.3dBW

Noise (residual) -62dB (775mV)

Radio AM stereo FM (mono)

Distortion 10%/1.2% (0.5%)

AGC range/overload point 66dB-100+dB/ μ V n/a

Signal/noise (ultimate) 55dB *dB/(55dB)

Sensitivity (40dB/50dB S/N) 40 μ V * μ V/(2.5 μ V)

Frequency response (corrected):

AM (rel 2x50 μ S): 2.2kHz: -1.8dB; 4.7kHz: -13.8dB;

9.0kHz: 80dB

FM (rel 1x50 μ S): 2.2kHz: -3.3dB; 4.7kHz: -5.5dB;

10.0kHz: -7.0dB

Cassette

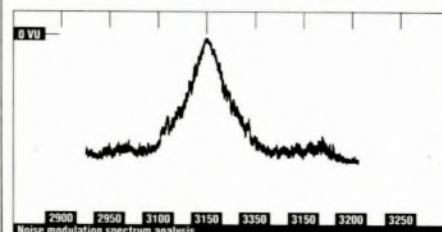
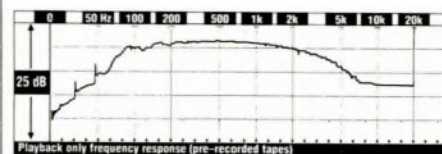
Wow & Flutter (pk. DIN wtd.) 0.34%

Wow/Flutter (pk. DIN wtd.) 0.22%/0.46%

Speed error -0.3%

Typical Retail Price £200

*synthesiser luzz predominates



SHARP RG-F882E

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



Sharp's 882 makes a very strong bid for the furry dice market; if car radios come any funkier than this then the world's a more warped place than I thought it was. Not only does the 882 have not a single rotary knob, but it has electronic eject and tape transport controls and a sliding volume control – even a separate 'sub-control panel' that flips out from inside the machine. If that isn't far out, what is?

As might have been expected, the 882's an ergonomic nightmare. The double sided block is particularly tricky for presetting stations: the automatic tuning functions are on one side, but the memory button is on the other, inside, which also contains the clock switch, 7-band graphic etc.

Considering all it does it doesn't look too garish, just feels a bit tacky. However, the preset buttons have a rubbery appeal and the LCD display is quite large and therefore that much easier to interpret. One might expect a machine with so much street cred to feature some variation on the anti-theft theme, but that is not the case.

RECEIVER

The amplifier has the necessary connections for two pairs of speakers plus phono sockets for an external CD player. Sharp make a portable player for this purpose and say that other models won't work; we'll see.

The tuner is also quite well endowed, with seek and scan tuning, five presets per band and automatic station programming (an auto-presetting device).

The FM sound quality, given a strong signal, is quite clear with good stereo separation and low noise, but extended listening proved a bit of a strain on the ear. There is an 'edginess' to the treble which makes listening at volume a less than great experience: one can dull the sound with the graphic; this makes it less grainy but more boring.

Dynamic range didn't seem all it could be on classical program, but rock material benefitted from the reasonable amount of power available. In a nutshell the sound is quite clear but not all that subtle.

CASSETTE

Considering the totally electronic servo oper-

ation, this autoreverse deck isn't all that smooth when it comes to playing a tape. When the cassette is initially inserted the transport clicks and whirrs for several seconds before deciding on a direction and getting going. The machine automatically assumes you're using a chrome or metal tape and want Dolby noise reduction – if you're not or don't these can be switched off (once you've found the appropriate button on the 'sub-control panel').

Classical music also sounds pretty unpalatable because of poor transport stability; piano and oboe notes warble and waver in a most unlikely fashion. Piano sounds 'glass like' and fragile – this is much more the machine to blare out the likes of Meatloaf or Def Leppard. Rock music sounds more persuasive and even enjoyable once the graphic has been adjusted to taste.

I did try my CD player on the inputs available, but the 882 ignored it as Sharp promised. There's a lead marked 'CD control' which needs to be corrected somehow in order to let the signal in.

LAB REPORT

The 882's power output is a decibel under ten watts, while the noise floor is on the poor side of average. Both FM and AM tuner results look good in most but one respect. FM sensitivity is good, though not the best, and readings for distortion and noise floor are also hard to fault.

The AM section has impressive overload performance (a full volt into the aerial socket produces no signs of distress), while noise, sensitivity and midband distortion all look very respectable.

If only they would change the AM ceramic filter and sort out the audio response. FM rolls off 8dB at 10kHz, while AM, like so many sets, is more than 10dB down at 4.7kHz. The dynamic range of the AM section is quite extraordinarily good, only the bass distortion figure giving cause for concern.

The tape transport managed to turn in a somewhat worse set of wow and flutter figures than the cheaper 816 model. In fact flutter was poorer than any other machine, which would explain the mess made of classical tapes. The speed error wasn't too great

either at over one per cent slow.

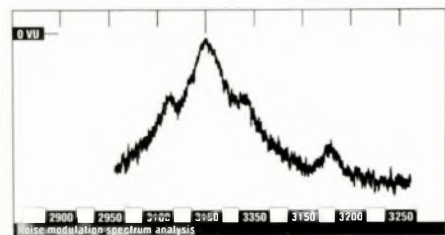
You may be wondering where the frequency response graph is for this machine. No we haven't forgotten it, we just couldn't persuade the player to produce one. The blank tape skip system decided that our –20dB test tone was too quiet above 500Hz, and fast-forwarded over the rest of the sweep. A clever device obviously put in to foil reviewers!

CONCLUSIONS

To be honest it would be quite a surprise if a player that looked this glitzy sounded great. It will sell on its features alone, that's for sure, but the mediocre sound quality isn't really up to the price.

TEST RESULTS

Amplifier		
Power output (4ohms, 13.8V)		8.5W/9.2dBW
Noise (residual)		–56dB (775mV)
Radio		
Distortion	6%/0.5%	stereo FM (mono) (0.5%)
AGC range/overload point	94dB/>120dB/μV	n/a
Signal/noise (ultimate)	57dB	54dB/158dB
Sensitivity (40dB/50dB S/N)	30μV	80μV/(6.3μV)
Frequency response (corrected):		
AM (rel 2x50μS): 2.2kHz: –1.7dB; 4.7kHz: –13.2dB; 9.0kHz: –52dB		
FM (rel 1x50μS): 2.2kHz: –2.3dB; 4.7kHz: –4.8dB; 10.0kHz: –8.0dB		
Cassette		
Wow & Flutter (pk. DIN wtd.)		0.34%
Wow/Flutter (pk. DIN wtd.)		0.22%/0.54%
Speed error		–1.36%
Typical Retail Price		£220



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IN-CAR ENTERTAINMENT: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Jason Kennedy brings you the low-down on this second batch of car cassette player/receivers – only the fittest survive.

Despite the higher average price of this second group of players the sound quality does not seem to have improved greatly, if at all. This month we've included something of a ringer in the form of the pricey but superb Nakamichi combo but last month's group, purely by accident, contained nearly twice as many notable machines. There are a couple of players designed for furry dice-mobiles with loadsa gizmos and flashing lights, and from the other end of the market two very conservative looking German players. Unfortunately, what links these two is a rather mediocre standard of sound quality.

The units tested did have certain consistencies, the most obvious being a tendency towards bass overkill (not extension so much as an unnatural low frequency boost) making them sound heavy with domestic loudspeakers. This only goes to show that they've been appropriately designed for car speakers which generally have very limited low frequency extension. This is due to a variety of factors including the size of the car and the lack of any solid cabinet to which to attach the drivers. Some companies, notably KEF, have attempted to tackle this by using subwoofers fitted in the boot with ports venting on the rear shelf; others use hefty amplifiers and a barrage of drivers – unconventional but effective to an extent.

All but one of the tuners had digital, switch operated tuning devices which are fine if you're able to concentrate on the display, but manual tuning is almost impossible otherwise. However, the search function found on most units means the radio will find stations for you. Some form of signal tracking would have been helpful with regard to the varying signal strengths encountered on the road, but this may be asking a bit much at the price. The preset system is also very useful, especially when it's possible to

identify the button using tactile rather than visual information. Incidentally, why is it so rare to find presets on ghetto blasters and the like when even the cheapest car radio has this facility?

The various anti-theft devices fitted to the more expensive models on test don't seem to take into account the probable mentality of your average car radio thief, who, unless he is well versed in the art, is unlikely to notice the little stickers advising him of the security code system fitted to the machine. Especially as a theft is more likely to happen at night. The ability to slide the player into and out of the car would seem a much more effective system, assuming you remember to remove it of course. (It's possible to buy these slide-in trays separately.)

Unlike the first batch we tested, the majority of these players were equipped with chrome/metal equalisation and some form of noise reduction system, Dolby being fairly common. Automatic equalisation seems to be reserved for the more expensive machines around, although one of the Sharps took it for granted that chrome tape was being used, which seems a bit presumptuous.

The variations in speed error were quite a bit better than those encountered last time with the majority below one per cent. Contradictorily enough, the best sounding deck handed in one of the worst speed errors! On familiar or critical material it is possible to detect quite low speed errors, however, much contemporary music merely sounds a little bright or lively which is something the tape medium lacks and is therefore not a big problem.

It was good to see that nearly all the decks were autoreverse types, which although compromising sound quality is worthwhile for ergonomic reasons.

As a whole these machines were quite neat, sensibly made

packages, certain models being very classy in appearance and slick to use. It would have been useful perhaps to have had an example of the type of player that comes as standard with say a \$10,000 car to see whether the difference merits the expense of a new player. I should imagine people upgrade their car radios for one of two reasons – sound quality or image. Compared to my old Panasonic, the players tested are stronger in both domains, unless you're into walnut fascias.

Recommended models from this and last month's tests:

BEST BUYS

Goodmans GCE 229 (£150)

Despite a rather weak performance in the lab, the 229 managed to sound quite good. It has a formidable array of features for the price, including Dolby NR, meta/chrome eq'ing and a music search system – which is a rarity.

RECOMMENDATIONS

Philips DC-553 (£120)

This relatively inexpensive Philips model is not particularly glamorous or that easy to use but it does give reasonable sound quality and turned in fair lab test results. However, its tonal balance may not suit some speakers.

Philips DC-680 (£180)

With its clever anti-theft system the 680 is a reasonably sophisticated machine at the price. The cassette player sounded quite subtle, aided no doubt by the minimal speed error found on test. Its only shortcoming is limited power and a horrid volume knob.

Aiwa CTZ-3500 (£199)

A very neatly designed player with a flip up lid for disguise and protection purposes, the quality of AM reception is exemplary and our wireless buff bought one for this reason. FM and cassette performance were less wonderful but still quite acceptable.

JVC RX-318 (£200)

The cheaper of the two JVCs in the test the 318 concedes nothing in looks to the 418 and even

improves on it when it comes to sound quality, which was particularly good on FM and decent from the cassette.

Pioneer KEH-5080B (£230)

While not the most refined player on test, the 5080 is an attractive and powerful machine. Fitted with a security code anti-theft system and a noise reduction circuit, it had a relaxed 'west coast' sound that was quite seductive.

Hitachi CSK-402E (£250)

This machine has an attractively designed fascia with a large informative black on orange display, which it complements with an open and enjoyable sound quality on both cassette and radio. It also has one of the secret code type security systems.

Alpine 7282L (£250)

This was about the best machine in the first bunch as far as sound quality goes and is extremely attractive to boot. Lab results weren't that good but showed a reasonable amplifier which is this player's strength.

Clarion 946HP (£250)

Another nicely built machine, the 946 has been well designed and gave an excellent FM performance and reasonable tape replay. AM, like most of the machines tested, was pretty poor but this was generally one of the better units on test.

Sansui RX-5100L (£250)

There are several clever little gimmicks on this tuner which turned in a remarkable AM performance and won the day for our radio consultant. A worse than average speed error stood in the way of the cassette player's absolute sound quality, but this was hopefully a sample fault.

Nakamichi TD-400E/PA-300 II (£450/£275)

This head unit/power amp combination from the leaders in the cassette deck market makes all the \$250 machines sound like trannies. It's a sonic advantage that one has to pay a serious sum for but if you're serious about your in-car entertainment then accept no substitutes.

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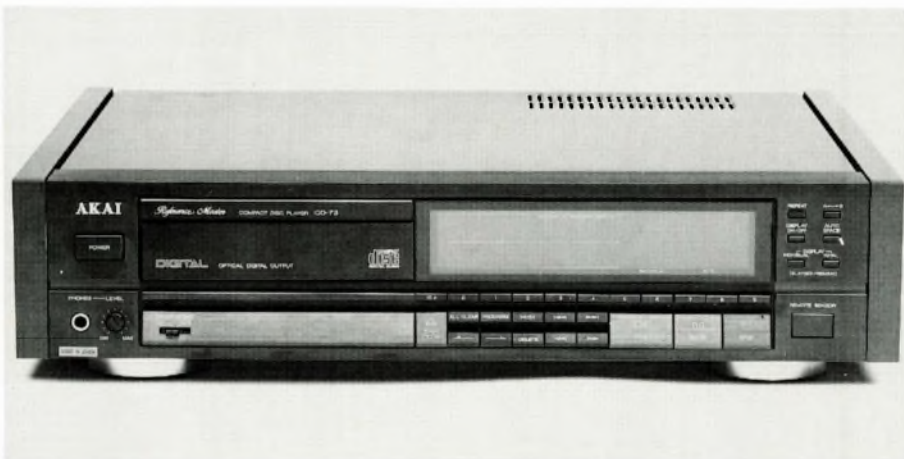
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AKAI CD-73

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



One of Akai's Reference Master series, the *CD-73* is the junior brother of the *CD-93* reviewed recently, and costs a full £250 less. In effect it is a lower spec, lower price *CD-93*, which sacrifices a little performance for quite a large cost saving. The facilities list is long and impressive and despite some shortcomings, discussed later, the *CD-73* is a classy player basically justifying its price.

Operating features are identical to the *CD-93* – the two models even share their instruction booklet without distinguishing between them in any material respect. The only differences on the spec sheet are a slightly wider LF bandwidth for the *CD-93* (2Hz for –0.3dB instead of 5Hz – a meaningless difference if ever there was one) and more weight – the *CD-73* weighs 7.5kg against the *CD-93*'s 13.6kg, reflecting a rather more prosaic standard of construction.

The Akai allows programming of up to 20 tracks using cursor keys and a calendar style readout of track numbers from 1 to 20. Other memory functions include A-B repeat and auto-space functions. Index search is supported, along with random track access via controls on the player itself and the supplied remote handset. Both are also home to numeric keys numbered 0–9 and 10+.

An output level control is the only obvious missing feature, for which I personally shed no tears. On the other hand, the complex display can be switched off which renders the player less visually intrusive in use and also has a small but beneficial effect on sound quality (confirmed on test). Other manufacturers please copy!

LAB REPORT

A heavily built machine constructed to reasonably high standards, the Akai is a 16 bit 4x oversampled, digitally filtered unit using separate Burr Brown PCM56P DACs for each channel, a large diameter disc damper,

and a generally high standard of components, including European sourced plastic film caps in critical circuit positions. The audio circuit has its own copper screened PC board, and employs relay muting and de-emphasis switching, which generally sounds superior to transistor switching. The case-work features some damping, with rather more elaborate damping used in the disc transport. The audio output employs optical stage coupling.

This test covers the second *CD-73* sample submitted and on the whole the two were reassuringly consistent. However there was some discrepancy between the –90dB waveforms on the two channels; the correct three level transitions are just visible through the glitches, but linearity tests gave poor results even at –80dB, with resolution estimated at a little under 15 bits. The frequency response shape is fine, with a small measured decline at HF, distortion levels rising a little faster than usual at low levels. The anti-aliasing filters are near linear phase but not quite, there being some ringing.

Using the usual standard test discs tracking is good, but ordinary marked discs left something to be desired with sometimes severe groove skipping. There was never any suggestion of groove skipping on clean discs, but it is implicit in this finding that the data-stream may suffer more error correction with normally less than pristine discs, and perhaps also with visually perfect ones too. This may have audible consequences. Track access times are a little slower than average.

SOUND QUALITY

The 'outside of the envelope' is decidedly good chez Akai. Dynamic swings are handled well, and stereo imagery is good, whilst the bass end is well integrated with plenty of drive. On the whole, the Akai sounds like the sophisticated, capable player it is, and even

after the acclimatisation honeymoon is over, impressions remain largely favourable.

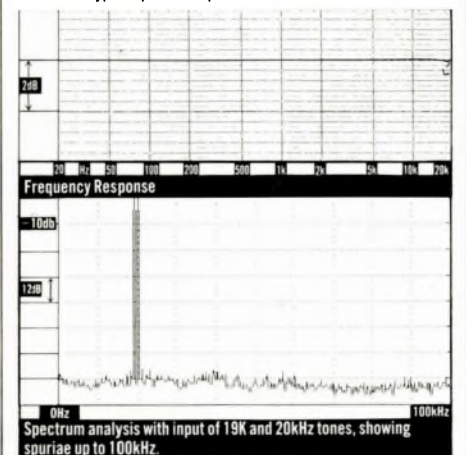
However, what is missing is real clarity. The midband sounds slightly muffled and slow, which detracts from the range of tonal colours, and downplays the expressiveness of fine playing.

CONCLUSIONS

Akai's version of affordable esoterica is a qualified success, with good features and build quality, let down to an extent by a lack of bottom line clarity. Worth auditioning.

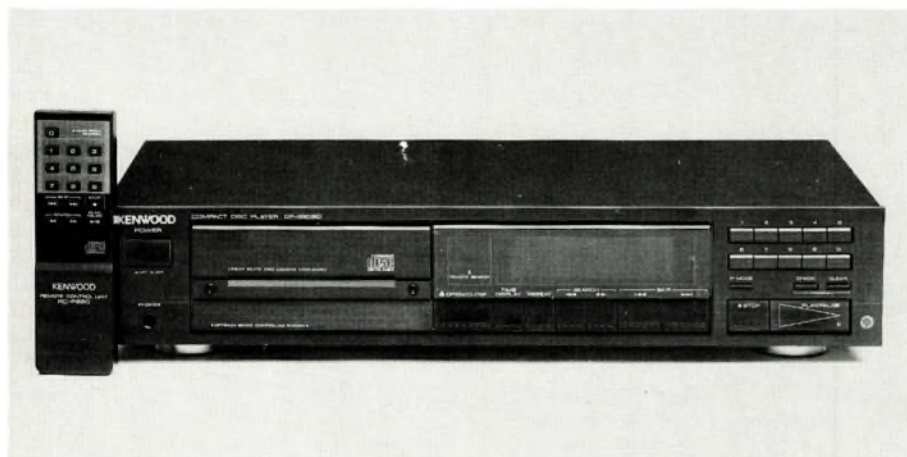
TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.16dB	0.18dB	0.23dB
Stereo separation	125dB	107dB	86dB
Channel phase difference	0°	0°	3°
Total harmonic dist, 0dB	–94dB	–91dB	–88dB
Total harmonic dist, –10dB	—	–82dB	—
Total harmonic dist, –60dB	—	–38dB	—
Total harmonic dist, –80dB	—	–19dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	–104dB
Intermodulation, 19kHz/20kHz, –10dB	—	—	–100dB
Frequency response,			
left channel	0.02dB	0dB	–0.24dB
Frequency response,			
right channel	0.02dB	0dB	–0.16dB
Signal-to-noise, 20Hz-20kHz			
unweighted	104/108dB with/without emphasis		
Signal-to-noise, CCIR/ARM,			
1kHz ref	98/101dB with/without emphasis		
Output level, 0dB, left/right			2.04V
Output impedance			215ohms
De-emphasis	1kHz, –0.37dB; 5kHz, –4.30dB; 16kHz, –9.04dB		
Track access time			3.0 secs
Error correction capability	>900µm gap, >800µm dot		
Mechanical noise			very low
Spuriae up to 100kHz			–102dB
Resolution at –90dB			–85/–83.8dB
Headphone socket			yes (variable) 75ohms
Dimensions (w x d x h)			46 x 35.5 x 11.3cm
Estimated typical purchase price			£450



KENWOOD DP-660SG

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



The *DP-660SG* is a perfectly conventional CD player in every respect except one – its price. Even in today's ultra-competitive environment, if the Kenwood is accepted on face value alone it is very attractively priced indeed. It sells for £180, and for that far from princely sum you get a player with good metalwork, a classy finish, and full remote control, not to mention a well implemented full calendar display. As I've had cause to write elsewhere about other representative models from Kenwood's current product range, pricing looks suspiciously predatory.

Operating features include a memory capable of storing up to 20 tracks, full remote control (this does not extend to remote programming though) and repeat play. A random access track number keypad is fitted both to the remote control handset and – unusual at this price level – the CD player itself. The display shows full time and current track number data, with a range of optional elapsed and time-to-go readouts, in addition to the calendar readout which gives a graphic indication of disc and memory status.

The only obvious omission is index search, though index numbers are increasingly being omitted from new disc releases too. Despite the plethora of controls, layout and organisation is perfectly sensible and control feel is typical of more expensive models. In practice operation quickly becomes intuitive, though if the player is positioned well below eye level the top part of the display, which is quite deeply recessed, becomes invisible.

LAB REPORT

Internally, the *DP-660* is a standard-issue Far Eastern player (it's made in Singapore) featuring a basic single PC board for nearly all components, digital and analogue alike. It's neatly constructed, mostly based on chips from Sony and NEC, the digital filter coming

from Sony and the single, time-shared DAC from Toshiba. Basic 2x oversampling is used, and the converter then feeds a circuit based on ordinary cheap op-amps and other standard grade components. The power supply section is powered by a small transformer.

The case is pressed steel and undamped, whilst the front is plastic with a plastic clip-on front finishing extrusion. The transport has its own fully floating mechanism investing it with some immunity from shock and vibration.

The *660* suffers at high levels when reproducing high frequencies due to poor 20kHz downband and IM distortion. The frequency response is severely affected too by a small but wideband (and thereby audibly significant) decline in output starting in the upper bass region, with a slight lift at HF due to ripple from the non-linear-phase anti-aliasing filters. (On our graph the solid and dotted lines show the left and right channels respectively.)

Output voltage is low and source impedance high, which militates against its use in systems with passive preamps. Linearity is poor, with a full 6.5dB error at –90dB, noise levels are high, though arguably still good enough to be of academic importance only. De-emphasis is not correctly engineered either, with no correction whatsoever applied to 1kHz.

SOUND QUALITY

Exceptional as the Kenwood *DP-660* certainly is in some other areas, it is rather less successful when assessed using music. The fundamental unevenness of the design was plainly apparent as a rather heavy, dull quality but with a somewhat fierce extreme top – which, however, is probably less attributable to the response rise at these frequencies than it is to phase and other effects in the region.

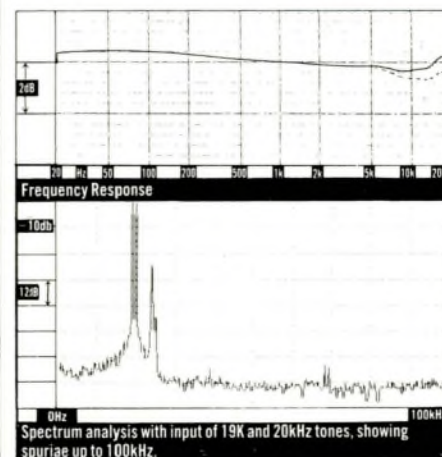
Intelligibility suffered to a degree, and there were clear indications that unless the disc in use is clear and transparent beyond reasonable question the Kenwood can sound a little cluttered and hard, especially at higher recorded levels, where it's at its least convincing.

CONCLUSIONS

Good in the less essential areas, and flawed where it counts most, the *DP-660* is a rather messy sounding player which tends to contradict the classy appearance and full range of features.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.03dB	0.04dB	0.49dB
Stereo separation	100dB	100dB	–78dB
Channel phase difference	0°	3°	40°
Total harmonic dist, 0dB	–86dB	–83dB	–66dB
Total harmonic dist, –10dB	—	–78dB	—
Total harmonic dist, –60dB	—	–36dB	—
Total harmonic dist, –80dB	—	–18dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	–75dB
Intermodulation, 19kHz/20kHz, –10dB	—	—	–75dB
Frequency response, left channel	0.45dB	0	–105dB
Frequency response, right channel	0.45dB	0	–152dB
Signal-to-noise, 20Hz-20kHz unweighted	—	—	89/90dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	86/90dB
Output level, 0dB, left/right	—	—	1.27V
Output impedance	—	—	2.2kohm
De-emphasis 1kHz, –0.05dB; 5kHz, –4.55dB; 16kHz, –9.2dB	—	—	—
Track access time	—	—	3.5 secs
Error correction capability	—	—	>900µm gap, >800µm dot
Mechanical noise	—	—	low
Spuriae up to 100kHz	—	—	–100dB
Resolution at –90dB	—	—	–83.5dB/–83.5dB
Headphone socket	—	—	yes 68ohms
Dimensions (w x d x h)	—	—	44 x 26 x 9.2cm
Estimated typical purchase price	—	—	£180



MARANTZ CD-75DX

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

RECOMMENDED



This *DX* version is the direct successor to the *CD-75*, but although it inhabits the same basic market patch, it is a quite dissimilar player. The *CD-75DX* uses the dual channel *TDA1541* digital converter, and the much improved *CDM2* mechanism, which is immediately obvious by its much smoother action and the fact that it closes automatically if tapped in the open position – in other words like any Japanese player.

From the operator standpoint, perhaps the most important selling feature is the 64-step remote volume control, which combined with an unusually high maximum output level (4 volts) means that the player is ideal for systems which don't use a standard pre-amplifier. Although CD players nearly always give more output voltage than tuners and cassette decks, there are many power amplifiers that simply can't be driven fully using the output of most CD players.

The display is a not unattractive dot matrix array with simultaneous time and track number readouts, and time-to-go available as an option. The usual track and index (please note!) search and memory play facilities (20 tracks, plus repeat) are fitted. So is FTS – Philips' proprietary play facility which recognises individual discs and tracks.

The remote control provides the usual alternative route into the players' electronic heart, adding a random access keypad into the bargain – and a volume control, which cannot be accessed from the player itself. Other features include a variable output headphone socket, gold plated socketry and both optical and electrical digital outputs. It also can be switched for use on different voltage supplies

LAB REPORT

For the *CD-75DX*, Marantz use the selected A version of the *TDA1541* 16-bit 4x oversampling dual channel DAC with linear phase

digital filters, but even this one has poor low level resolution. Otherwise this is a standard Philips clone with cheap but adequate construction that uses standard Philips latest generation hardware, including the *CDM2* transport. It also has a typical Marantz inspired package of improvements, including better quality coupling and smoothing capacitors, better power supply regulation, custom DAC decoupling components and Ceratin non-polar output capacitors – all of which help offset the damage inevitably wrought by the Philips thick-film volume control. The latter has lots of steps but clicks slightly as levels are changed. It can't be bypassed.

Output voltage defaults to 2V at switch-on, but up to 4V is available at the highest setting, and at a moderate 200ohm source impedance. Leaving resolution and peripheral considerations like track access times to one side, performance on test in respect of amplitude response linearity (ie frequency response), distortion, noise, de-emphasis tailoring and so on were a little better than average. There are no problems here.

SOUND QUALITY

Marantz have wrought their customary touch of well informed black magic to produce what by any standards is a fine and desirable £300's worth, perhaps the best at this level that also includes a remote volume control. But as usual, particularly with Marantz, the promise of good sound quality is only realised after a thorough warming up period.

That done, the player worked extremely well. Compared to the bulk of its rivals, the Marantz sounds particularly lively and open, with a strong bass and forceful (but not forced) sense of dynamics. Clarity is of a high order, though there's no danger of setting new standards here, and stereo soundstaging is articulate with good specificity, depth and image scale. The *75DX* also sounds very

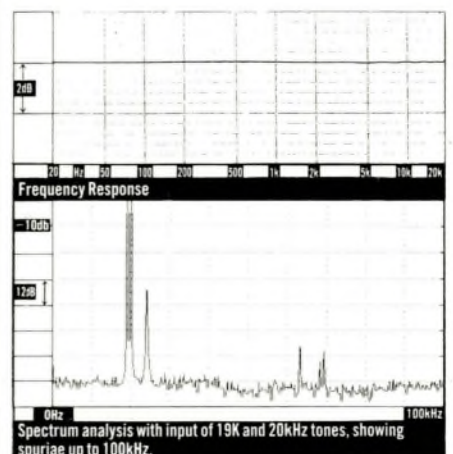
immediate and well defined.

CONCLUSIONS

An excellent all rounder and a particularly good candidate for connection direct to a power amp, it only lacks a clean feed so that the volume control can be bypassed when it isn't needed. This minor detail apart, the *CD-75DX* is a worthy successor to the *CD-75*, and certainly good enough to give a taste of audiophile sound quality, even at this price. Recommended.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.07dB	0.08dB	0.08dB
Stereo separation	110/128dB	112dB	98dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-100dB	-88dB	-86dB
Total harmonic dist, -10dB	—	-81dB	—
Total harmonic dist, -60dB	—	-43dB	—
Total harmonic dist, -80dB	—	-15dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-102dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-88dB
Frequency response, left channel	—	0	—
Frequency response, right channel	—	0	—
Signal-to-noise, 20Hz-20kHz unweighted	105/107dB with/without emphasis		
Signal-to-noise, CCIR/ARM, 1kHz ref	101/103dB with/without emphasis		
Output level, 0dB, left/right	2.0V (see text)		
Output impedance	200ohm		
De-emphasis	1kHz, -0.38dB; 5kHz, -4.61dB; 16kHz, -9.11dB		
Track access time	35 secs		
Error correction capability	> 900µm gap, > 800µm dot		
Mechanical noise	low		
Spuriae up to 100kHz	-87dB		
Resolution at -90dB	-118.5dB/-98dB		
Headphone socket	yes, variable 150ohms		
Dimensions (w x d x h)	42 x 28.5 x 8.0cm		
Estimated typical purchase price	£300		



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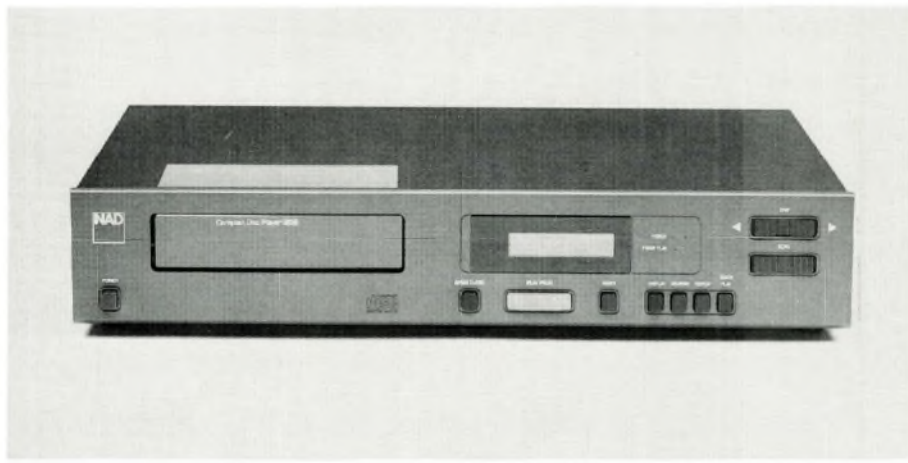
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From the outset NAD, the Hi-fi Markets house brand, has had an arm's length relationship with the wee silver disc judging by the relatively few models to have appeared, but the 5220 tackles one important objection to the medium – the paraphernalia that goes into it. The usual ranks of flashing lights and controls are mostly stripped away, leaving just a small number of well designed controls and displays which are intuitively very easy to use.

Centrepiece of the fascia is a soft glowing orange fluorescent display which gives a readout of track numbers (complete with leading zeros) and timings. Time remaining can be displayed if required. The other gadgets cover memory play for up to 16 tracks and repeat, in addition to the usual cueing and track-skip keys. One unusual feature in this price area is 'timer play', although what its use is I cannot say unless you are short of alarm clocks. The rest is housekeeping – power on/off etc.

Styling is fresh and original by normal standards. It conforms to NAD house style, which in my view is a lot better than what passes for modern styling in the tail end of the 1980s. One particularly sensible touch is the rocker switch design for the cueing and scanning controls.

There are, however, several significant omissions, the most notable of which is remote control. There's just one output, so you can't drive an external digital converter, and the NAD doesn't drive headphones either (but presumably the partnering amplifier or cassette deck probably will).

LAB REPORT

With a thin steel case and a perfectly reasonable transport this is a simple, ultra-basic player built onto a single board designed around a Toshiba chipset, using a non-oversampled (!) time-shared DAC. This con-

figuration requires a 'brick wall' filter with attendant very non-linear phase response at the audio output. Noise levels are also below average due to the lack of oversampling, but nevertheless perfectly acceptable by traditional non-CD standards. Some post production modifications can be seen inside.

Despite its apparent crudeness, the NAD measures reasonably well, at least taking price into account. De-emphasis is out by 0.5dB at 1kHz and 5kHz but almost correct at 16kHz, and track accessing takes longer than usual. The output voltage is low and output impedance high, militating against use with a passive preamplifier or direct into a power amp. Linearity is unexceptional, achieving something like 14.5 bits resolution, and some intermodulation products can also be seen. Tracking was good on the standard test disc, but less so on a badly scratched ordinary music disc which in many ways is a representative if exaggerated version of the real life situation. Shock resistance was relatively poor too, and clear gains in sound quality were had with careful siting, preferably on a proper hi-fi shelf support or table.

SOUND QUALITY

I didn't much like the sound of this player, and also thought it was sonically somewhat inconsistent with other NAD equipment which has always tended to err on the side of listenability and euphony. In contrast the 5220 is hard and aggressive, and has a thin and shut-in bass.

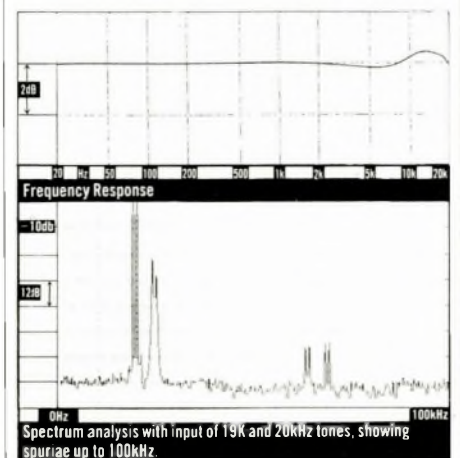
There is a kind of precision to the sound, but it's precision by default – apparent rather than real, and caused more by the emphasis in the mid and upper end of the audio spectrum rather than any real innate ability. Comparison to other CD players quickly reveals that the stereo soundstage is narrow and lacks depth, and that real 'hear through' clarity is somewhat compromised.

CONCLUSIONS

Promoted with a theme of purposeful simplicity, it's worth noting that although the 5220 is not expensive, it still costs about £80 more than the cheapest legitimate competition – legitimate in this context referring to currently manufactured models from 'name brand' manufacturers. It's therefore not unreasonable to expect rather more than a performance standard which in all honesty resembles the less exciting budget models of several years ago.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.16dB	0.14dB	0.07dB
Stereo separation	113dB	106dB	76dB
Channel phase difference	0°	5°	75°
Total harmonic dist, 0dB	-88dB	-87dB	-69dB
Total harmonic dist, -10dB	—	-84dB	—
Total harmonic dist, -60dB	—	-39dB	—
Total harmonic dist, -80dB	—	-17dB	—
Intermodulation, 19kHz/20kHz, 0dB			-92dB
Intermodulation, 19kHz/20kHz, -10dB			-95dB
Frequency response,			
left channel	0.01dB	0dB	-0.46dB
Frequency response,			
right channel	0.01dB	0dB	-0.37dB
Signal-to-noise, 20Hz-20kHz			
unweighted			95/98dB with/without emphasis
Signal-to-noise, CCIR/ARM,			
1kHz ref			89/94dB with/without emphasis
Output level, 0dB, left/right			1.55V
Output impedance			1kohm
De-emphasis	1kHz, 0.51dB; 5kHz, 4.94dB; 16Hz, 8.95dB		
Track access time			5 secs
Error correction capability			>900µm gap, >800µm dot
Mechanical noise			low
Spuriae up to 100kHz			-101dB
Resolution at -90dB			-83.1dB/-83.1dB
Headphone socket			no
Dimensions (w x d x h)			42 x 31 x 8.5cm
Estimated typical purchase price			£230



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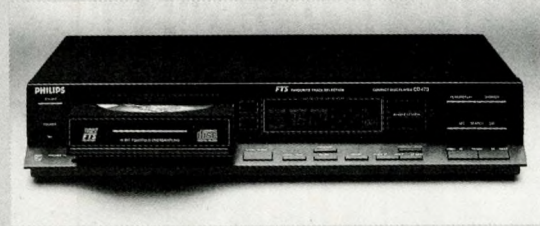
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RECOMMENDED



Number two from the bottom of a range of five new Philips CD players, this £250 mid-width model comes complete with remote control.

Having scored over their rivals with FTS (Favourite Track Selection) Philips are busy making hay whilst the sun shines by fitting FTS to ever cheaper models in their fast changing hierarchy. FTS remembers programmed track sequences on individual discs, automatically recognising the disc on insertion, using the directory listing of track numbers and playing times unique to each. FTS memory capacity can deal with about 150 discs at five tracks per disc, the exact number being dependent on the number of tracks programmed, plus a fixed overhead per disc.

The 373 has a remote control with random track access and programming for up to 20 non-repeated tracks, and an output volume control. The usual track and cueing controls are fitted, along with a headphone socket with its own volume slider, and an electrical digital output.

The display shows track and index numbers, or, at the press of a button, elapsed track timings. Although the 373 is fitted with the latest generation disc tray, a much slicker item than of old, the player both looks and feels tacky, some of the controls being unnecessarily stiff. Philips have also managed to score a resounding 'miss' with ergonomics, specifically control layout and labelling, which is quite a trick given how few of them there are. However, matters are improved via the remote control.

LAB REPORT

Technically a standard late generation 4x oversampled 16-bit player, the CD373 uses the usual Philips chip set which ensures true parallel processing for zero phase difference between channels and digital linear phase

filtering. A small PC board is added on to accommodate the 6 x 3dB step volume control. Generally construction is as cheap and plasticky inside as it is out, but adequate.

Performance is quintessentially Philips, down to the superbly flat frequency response, and including the almost total lack of output of any kind in the -90dB region, giving poor low level resolution. Channel separation is lower than usual, though the shortfall is probably academic, while distortion is basically good except, by definition, in the region of severe non-linearity.

Tracking is good even on badly mauled discs, and the clean signal extracted off disc is almost certainly one reason for the high class auditioning results traditionally associated with the marque. But track access times are a little protracted, and mechanical noise levels no better than average. The Philips has the latest series CDM2 transport mechanism, and in this area at least, operation is much better than before.

SOUND QUALITY

Sound quality is good enough to ensure recommendation at the price, but is still unexceptional. In fact the player appears to be inferior in clarity to the cheaper CD371, for which two obvious explanations present themselves. One is the presence of the remote control, and the other, of course, is the electronic volume control, a device which nearly always detracts from the sound. The contribution of the control cannot be isolated in this case since there is no parallel fixed level output (the headphone socket has its own IC driven amplifier), but that certainly doesn't mean that it's not there, and the slight but pervading graininess and artificiality tends to confirm the hypothesis.

Good points are strong, well articulated dynamics and consistency with level, plus good stereo focus and depth. Detail resolu-

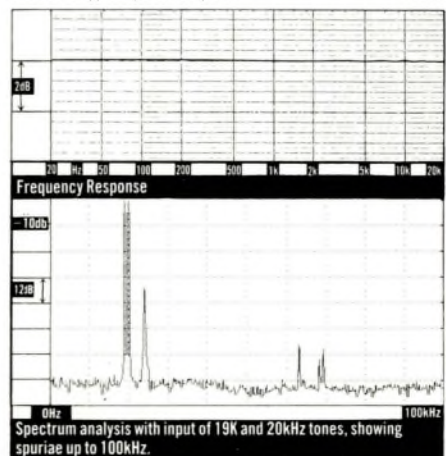
tion is fine, but far from top of the class, and the 373 doesn't have the clarity and sophistication of the better players at the other end of Philips' price scale.

CONCLUSIONS

A good performer, but with comparatively little effort it could be better still – for example by adding a direct (non volume controlled) output. Control layout is iffy too and build quality is adequate rather than inspiring. But the usual strong, three dimensional Philips sound cuts through.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.08dB	0.08dB	0.10dB
Stereo separation	72dB	90dB	87dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-95dB	-87dB	-85dB
Total harmonic dist, -10dB	—	-79.5dB	—
Total harmonic dist, -60dB	—	-43dB	—
Total harmonic dist, -80dB	—	-13dB	—
Intermodulation, 19kHz/20kHz, 0dB			-103dB
Intermodulation, 19kHz/20kHz, -10dB			-90dB
Frequency response, left channel	0dB	0dB	-0.01dB
Frequency response, right channel	0dB	0dB	-0.02dB
Signal-to-noise, 20Hz-20kHz unweighted	104/105dB with/without emphasis		
Signal-to-noise, CCIR/ARM, 1kHz ref	100/103dB with/without emphasis		
Output level, 0dB, left/right			1.97V
Output impedance	200ohm		
De-emphasis 1kHz, -0.38dB; 5kHz, -4.62dB; 16kHz, -9.10dB			
Track access time	3.55 secs		
Error correction capability	>900µm gap, >800µm dot		
Mechanical noise	average		
Spuriae up to 100kHz	-87dB		
Resolution at -90dB	-107dB/-111dB		
Headphone socket	yes, variable 1510ohms		
Dimensions (w x d x h)	32 x 30 x 8.0cm		
Estimated typical purchase price	£250		



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CD PLAYERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Alvin Gold sums up the present state of the compact disc player market. Quality continues to improve . . .

Ten compact disc players scarcely represent a statistically viable sample, but the hit rate achieved this month and last – six Recommended players out of ten – is indicative of the general improvement in the standards of CD players.

Improvements have come about in various ways. There have been technological upgrades all round, and an increasing tendency to play numbers with multiple oversampling and 18-bit digital to analogue conversion to pick just two examples. These techniques can, and in skilled hands do, result in real improvements in resolution and thereby sound quality.

There is now also quite widespread appreciation of ideas like parallel, time-coincident digital to analogue conversion using separate DACs, an idea introduced by Philips in Europe, and first taken up in Japan by Denon and Sony.

The latest Philips DACs consist of dedicated converters for each channel, mounted on a single substrate in a single package. It's interesting to see that Sony (amongst others) are using them in some of their recent players, including the *CDP-337* tested last month, and in that case in a configuration that Philips themselves never thought of (presumably). The traffic in technology is not all one way though.

At least as important as the technology itself is the interest being shown by the larger mainstream manufacturers in an idea that until recently was the exclusive preserve of the lunatic fringe – the sound quality of nominally identical passive components, especially resistors and capacitors. There's been a general upgrading in standards here, and in related ideas such as the use of non-magnetic, anti-

resonance damped body panels and fastenings.

A less welcome parallel trend is that players are sprouting more and more almost wholly useless gadgets and displays, one which surely hit the zenith of stupidity with the 'shuffle' switch that randomises the play order of a disc. Objectively, the vast majority of the gadgets you see fitted are completely unnecessary. It simply doesn't make sense to have 30 or sometimes 40 controls just to play a disc.

Complex displays are equally annoying, and have a directly deleterious affect on the sound which can be demonstrated on one of the very few players currently available with a 'display off' switch. Unfortunately, there are no signs that things are changing, at least not yet, but there's bound to be a reaction against the gaudy over-complexity of many of today's CD players later if not sooner.

Choosing a player has its problems, not least that of arranging for adequate demonstrations, which can be prejudiced simply by seemingly minor volume level differences or perhaps because a player hasn't been sufficiently warmed up. Nevertheless there's no other realistic way to choose between them, though reviews can be used as a guide and to help draw up shortlists. However, you'll always be shooting at a moving target as typical product lifetimes at the time of writing are around nine months, compared to as much as two years for other system components.

One facility not often considered but well worth having is a raw digital output, which can be either electrical (good), optical (better) or both. A digital output can be looked on as a way of protecting your investment, for

example by allowing the use of outboard converters like the surprisingly effective A&R Arcam *Black Box* (Musical Fidelity will shortly have an equivalent on the stocks and others will certainly follow.)

There does tend to be a degree of correlation between price and performance, though some very low cost players break the pattern by appearing far higher up the rankings than you'd expect from the price alone. Still, when you think of some of the high price monstrosities that masquerade as, say, amplifiers or loudspeakers, I'm sure you get the picture.

For a resumé of all the CD players reviewed by *Choice* you should refer to the Directory at the back of the magazine. Meanwhile, of the ten players tested in this and the last issue, the following models are explicitly Recommended, and are listed here in price ascending order:

Onkyo DX-2500 (£200)

An excellent player, with music making ability that leans more towards being easy on the ear than informative. The Onkyo is also blessed with good equipment levels and finish – and it's cheap. Well, cheapish.

Philips CD373 (£250)

This is one of those players that

can only be auditioned via its onboard electronic volume control. The *CD373* remains a fine sounding machine at a reasonable price, albeit with modest build standards and questionable ergonomics.

Marantz CD75DX (£300)

A typically excellent Philips' clone, with a high and controllable output making the player particularly suitable for direct connection to a power amp. Shame the volume control can't be bypassed for conventional use.

Technics SL-P770 (£350)

Good . . . but it's dauntingly complex to drive. In common with a number of recent up-market players, clarity is achieved at some expense, dynamics and, ultimately, 'believability' tending to be short changed.

Sony CDP-337 (£550)

Another in a long line of sonically successful Sony CD players, the *337* has some novel gadgets, some of which might even be useful. Musical quality and build are both to a high standard.

Pioneer PD-91 (£800)

The *PD-91* turned out to be the real surprise – a superbly engineered high-tech product that sounded truly excellent. It's fully competitive even at £800.



Pioneer's fabulous PD-91: the sound improves when the display is switched off.

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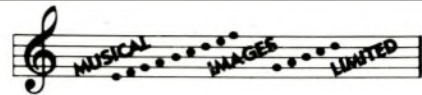
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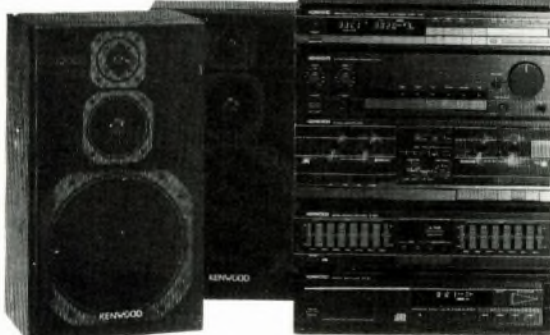
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Programmable Linear Tracking Turntable
 ■ Direct drive system ■ Fully automatic computer controlled operation ■ 7 programme random access memory play ■ Auto variable speed selector ■ Auto repeat ■ Synchro recording system ■ System remote controlled (IP-91)
Double Auto-Reverse Cassette Deck
 ■ Computer Controlled CD Recording System (CCRS) ■ Auto Bias ■ Full range (mono) ■ Independent Dual Recording System (IDRS) ■ Cross Dolby system with Dolby B/C filter ■ Automatic tape selector ■ LED peak meter ■ 3 reverse modes ■ Direct 16 Programme Search System (DPS) ■ Relay record ■ Timer relay play ■ High speed dubbing ■ Timer record/play ■ Synchro recording ■ System remote controlled (A 91)
100W 3-way Speaker System
 ■ 100W maximum input power ■ 2.3cm polypropylene cone woofer with Double Voice Coils ■ 6.5cm cone mid range ■ 3cm piezo electric tweeter ■ Bass reflex design ■ Magnetic Shield for audio videosystem ■ Frequency response 35Hz-20kHz (S-91)

Quartz Synthesized FM/MW/LW Tuner with Timer
 ■ Station Name Preset System (SNPS) ■ Random presets for 12 (with SNPS) or 20 (without SNPS) stations ■ Preset scan ■ Automatic Tuning ■ Twice a day 2 programme system timer ■ Sleep timer ■ System remote controlled (T-91)
BSW x 2 Integrated Amplifier
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EXTRA OPTIONS
Double Graphic Equalizer/Spectrum Analyser
 ■ Double 7 band equalizers ■ ± 6dB or ± 12dB variable range ■ Electronic controls ■ 20 memory presets ■ 10 programmable and 10 built-in ■ Dual spectrum analyser F.I. display ■ A/B selector ■ Equalizer recording ■ Reverse mode ■ Flat response switch ■ System remote controllable (memory, IQ system) (GE-910)
Programmable Compact Disc Player
 ■ Computer Controlled CD Recording System (CCRS) ■ 3 beam laser pick up ■ Double oversampling digital filter ■ Optimum Servo Control ■ 20 track random programme memory with Music Call under display ■ 10 key input and 10 key for Rapid Direct Play system ■ Memory Check & Clear ■ Dual mode playing/remaining time display ■ Repeat ■ Auto-spacing ■ System remote control (DP-710)



Offering excellent value, the M-31S provides high-quality sound reproduction (via full-size 3-way speakers plus superb versatility and ease of operation. The system powerhouse is a digital-ready amplifier combined with a double cassette deck that offers high-speed dubbing, synchro-recording and Relay Play. Stereo broadcasting is picked up by the quartz synthesized tuner with 20-station preset memory and SNPS, while records are handled with precision and delicacy by the fully automatic turntable.

Fully Automatic Turntable
 ■ Precision belt drive system ■ Auto lead-in and return ■ Auto variable speed selector ■ Auto repeat ■ Cueing and manual search keys (P-31)
30W x 2 Integrated Amplifier with Double Cassette Deck
 ■ 30W x 2 power unit (DIN, 8 ohms) ■ Independent inputs for CD, DAT, TAPE, TUNER, PHONO, AUX ■ Separate bass and treble tone controls ■ Mic. mixing ■ Headphone monitoring jack ■ Automatic tape selector ■ Mecha logic tape controls ■ Timer relay play ■ High speed dubbing

■ Dolby B NR ■ LED peak meter ■ Timer record/play (tuner) ■ Synchro recording (AX-31)
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70W 3-way Speaker System
 ■ 70W maximum input power ■ 16cm woofer ■ 5cm cone tweeter ■ 3cm piezo electric super tweeter ■ Bass reflex design ■ Frequency response 50Hz-20kHz (S-91)

Programmable Compact Disc Player
 ■ 3 beam laser pick up ■ Double oversampling digital filter ■ Optimum Servo Control ■ 15-track programme memory ■ 99 track random access play ■ Memory Check & Clear ■ Search & Skip keys ■ Dual mode playing/remaining time display ■ Repeat ■ THD less than 0.01% (DP-310)

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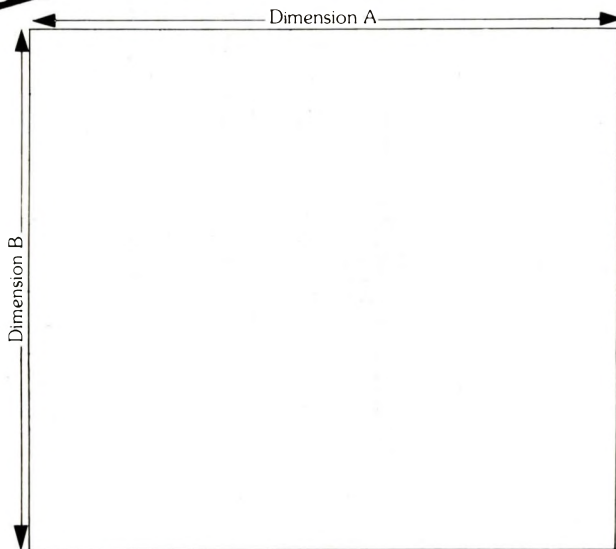
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kj SYSTEM DESIGN BRIEF

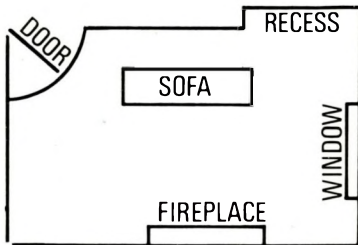
You can use this form to take advice from our team of hi-fi consultants who will be pleased to recommend suitable equipment. You can use it even if you are only intending to replace one or several items within your existing system.

**FREE
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Please draw the shape of your living room.



(Diagram of example room layout)



MEASUREMENTS

Dimension A:
 Dimension B:
 Ceiling Height:
 Is the room wall to wall carpeted? YES NO

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

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

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

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

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

Any other items?

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

.....

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

.....

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

- FM/VHF MEDIUM LONG

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

- FLOOR STANDS WALL BRACKETS EXISTING SHELVES

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

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

.....

Is the equipment in full working order? YES NO

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

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

Please tick box if quotation for instalment credit required

Please tick box if you prefer installation of equipment

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

NAME (Mr/Mrs/Ms)

ADDRESS

..... POST CODE

DAYTIME TEL HOME TEL

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THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *RD90 Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories – ie a cassette deck rated 'excellent' in sound quality will not usually offer

the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and it is best to refer to the original review for this, of which more later.

The next column(s) varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability, for instance arm matching figures are given with the cartridges which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the Directory are those found in the Value column, the *Rs* and *Bs* denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price

limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – ie cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different pre-recorded music media competing for the attention of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others as a tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system. Furthermore the vinyl repertoire is still the cheapest, largest and most varied.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, which may cause aggravation when upgrading a few years hence. It is worth remembering that though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

There is some debate about the best form of fixing, however, adjustable spikes through to the

floor proper, seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed.

Most decent quality turntables are fairly immune to feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

THE DIRECTORY

TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality

improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help. Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. **Lab performance** summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of mechanically compatible cartridges (see cartridge listings)

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S-MCS £695/£412	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	60
Ariston Q-Deck £140	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average + Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average + Average +	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 6g (B&O carts. only)		48 (Summary)
Dual CS503-1 £125	Poor Average	Slated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,000	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £279/£249	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Kuzma Stabi/Stogi £575/£349	Average + Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis £345	Good + Good +	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	60
Manticore Mantra £300/£330 (Arm)	Good + Good +	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coil
NAD 5120 £90	Average Average –	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
Omega Point Silver/Black £895/£295	Good Good +	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Rega Planar 2 £135	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
Rega Planar 3 £188	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Integrated turntable, manual, 11.5g	BB	48
Revox B291 £759	Average – Average –	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Rotel RP-830 £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK; mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	55
Source/Odyssey RP1 From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
Systemdek II £199	Good + Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good + Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average – Average –	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the DD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average –	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
Thorens TD166III £179	Good Good	Old turntables never die, this revived 166 yet again takes its place near the top of its class	Auto lift, subchassis, 7g	BB	48
Thorens TD316 £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
Thorens TD320 £319	Good + Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis, 7g (available without arm)	R	48

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MONITOR AUDIO R252V	£60.00
MORDAUNT-SHORT MS25ti	£30.00
MORDAUNT-SHORT MS35ti	£50.00
TANNOY MERCURY MkII	£50.00

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ACOUSTIC RESEARCH EB101 with cartridge	£80.00
DUAL 505/3 DELUXE with cartridge	£25.00
NAD 5120 with cartridge	DEDUCT £30.00
ROTEL RP830 with AT110E cartridge	£30.00
REVOLVER with REVOLVER arm & cartridge	£75.00

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ACOUSTIC RESEARCH CD04	POA	CD 371	POA
ARCAM DELTA 70	POA	CD 373 remote FTS	POA
CAMBRIDGE CD1	POA	CD 471	POA
CAMBRIDGE CD2	POA	CD 472 (with remote)	POA
DENON DCD 300	POA	CD 473 (with remote FTS)	POA
DENON DCD 600	POA	CD 960	POA
DENON DCD 800	POA	ROTEL RC0820BX	POA
DENON DCD 1500 MkII	POA	ROTEL RC0820BX2	POA
DENON DCD 1700	POA	TECHNICS SLP200	POA
DENON DCD 3300	POA	TECHNICS SLP250	POA
MARANTZ CD273SE	POA	TECHNICS SLP350	POA
MARANTZ DC65DX	POA	TECHNICS SLP550	POA
MARANTZ DC75DX	POA	TECHNICS SLP770	POA
MARANTZ CD94	POA	TECHNICS SLP990	POA
MERIDIAN CD207	POA	TECHNICS SLP1200	POA
MERIDIAN 209 Remote control	POA	TECHNICS SLPJ20	POA
MISSION PCM II	POA	TECHNICS SLPJ22	POA
MISSION PCM 7000	POA	TECHNICS SLPJ44	POA
NAD 5220	POA	YAMAHA CDX510	POA
NAD 5240	POA	YAMAHA CDX810	POA
PHILIPS CD360	POA	YAMAHA CDX910	POA
PHILIPS EM2000 Remote control	POA	YAMAHA CDX1110	POA

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THE DIRECTORY

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston RD90 Superior £900	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
Audio Labor Konstant £2,560	Good + + Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
Goldmund Studio £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	60
Mitchell Synchro £235	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	55
Mitchell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Turntable £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set up, the price (necessarily includes stand	Manual, belt drive subchassis, stand, 33 $\frac{1}{3}$ rpm		60
Oracle Delphi III £1500	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service – but very expensive	Manual, belt drive, subchassis	R	60
Oxford Acoustics Crystal Reference £1955	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R	60
Pink Triangle PT 100 £539	Very Good Very Good	A substantial improvement on its predecessor, the 100's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting up is critical, and for experts only	Manual, belt drive, solid/decoupled	R	60
SEE Revolver £127	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IV £448	Good+ Good+	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average+	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average+	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities such as ability to accommodate 12 inch arm compensate	Manual, belt, suspended motor unit, 78rpm, pitch control		55
Townshend Rock £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £395	Good + + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average+	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summary
Eminent Technology £960	Good+ Good+ +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good+	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Very expensive but with a performance that merits recommendation	12g	R	48
Linn LV Plus £129	Good+ Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £429	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Manticore (Logic) Datum 2 £140	Very Good Good + +	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'untidy'	15g	R	48/Coll
Mission Mechanic £700	Good Good+	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £65	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £90	Good + + Good + +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
SME 3009 Series IIIS £156	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1138	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good + + Good + +	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

THE DIRECTORY

CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries).

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
A&R E77Mg £47	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
A&R P77Mg £57	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal, MM		38
ADC TRX II £69.60	Average Average +	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal, MM		38 (Summary)
Audionote IO2VDH £795	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity'. But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer), MC		43
Audiquest MCS £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose "overall performance was very good for the price"	6-16g Normal, MM		43
Audio Technica AT95E £14.95	Average – Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal, MM		43
Audio Technica AT3200XEI £42.95	Average + Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal, MC	R	43
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low, MC	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricy product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal, MM		43
Audio Technica ATF50CC £100	Average + Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low, MC	BB	54
Audio Technica AT33ML £238.95	Average + Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low, MC		43
Audio Technica ATOC7 £245	Good + Good +	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average + Very Good	Tonal colours were reproduced faithfully while stereo images were clearly isolated and focused despite contributing to a thoroughly integrated whole. Slightly less transparent than more costly MCs	6-14g Low, MC	R	60
Azden YMT0VE £12.50	Average Average –	A good tracker. Sounds rather bunched-up but not totally incoherent – for very basic systems only	5-15g Normal, MM		54
Azden GM1E £30	Average – Average –	Of academic interest only, this high o/p MC is seriously flawed in sonic terms	8-18g Low/normal, MC		54
Azden GMP5L £99	Average + Average +	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low, MC	R	54
B&O MMC5 £21	Average + Average	'Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £33	Good Average +	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £75	Good Average +	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p, MC	R	48/Coll
Clear Audio Gamma £285	Average Average +	Brimming over with enthusiasm, the unusual looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average + Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Pradikat £1225	Average + Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g MC		Coll
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
Denon DL110 £60	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £80	Average + Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low, MC		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Dynavector DV-50X £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector DV XX-1 £360	Good Good+	The XX-1 embodies a power and solidity rarely encountered amongst the breed, nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems	7-17g Normal, MC		60
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average+	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal, MM	R	48
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal, MM	BB	54
Goldring G1020 £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal, MM		43
Goldring G1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model - no great actress	8-16g Normal, MM		48
Goldring Eroica L £91	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low, MC	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal, MC		43
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low, MC		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery - consider this model	5-10g Normal, MM		48
Grado XTE + 1 £20	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Grado XF3E + £45	Average- Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Highphonic MCA3 £360	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
Kiseki Blue Silver Spot £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low, MC		54
Kiseki Purpleheart Sapphire £695	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1595	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £3500	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble fizz. Listen before deciding	6-18g Low, MC	R	48/Coil
Koetsu Red £896	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low, MC	R	48/Coil
Koetsu Red Signature £1300	Good Excellent	Technically this cartridge suffers no faults whilst on a subjective level it offers rare musical insight	10-21g Low, MC	R	60
Linn Basik £19.50	Average- Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal, MM	BB	48/Systems
Linn K9 £69	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coil
Linn Asaka £279	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coil
Linn Karma £435	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	48/Coil
Linn Troika £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coil
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top end control	8-16g + damping Normal, MM		48
London Super Gold £248	Average- Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal, MM	R	48/Coil
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low, MC		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coil
Milltek Olympia £298	Average+ Good+	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low, MC	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low, MC		Collection
NAD 9100 £12	Average- Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal, MM	BB	38
NAD 9200 £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal, MM		28
Nagaoka MM4 £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

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N3D



VN45MR



VN35MR



VN15E



N140HE



N105E



NDC-EJ



N97 LT



NE97HE



NE95ED



VN5HE



SS39ED



N95HE



N14



VN5P



SS35C



N120HE



N104E

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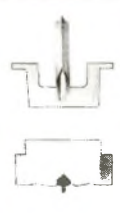
N75B Type 2



N111HE



N99E



SS78E



N44C



N44E



N70EJ



VNMR-P



N75G Type 2



N110HE



N92E



N75EC



N44G



N44-1



N70B



N75HE Type 2



N75-6



SS39EJ



N95ED



VN45 LT



N44-3



N44-7



VN35E



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N55E



N72B



VN5MR



N94LT



N93E

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CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Nagaoka MP11 Boron £38	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP10SB £40	Average Average+	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal, MM	R	54
Nagaoka MP11 Gold £45	Average- Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka MP11 Gold SB £70	Average- Average	Excessive price loading for a blob of aluminium	2-6g Normal, MM		54
Ortofon OM5E £12	Average- Average-	The OM10 is a hi-fi cartridge - the OM5E is not	5-16g Normal, MM		43
Ortofon VMS5E II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal, MM		38 (Summary)
Ortofon OM10 £15	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon VMS 10E II £21	Average- Average-	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal, MM		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal, MM		48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon VMS30E II £52	Average+ Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal, MM		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon OM40 £75	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal, MC		48
Ortofon MC20 Super £139	Average+ Good+	An "inviting" sound quality, polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	48/Coil
Ortofon MC30 Super £199	Very Good Good+	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coil
Ortofon MC3000 £800	Good Excellent	Quite simply, the most accurate transcription device yet created - not one for the faint hearted	6-16g V. Low, MC	R	60
RATA RP20 £22	Average- Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average+	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average+	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega RB100 £38	Average Average+	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal, MM	R	48
Shure M92E £15	Average- Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £26	Average- Average-	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £24	Average Average-	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £32	Average- Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £44	Average Average+	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £45	Average Average-	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average+ Average+	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average+ Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £195	Good Average+	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Supex SM100E £115	Average Average+	Delivers as much musical information as many moving coils - the bass in particular having an attractive bounce	6-15g Normal, MM		38
Supex SD900IV £350	Average+ Good+	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low, MC		48/Coil
Supex SD901IV £375	Average+ Good+	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price tag	8-18g Normal, MC	R	48
Supex SDX2000 £651 L £721 H	Good Good+	The high-o/p 2000 was preferred on listening tests to the low-o/p model, which even so has a unique place among the top designs	6-16g Either, MC		48
Van Den Hul MC10 £699	Good Good+	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
Van Den Hul MC One £799	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60

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AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) – but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of **features** provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research AR-04 £160	Very Good Good	A powerful, well equipped model precisely tailored to UK standards. Performance is close to the class winners	40W, MM/MC, 5 inputs, hdph, tone controls	BB	This
A&R Arcam Alpha £150	Average+ Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation	5 inputs hdph MM/MC tone controls 30W		50
A&R Arcam Delta 60 £250	Very Good Fair	Our first pre-production sample was not up to expectations but better ones are promised soon. It gave a solid technical performance	55W, MM/MC, 5 inputs, hdph		This
A&R Arcam Delta 90 £330	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey	70W MM/MC 5 inputs tone controls		50
Albarray M408 II £649 pr.	Good+ Good+	Unusually styled transistor monoblok power amplifiers reintroduced with improved performance and sound quality. Needs good warm-up for best sweetness and clarity	40W Power amp only	R	56
Albarray M1008 II £899	Very Good Good	A larger version of the similarly styled M408II, fairly good all round but only of average quality for the price	80W, monoblok		This
Audio Research SP9 £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound	5 inputs, MM/MC	R	60
Audio Research SP8 £1998	Very Good Good+	The sound from this valve preamp was good enough to do justice to the finest ancillaries	5 inputs MM		39
Audio Research M100 £2850 each	Good+ Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them	100W	R	60
Audio Research SP11 II £5350	Very Good Excellent	Current state of the valve preamp art. A reference point	Straight line MM/MC Disc + phase invert	R	60
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/MC, 5 inputs, hdph, tone controls	R	This
Audiolab 8000A £350	Very Good Good	A long running and high dependable classic, versatile and consistent via all inputs	50W, MM/MC, 5 inputs, hdph, tone controls	R	This
Audiolab 8000P £495	Excellent Very Good	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	This
Beard 506 £1195	Good+ Good+	A versatile valve preamp – the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/MC		50
Beard M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Burmester 838 £1490	Very Good Good	A disc-only minimalist preamp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing	MC only, MM option		Collection
Burmester 846 £1599	Very Good Good+	Usually coupled with the 838 this high-level preamp provides many and versatile input facilities	6 inputs		Collection
Burmester 850 £3995	Good+ Good	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range	100W		Collection
Cambridge Audio P40 £200	Good Good+	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability	5 inputs 40W MM/MC straight line	BB	50
Cambridge Audio C75 £279	Good+ Good+	Whilst not quite on par with its A75 companion this preamp provided excellent stereo imagery but was a touch "heavy" in character	MM/MC disc	R	50
Cambridge Audio P55 £290	Very Good Very Good	A grown up P40, the P55 suffers slight noise on the moving coil input but offers great sound for the money	55W, MM/MC, 5 inputs, hdph	BB	This
Cambridge Audio A75 £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies	100W	R	50
Cello Audio Suite £5280	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Conrad Johnson PV7 £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money	5 inputs, MM disc		57
Conrad Johnson MV50 £1795	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson PV5 £2010	Good+ Good+	The PV5 is a classy sounding valve preamp, and natural partner to the MV50	5 inputs MM		Collection
Conrad Johnson Motif MC-8 £2500	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
Conrad Johnson Premier Three £3775	Good+ Very Good	The Three is a musically accurate and graceful preamp which proved versatile on a wide range of inputs	5 inputs MM/MC	R	Coll
Conrad Johnson Premier Four £3900	Good+ Very Good	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations	100W		Coll
Copland Pre and power amps £649 each	Good+ Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear	3 inputs MM, 12W		50
Counterpoint SA7 £747	Average+ Good	Simple valve Californian preamp offering inspiring transparency for the price	4 inputs straight line MM/MC		Collection
Counterpoint SA12 £1250	Good+ Good+	A real power-house power amp, beefy and load-tolerant although like the SA7 a trifle untidy at frequency extremes	100W		Collection
Creek 4040 £145	Average+ Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance	4 inputs MM 12W	R	50
Creek CAS 4040 II £160	Good Good	The Mk II has no problems and is a fine all rounder	30W, MM, 4 inputs, tone controls	BB	This

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Greek CAS 4140 £219	Good+ Good	Redesigned for '88, this is a fine allrounder with good moving coil input, plain presentation	40W MM/MC 3 line inputs	BB	This
Croft Micro £150	Average+ Good	A real upsetter, this excellent valve preamp put the cat among the pigeons proving good sounds can be made at budget price levels	4 inputs MM straight line	R	Coil
Croft Super Micro A £500	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £730	Good Good	The original IV is still available now supplemented by the higher price and power (S), both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
DBX CX3/DX3 £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4-channel surround		56
Deftec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA 250 II £125	Good Fair	Despite a claimed increase in power this competent model now slips behind the competition on sound quality grounds	30W, MM, hdph, tone controls		This
Denon PDA-6600 £1,000/pair	Excellent Excellent	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3 £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
E.A.R. £3,000/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £360/£340	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		This
Goldmund Mimesis 6 £2,500	Very Good Very Good	Small and discrete for those who'd rather not flaunt it, this is no powerhouse but sounds subtle, delicate and refined	80W stereo power amp		60
Grant G60AMS £948 pr	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 41 8ohms	R	57
Hafner DH120 kit form £295	Fair	We didn't build one, see below	60W		44
Hafner DH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harman Kardon 640 Vxi £225	Good+ + Good	Moderately priced but built to HK's high standards; good value and good load tolerance	50W MM, 5 line inputs tone controls		56
Harman Kardon PM645VXi £300	Very Good Good	Fits in well with the Harman Kardon series, giving a competent all round performance at a fair price	75W, MM/MC, 5 inputs, hdph, tone controls		This
Harman Kardon 655 Vxi £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls		56
Harman Kardon PM665VXi £699	Good Good	A versatile and meaty amplifier with high current capability, but sound quality lags behind certain home grown alternatives	150W MM/MC tone controls (switchable)		60
Hitachi HA-006 £120	Very Good Fair	Despite reasonable lab test results this did not make the grade on sound quality	55W, MM, 4 inputs, hdph, tone controls		This
Hitachi HA007 £150	Good+ Fair	Decent but unexceptional performance and sound quality, plus good facilities; represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
Inca Tech Dirk £215	Good+ Good+	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
Inca Tech Claymore £345	Good+ Good+	Limited facilities but a strong, clear, well-focused sound results in auspicious <i>Choice</i> debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
ITL MA-80 £150	Good Good	A promising start for this young company, the MA-80 gave a fine sound with CD but was less wonderful on the moving coil input	30W, MM/MC, 5 inputs	R	This
Jadis JP30/JA30 £6,790	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre., monoblok power, MM-only, 4 line inputs	R	60
JVC AX-222 £110	Good Fair	Not very impressive, JVC need to pull their socks up if their budget amplifiers are to score	35W, MM, 4 inputs, hdph, tone controls		This
Kelvin Labs Junior/130 £295/£295	Good Good	Their heart is in the right place but the class A Junior combination is a bit expensive for what you get	20W, MM/MC, 5 inputs		This
Kenwood KA-550D £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	This
Krell PAM5 £1589	Very Good Good	Superbly built, the Pam 5 preamp gave good definition throughout the frequency range with a good measure of excitement	MM/MC		50
Krell KSA50 Mk2 £2540	Very Good Good+	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W		50
Le Tube £585	Good+ Good	If moving coil sensitivity is not required then this preamplifier will offer a clean view with very good stereo	3 inputs MM	R	44
LFD £2,995+	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components (cartridge, power amp)	MC (with care), passive line extra	R	60
Linn LK2 £440	Good+ Fair	This preamp was marginally less successful than the LK1 but the pair (of Linn's) worked well together and are well worth considering. Recent modifications as yet unchecked	5 inputs MM/MC		50
Linn LK1 £459	Good+ Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition	60W		50
Linx Stratos £999	Good+ Good	Facing strong competition in the UK this New Zealand pre/power combination gives good sound quality... but not exceptional at the price	120W MM/MC straight line		50
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Luxman LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 80W, MM/MC tone controls		57

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Magnum A100 £1995 pair	Good+ + Good+	Given their massive power rating a pair of A100's make a fine stereo power amp; ideal for high levels and with a wide dynamic range for digital programme	320W		50
Marantz PM25 £125	Good Fair	Soft and sweet like the rest of the range, the PM25 is inoffensive and undemanding	25W, MM, 5 inputs, hdph, tone controls		This
Marantz PM35 £170	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality, well equipped and versatile	45W MM/MC 3 line inputs tone controls		56
Marantz PM45 £200	Good+ Fair	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls		50
Marantz PM94 £1,000	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/MC tone controls (switchable)		60
Meridian 201/205 £550/£395 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/—	This
Mission Cyrus One £180	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built - however, the headphone socket will only take a 3.5mm jack	30W, MM/MC, 5 inputs, hdph, straight line	BB	This
Mission Cyrus PSX £200	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	This
Mission Cyrus Two £300	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Again, only 3.5mm headphone socket	50W, MM/MC, 5 inputs, hdph, straight line	R	This
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all rounder	50W, MM/MC, 6 inputs, hdph, tone controls	R	This
Musical Fidelity A1 £249	Good Good+	Fine ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	BB	56
Musical Fidelity B200 £299	Very Good Good+	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/MC 4 line inputs straight line	BB	This
Musical Fidelity Pre 3/P140 £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
Musical Fidelity A100 £439	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs straight line	R	This
Musical Fidelity P170 £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	This
Musical Fidelity MVT MK 3 £1199	Very Good Very Good	The MVT preamp was "strong in its class", providing competition for £1500-plus amplifier systems, now rivalled by the MF3B	MM/MC 5 inputs	R	50
Musical Fidelity P270 £1199	Very Good Excellent	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R	50
Musical Fidelity MVX £2,000	Very Good Excellent	Soundwise this preamp puts Musical Fidelity on terms with much more expensive exotics, with top class transparency, focus and dynamics	MM/MC, phase invert	R	60
Musical Fidelity A370 £2199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
NAD 3020e £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	R	50
NAD 3220PE £140	Good Fair	Like the 3020E but with more peak power and loudness thanks to the 'power envelope'	20W, MM, 5 inputs, hdph		This
NAD 2200 £339	Good+ + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
Naim NAIT 2 £322	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-c£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/MC etc	R	60
Nakamichi CA-5E £750	Very Good Good	A fine lab performance and high build quality but rather disappointing sound quality for a preamp of this price	MM/MC, 6 inputs, hdph, tone controls		This
Nakamichi PA-5E £1150	Very Good Good	A strong sound in several respects but one which ultimately failed to satisfy	100W		This
Nakamichi CA7E/PA7E £2500/£1700	Very good Good/Good+	Exceptional build and finish, plus good general performance, remote control and versatility, but expensive	200W MM/MC 6 line inputs, remote, tone controls		56
Nikko NA700 £189	Good+ + Poor	Disappointing sound quality at an above budget price. Inescapably old fashioned	60W MM/MC 4 line inputs tone filters		56
Nuance £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer	4 inputs MC		50
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Perreux SA3 £690	Very Good Fair	This exotic New Zealand-built preamp did not really offer the sort of sound quality expected at the price	4 inputs MM/MC		44
Perreux 1850 £990	Very Good Fair	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/MC, 4 inputs, battery supply	R	This
Pioneer A333 £149	Very Good Fair	A rather average but nonetheless competent performer that is pleasant enough	55W, MM, 5 inputs, hdph, tone controls		This
Philips FA860 £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
Philips FA960 £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
QED A240 CD II £169	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	This
QED A240 SA II £219	Good+ + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	This

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Quad 34 £269	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz. detail/dynamics)	4 inputs MM/MC tone controls		44
Quad 405 £329	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Quicksilver Mono £1495	Good Good+	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblok 4/8ohms		57
Radford SC25 £598	Very Good Very Good	A very fair price for a solid, well built valve preamp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
Radford MA75 £776	Good Very Good	A fine quality valve monoblok with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monobloks	R	57
Radford STA25 Renaissance £897	Good Good+	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
Revox B250 £1128	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Robertson Forty Ten £987	Very Good Good	Here is a neat little power amp (60W) you can fit and forget; it proved most satisfying over long listening sessions	60W		Collection
Rotel RA810A £100	Very Good Fair	As a cut price RA820A this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	This
Rotel RA820A £130	Good++ Good	This A version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
Rotel RB/RC850 £140/£119	Good++ Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/MC 4 line inputs tone controls	BB	This
Rotel RA820BX3 £160	Very Good Good	The latest upgrade is not that impressive, but the BX remains a fine amplifier and now has a moving coil disc input	30W, MM/MC, 5 inputs, hdph, straight line	BB	This
Rotel RA870BX £325	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/MC 7 line inputs tone controls	R	56
Sansui AU-G11X £139	Good+ Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls		50
Sansui AU-G30X £199	Good++ Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls hdph		50
Sansui B2301 £1880	Very Good Good+	Rating better than the preamp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Collection
Sansui C2301 £2306	Excellent Good	Sansui's flagship preamp did not really rate well given its price, but is not short on features	All facilities		Collection
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
Sony TAF 700ES £500	Good+ Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
Sumo Nine+ £1200	Very Good Excellent	Macho styling of this class A stereo power amp conceals a sonic subtlety that is exceptional for the price, limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Tannoy SR-840 £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)		50
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var. loudness		56
YBA 2 pre & pwr £1395/£1695	Good++ V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	This
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	This

LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

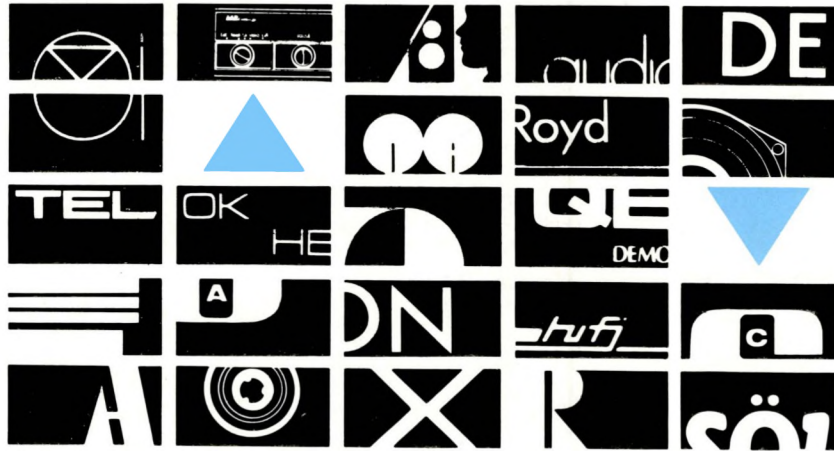
The average loudspeaker consists of a smallish enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and

dispersion come into the equation.

Careful placement of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £700	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/W 60Hz	R	59
Acoustic Research 88X £100	Average Average-	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £170	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	59
Acoustic Research 35BX £200	Average Average-	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
Apogee Caliper £2550	n/a Very Good	Near state of the art performance, not materially worse than bigger Apogeos, just less bass. Rich, subtle and slightly dull, with a clear, articulate midband, but uncommonly system fussy	122.5 x 71 x 10cm ex. rear foot, free standing, away from walls	n/a n/a	R	60
Apogee Scintilla £4990	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/Colt



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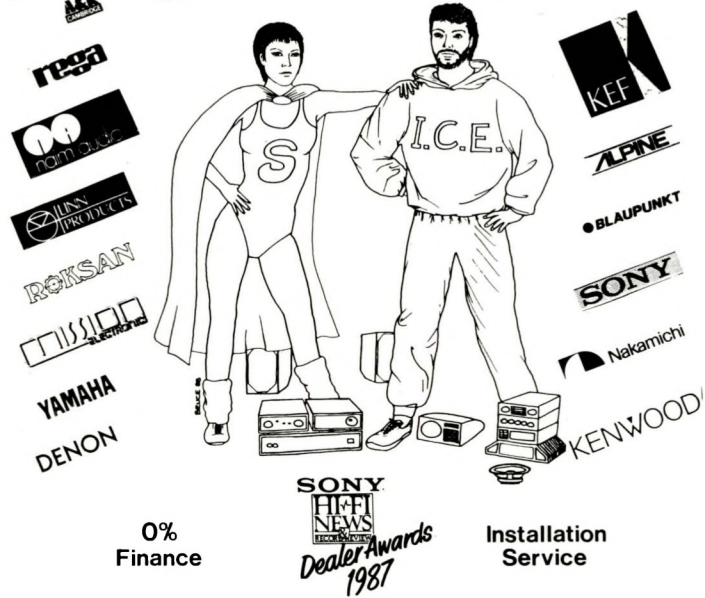
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THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Three £150	Average + Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/W 95Hz		53
A&R Arcam Two £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "bally" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		59
A&R Arcam One Plus £359	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/W 60Hz		59
Ariston QLN1 £350	Very Good Good+	This very sophisticated loudspeaker has much of the euphony of a LS3/5A but with rather more 'oomph'. A little 'romantic' for some tastes - Schubert and Sting rather than Stockhausen or the Stones perhaps?	35 x 25 x 26.5cm free space, 24 inch stands	84.5dB/W 65Hz	R	59
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average + Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average + Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
Avance Concrete 2000 £970	Below Average Below Average	Very low cabinet talk, but the system sounds terminally uneven - lumpy bass and over-forward midband dominate	86.5 x 29.2 x 43cm clear of walls	94dB/W 40Hz		60
B&W DM100i £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband.	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 90Hz	R	59
B&W DM110i £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive.	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		59
B&W LM1 Mk II £249	Average + Average	Probably one of the best 'micros' ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz	*	31
B&W DM1600 £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	59
B&W Matrix 1E £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
BBC LS3/5A £265	Good + Average +	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not yet checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coll
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/W 70Hz		59
Bose 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		59
Boston A4011 £110	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Castle Clyde £139	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
Castle Durham £189	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/W 67Hz	R	46
Castle Pembroke £289	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31
Celestion DL6 Series Two £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		59
Celestion DL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/W 60Hz	R	59
Celestion SL6S £350	Good Good +	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
Celestion SL600 £700	Good Good + +	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
Celestion SL700 £1220 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/W 45Hz		60
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/W	R	60
Chameleon 500 £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		59
dbx 1000 £450	Average— Average—	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
Gale 301 £279	Average Average +	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £699	Average + Average +	Clean but rich and powerful bass; stereo focus was not a strong point, but it is worth considering (Recent revisions not yet checked)	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz	*	46
Goodmans Maxim Two £80	Average + Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/W 85Hz	BB	59
Goodmans Point 3 £90	Average + Average—	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/high stand near wall	90dB/W 80Hz	R	53
Goodmans Point 7 £170	Average + Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	89dB/W 47Hz		53
Harbeth HL Compact From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/W 65Hz		59
Harbeth HL Mk 4 £525	Good + Good +	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
Heybrook Point Five £139	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		59
Heybrook HB1 £189	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
Infinity RS2000 £130	Good Good +	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	59
JBL TLX-3 GI £130	Average Average—	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
JBL L 60T £399	Good+ Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL L80T £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
JBL 18Ti £599	Good+ Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. Try the cheaper L201	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
JBL 250Ti £3599	Good+ Good+	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
JPW P1 £125	Good Average+	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/W 60Hz	R	59
JPW AP2 £145	Good Average+	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	R	53
JPW AP3 £210	Good Average+	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
KEF C10 £94	Good Average-	Listening panelists gave this a poor reception	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
KEF C40 £209	Average+ Average-	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
KEF R102 £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect, what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
KEF 103/3 £630	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £806 (£905)	Very Good Good+ +	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/W 50Hz	R	60
KEF 107 £1890	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	60
Linn Nexus £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		59
Linn Sara £729	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before	43 x 34.4 x 26.5cm stand mounting, near wall before	88dB/W 50Hz	R	60
Linn Isobarik £1695	Good Good+ +	Exceptional capabilities in the dynamic range and bass performance, demands serious consideration as a state of the art contender, but odd stereo	76 x 33 x 41.5cm low stands against rear wall		R*	Coll II
Magneplanar SMGa £697	Average- Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MG2.5R £1897		Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/W 35Hz		60
Magneplanar MG11a £2650	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz		46
Marantz LD20 DMS £150	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/W 55Hz		53
MB Quart 390 £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/W 60Hz		59
Meridian M30 £725	Average+ Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70 II £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cms on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 700LE £140	Good Average	Mission re-submitted this popular model and again got a positive review - which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	59
Mission R737 Renaissance £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition - wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		59
Mission Argonaut £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cm floor-standing near wall	91dB/W 40Hz	R	60
Monitor Audio R100 £139	Average+ Average-	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46
Monitor Audio R252 £159	Average+ Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
Monitor Audio R352 £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
Monitor Audio R700 MD £269	Average+ Average+	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R	46
Monitor Audio R352 MD £299	Good Average+	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB	53
Monitor Audio R452/MD £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a punchy, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz		59
Monitor Audio R652 MD £369	Average Average+	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz		53
Monitor Audio R852/MD £380	Good+ Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good - an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	59
Mordaunt Short MS10 II £90	Average Average-	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
Mordaunt Short MS100 £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
Mordaunt Short 45Ti £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unobtrusive	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
Mordaunt Short MS300 £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Mordaunt Short 442 £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/W 40Hz	R	60
Musical Fidelity MC-2 £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear; the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	59
Musical Fidelity MC-4 £499	Very Good+ Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and a large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	59
Quad ESL-63 £1459	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/W 34Hz	R	60
Rogers LS2 £170	Good Average+	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R	46
Rogers LS6 £240	Good+ Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition – well balanced with an open and informative nature	51 x 27 x 28cm open stands, free space	87.5dB/W 50Hz	BB	46
Rogers LS7t £360	Good+ Good+	A fine combination of classic qualities at reasonable price produces the “R” tag, but try to get a pair home on approval to check for bass ‘heaviness’	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	59
Roksan Darius £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
Rotel RL850 II £120	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to ‘heaviness’ needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	59
Royd A7 Series 11 £99	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble “ramp” made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/W 75Hz	R	53
Royd A25 £100	Average+ Average—	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
SO Acoustics S01 £1050	Average Good	A large scale, airy and unusually detailed system with excellent dynamics. Balance is light and bright, and can upset some systems/listeners	123.5 x 38.2 x 31.9cm free standing, away from walls	90dB/W 50Hz	R	60
Sony APM 10ES £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	59
Sony APM 22ES £249	Good+ Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
Sony APM 66ES £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the bronny side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		59
Spendor Prelude II £350	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
Spendor SP2 £450	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	59
Spendor SP1 £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	60
Spendor SA3 Passive £1400	— Good+	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
Spendor SA3 Active £2708	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
Spica TC-50 £595	Average+ Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R	59
Spica Angelus £1195	Good Average	A little bass shy and soft in the bass and lower mid, the Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm free standing away from walls	86.5dB/W 50Hz		60
Tannoy Eclipse £120	Average+ Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	59
Tannoy Mercury II £160	Good Average+	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as yet unchecked	50 x 25 x 23.5cm open space 45cm stands	88dB/W 55Hz	BB*	53
Tannoy Westminster £3500	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
Technics SBC 250 £130	Average+ Average—	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average+	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB	59
Wharfedale Delta 50 £99	Average+ Average—	“There’s nothing obviously wrong, but it seems a bit mundane,” is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
Wharfedale Diamond 111 £100	Below Average Average—	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz		59
Wharfedale 504 £139	Average+ Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R	46
Wharfedale Super Diamond £140	Average Average—	Although there are improvements on the basic “legendary” model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/W 57Hz		53
Wharfedale 510.2 £299	Average Average—	Even in it’s latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz		59
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R	46

* rating refers to original, tested model.

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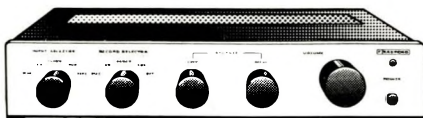
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Stereophile, U.S.A. September 87.



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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.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-WX707 £180	Poor Average	Not bad value for a twin deck, but marginal from the high fidelity viewpoint. The review sample was poorly set up.	Dual deck, auto-reverse, Dolby B & C, bias adjust		57
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	BB	99
Akai GX-52 £249	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track local features	BB	57
Akai GX-6 £350	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Denon DR-M07 £140	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	R	52
Denon DR-M12HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good+	This deck will slot into many high grade systems without disgracing itself – or the cassette medium. Very presentable high resolution sound with good stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	BB	60
Denon DR-M44HX £400	Excellent Excellent	A well designed deck that also performed fine sonically, working very well with ferric and metal tapes	Real-time counter, Dolby B, C, HX Pro, tape alignment adjust, remote control, 3 Head	R	60
Harman Kardon TD202BL £249	Average Average	A competent middle-ranking performer but lacks sonic incisiveness and is a bit expensive	Dolby B, C, bias adjust		52
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Hitachi D-003 £130	Average— Average—	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £180	Average— Poor	This double 'dubbing' deck proved a mixed bag – good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
Kenwood KX550HX £150	Average Average+	This well-laid-out and attractive deck ultimately lacks the edge to stand out in a competitive field	Track search, Dolby B, C, HX Pro		52
Luxman K-100 £199	Average+ Average+	Poorly laid out but it fared quite well on metal tapes. Commercially recorded tapes sounded bright and cramped, however	Dolby B & C, remote control		52
Luxman K-105 £349	Average Average	Rating quite well for an auto reverse deck, and featuring complex track search facilities, it was not sonically competitive on price	Auto reverse, track search, Dolby B & C, remote control		52
Luxman K-112 £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lossy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
Marantz SD-35 £160	Good Good+	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	BB	52
Marantz SD-4511 £200	Good+ Good+	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Nikko D-80II £309	Average Average	Easy and rewarding to use (apart from the mannered aesthetics), but sound quality is below par for the price, especially with dbx	Real-time counter, auto reverse, track search, Dolby B, C and dbx, bias adjust		57
Onkyo TA 2130 £140	Average+ Average+	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust	R	52
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Proton AD-200 £140	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unremitting harshness and an almost total lack of detail	Dolby B & C		57
Proton AD-300 £200	Average— Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
Revox B215 £1461	Good Average+	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52

THE DIRECTORY

CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Rotel RD-830 £110	Average— Poor	A pretty fundamental if slightly dated design with little sonic merit but an attractive enough price	Dolby B		52
SAE CT02 £549	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sony TC-FX 150 £90	Average+ Average+	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C	R	52
Sony TC-W250 £149	Average— Average—	Rather rough and ready but a nonetheless honest and tolerably transparent sounding deck. Acceptable sound at the price	Dual deck, Dolby B & C		57
Sony TC-R303 £179	Good Good	Bright, detailed but not especially refined sound quality, makes excellent Dolby recordings, but has slightly suspect pitch stability	Auto reverse, Dolby B & C, remote control		57
Sony (WMD6C) ProWalkman £249	Good+ Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	60
Tandberg 3014A £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
Teac R-515 £299	Average+ Average+	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
Teac V-970X £499	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
Technics RS-B505 £160	Average+ Average+	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57
Technics RS-B605 £180	Good Average+	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx	R	57
Technics RS-B705 £250	Average Average—	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Technics RS-T80R £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52
Yamaha KX-200 £140	Good— Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	BB	52
Yamaha KX-300 £150	Average+ Average—	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-400 £200	Good Good+	A highly commercial package with every widget under the sun. Happily it sounds good too.	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-1200 £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving

than top quality vinyl replay.

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. Sound quality variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good+ Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephen Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming		58
Arcam Delta Black Box £249	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straightforward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphone socket etc.	R	58
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning.	Track entry keypad remote, menu display (switchable)		This
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
Cambridge Audio CD2 £600	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 114

THE DIRECTORY

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Cambridge Audio CDI £1500	Good+ Excellent	Advanced design and circuitry give this top class two-box machine exceptional performance, so the intrinsic qualities of CD, (eg. silent surfaces), make themselves felt	No headphone socket, seven audio filters, skip and scan	R	Coll II
dx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD-600 £250	Below Average Average	Slightly raw sound which lacks resolution. Bass and dynamics are good however and the player sounds pleasant on audition, even if it isn't quite the obvious first choice at the price	Remote track entry, calendar display, headphone output (fixed)		61
Denon DCD-800 £300	Good Good	A generally good subjective and objective performance, a comprehensive range of remote controllable facilities, plus Denon's good reputation for build quality and field reliability.	Track entry remote, menu display etc.	R	58
Denon DCD-1500H £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented.	Track entry/volume remote, menu display etc.	R	60
Denon DCD 1700 £650	Good+ Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphone socket, programmable	R	58
Denon DCD-3300 £1200	Good+ + Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphone		51
Goodmans GCD-500S £150	Average— Poor	User-friendly but flimsy build quality and second class sonics make this poor value even at the price	Audible scan and track skip, programming		51/45
Hitachi DA-7000 £180	Good Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities – a good budget starter	Memory and repeat, plus the basics	R	58
Hitachi DA7200 £200	Good Fair	Distinctly more competitive than the '009, the '7200 remains undistinguished in the current state of compact disc technology and sound quality	Simple remote etc.		58
Hitachi DA007 £230	Average Fair	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming		51
Hitachi 009 £300	Good Fair	Despite a pretty clean bill of technical health and an extensive range of facilities, the 009 failed to inspire the subjective enthusiasm needed for recommendation at its £300 price level.	Random, 'roulette' play, menu display, complex remote		58
Kenwood DP-660SG £180	Below Average Below Average	Build quality and ergonomics are good, and the range of features far exceeds the price norm. However, sound quality is messy with a soft bass, recessed mid and sometimes spiky top	Remote control, calendar/menu display, keypad, 20 track memory		This
Kenwood DP-990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58
Kinergetics KCD-30 £1700	Very Good Very Good	Definitely a technical oddball with its distortion-cancelling circuits, the pricey KCD-30 nevertheless does sound very good, and also noticeably 'different' – not necessarily to our collective tastes, but possibly to your's	Favourite track selection, remote, high output (vol, bal)		60
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation	Track entry remote, programming etc.	R	58
Luxman D-100 £399	Average Poor	Sparsely equipped with a slightly old fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphone socket (variable)		51
Marantz CD273 £170	Good Good	An ambitious machine at the price, offering pretty good sound quality but a slightly below average build standard	Skip, scan, programmable	BB	51
Marantz CD873 £200	Good Very Good	Putting many 'audiophile CD's' to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
Marantz CD-273SE £200	Good+ Very Good	The Euro-tweaked version of the standard 273, this model fulfils pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
Marantz CD873LE £250	Good Excellent	This was the outstanding sound quality bargain in its review group, with discreet if plasticky presentation and rather lightweight build.	Manual repeat, skip, scan, programming	BB	58
Marantz CD-75DX £300	Good Very Good	Attractively sharp, clear and articulate sounding player with tidy treble and powerful bass. Good tracking ability, ordinary build quality but pleasant to use.	Remote volume, comprehensive display, headphone socket, FTS, optical output	R	This
Marantz CD94 £800	Good+ + Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphone socket, favourite track selection, remote	R	58
Marantz CD94/CD94 £1600	Very Good Excellent	Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price which seems a little steep. Very refined	Favourite track selection, remote, balanced output etc	R	60
Meridian 207 £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile – on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	On-board preamp, remote (inc volume)	R	60
Mission PCM7000 £400	Good Very Good	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
NAD 5220 £230	Average— Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		This
Nakamichi DMS-1E £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi DMS-3E £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphone socket		51
Nakamichi DMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
Nakamichi DMS-5EII £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi DMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
NEC CD610 £250	Good Very Good	Although NEC's CD players may take a bit of hunting down, the sound/price/build equation comes down firmly in favour of the '610 despite unspectacular lab performance	Track entry remote, menu display etc.	BB	58
NEC CD810 £400	Very Good Very Good	While the lab performance might have been better still, sound quality, ergonomics and build quality all point towards Recommendation for this rare but attractive example of the CD player maker's art.	Track entry remote, menu display etc.	R	58
Nikko CD200R £250	Fair Fair	This player delivers fair overall performance at what is presumably a fair price, but is insufficiently distinguished to warrant Recommendation.	Simple remote, skip, scan, programming etc.		58
Onkyo DX-2500 £200	Average— Above Average	Attractive, easy on the ear sound quality at the cost of some loss of low level clarity and dynamics. Good tracking	Keypad remote, memory, headphone socket (variable)	R	61
Philips CD371 £150	Fair Good	Though the build and presentation may not be to every taste, this is a fundamentally honest basic player that delivers more than enough of the sonic goods to merit a Best Buy rating.	Skip, scan, programming	BB	58

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Philips CD472 £200	Fair Good	Once again one cannot argue with the fine sound quality Philips make available at a modest price – with remote control and extensive facilities besides.	Simple remote, programming etc.	BB	58
Philips CD373 £250	Average Good	Good, but slightly less so than CD371, which is better value for money. Musical architecture and dynamics are excellent, but some coarseness and 'smear' remain.	Track entry/volume remote, headphone output, FTS	R	This
Philips CD473 £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet; we were unable to catch it out on classical through Jazz program.	Favourite track selection, remote control with volume, headphones etc.	BB	58
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc.	R	60
Pioneer PD-91 £800	Excellent Excellent	Close to state of the art in nearly all areas – soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player.	Track entry remote, calendar display, index search, etc.	R	61
Revox B226 £756	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price.	Infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD820BX2 £300	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and convincingly deserves Recommendation.	Direct track entry remote etc.	R	58
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
Sanyo CP17 £200	Average— Poor	A no-frills midi-sized package, this was not up to the usual Sanyo sonic or technical standards but it was well built.	Skip, search, repeat, 16-track memory programmable		53
Sanyo CP27 £220	Fair Fair	System remote apart, the CP27 offers no improvement over the cheaper CP17, and neither of these systems-oriented players really are the subjective musical.	LCD display, skip, scan, programming		58
Sharp DX-R700H £225	Average— Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use.	Remote control, track selection keypad, skip, scan repeat programming		53
Shure Ultra D6000 £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price.	Remote control (full function inc volume)		51
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player.	Full search programme and timing	R	51/Coll
Sony CDP-M35 £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony CDP-M75 £230	Good Good	This midi version of the '750 saves £20 on the price (see CDP-750 review).	Track entry remote, menu display ect.	BB	58
Sony CDP-310 £250	Average+ + Fair	Fine build, facilities and healthy enough sound quality – recommended, but look around the range.	Remote control (+ usual)		51
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.		58
Sony CDP-222ES £449	Good Fair	Exceptional build quality and presentation plus respectably good sound quality but some of its kin were preferred.	Remote control, 20 digit keypad, track access, programming		51
Sony CDP-337ESD £550	Good Very Good+	Well built, high grade player with excellent if un-demonstrative sound. Excellent resolution, dynamics and bass weight, though arguably not control.	Random access remote, calendar display, FTS, memory	R	61
Sony CDP-333ESD £600	Excellent Excellent	Sony's new '333 represents a triumph for their development department, effectively bringing down the entry level price to 'high end' compact disc replay.	Track entry remote, menu display etc.	R	58
Sony CDP 555es £1000	Very Good Very Good	Extravagant build quality, sophisticated features and near state-of-the-art performance, it competes effectively with more expensive models.	Remote control, 20 digit keypad, track access, programming	R	51
Tandberg 3015A £1250	Good Fair	Very classy presentation is not enough to compensate for subjectively and objectively faring no better than standard and modified Philips packages that cost a fraction of its price.	Simple remote, skip, scan, programming etc.		58
Teac PD135 £180	Fair Fair	Particularly easy to use, this lags a little behind the pack when it comes to sound quality, but it still represents a valid alternative for those who find the presentation attractive.	Skip, scan, programming, repeat.		58
Technics SL-XP5 £250	Average— Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality.	Headphones, "high cut" filter, skip, search		51
Technics SL-P770 £350	Excellent Good	Sophisticated, high resolution player, but inconsistent with level with some coarseness and compression during loud passages.	Remote, 18 bit, rotary cue wheel, comprehensive display	R	61
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good+ + Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good.	Headphones, remote control, search dial cueing, etc.		51

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are

often selected merely to match a chosen amplifier cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is usually well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most.	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder.	6AM, 6FM presets. FM/MW. LW display manual tune.	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only.	FM only	BB	50
Denon TU 450L £130	Average+ Average+	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation.	FM/AM Digital	R	50

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TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/FM, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/AM seek/manual adjustment tuning, 16 presets remote control	R	60
Hitachi FT-MD 5500 £200	Excellent Good + +	A powerful, good sounding tuner with versatile facilities	16 presets, FM, AM, MW auto scan digital, signal meter	BB	55
Hitachi FT5500 II £200	Very Good Good +	Soundwise highly rated on FM, and on AM basically satisfactory - a versatile all-rounder	Auto and manual tuning, 16 presets	R	44
Marantz ST35L £125	Good + Average -	It works well enough but the sound could be better for the money	16 presets, AM/FM, digital auto scan, active tracking		55
Meridian 204 £495	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity TI £300	Good + Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CBI	FM only, analogue box dial, manual tune, signal meter	R	55
NAD 4020B £139	Good Average +	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient"	Analogue FM/AM	BB	50
Naim NAT 01 £1098	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only, Analogue	R	50
Nakamichi ST-7E £750	Good + + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schott enhanced sensitivity, auto time digital		55
Nikko NT-540 £154	Good Average	Lab report was promising but the sound was rather dated	8 presets, AM/FM, digital auto scan		55
Onix B.W.D.1 £520	Good + + Good	Unexceptional sound despite the costly power supply option	FM only, manual digital, variable bandwidth		55
Pioneer F551L £100	Good + Good +	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	55
Pioneer F91 £350	Excellent Good + +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Quad FM4 £289	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £918	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £110	Good + Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good + Good +	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
Sansui TU-D99XL £249	Very Good Good +	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST 500ES £200	Good + + Average -	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 presets, digital scan	BB	60
Tandberg 3001 £1295	Excellent - Good	An enthusiast dx model, versatile performance and generally good sound; excellent build	8 presets, FM only, analogue, manual dial, var. bandwidth, signal meter		55
Yamaha TX-L400 £130	Good + + Good +	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average + Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on sound quality, but there's no denying the attractiveness or popularity of this approach - the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa V1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54
Binatone Laser CD System 2000 £270	Bad Bad	A bit of a disaster even at the price. Built to extremely low standard with an appalling turntable. CD and loudspeakers OK, but let down by amp	Twin cassette		Systems
Ferguson HF03 £400	Average + Good	An all round success with British built speakers and all sources achieving a reasonable standard. Compact disc was weak compared to other units	Twin cassette	BB	Systems
Fidelity MS202 £340	Bad Bad -	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
Fisher Midi System M46CD £500	Average Average	Somewhat overpriced, the M46 is let down by a poor amplifier and worse speakers. Other elements perform reasonably, CD being its strongest point	Twin transport		Systems
Fisher Midi System M56CD £580	Average Average	Fitted with a pretty good amp, but dire loudspeakers; otherwise a competent combination including a pretty fair cassette deck	Twin cassette, 5-band graphic equaliser		Systems
Fisher 2400 £600	Average Average	An ambitious and competent package with a strong amplifier and CD player. Given its new lower price it would have merited recommendation if the loudspeakers hadn't let it down	Twin deck, Graphic eq, 5-band		Systems
Goodmans 5100 £350	Poor - Bad	A combined electronics package, with performance standards only too typical of the time. Speakers good for type but don't compensate	Twin cassette, one-piece system		54
Goodmans 5200 £459	Average + Average +	Offering possibly the best speakers around in this midi system market, the Goodmans wins on a fair standard for the price, though the turntable was not too hot	12 Band Graphic Eq, Twin deck	BB	Systems
Goodmans Maxim-Midi System £520	Average Average +	De-luxe version of 5200 system - very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54

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CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Marantz MX673CD System £900	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional	R	54
Mitsubishi CD51 £429	Average Average-	In some ways a well balanced system in that the amp and speakers smooth the rougher edges of some sources, but not very satisfactory on the whole	Remote, twin deck		Systems
Mitsubishi E602CD £500	Poor- Poor-	Totem-pole aesthetics match the mixed constructional quality. Sound quality is already poor, but featured synthesised bass can make matters worse still	Spare in/output set, twin cassette		54
Mitsubishi 100R £650	Average Average+	A pretty good package, flawed by 'tinny' loudspeakers, but having a fair turntable - a rarity in this category of equipment	Remote, Multidisc CD, Twin	R	Systems
Sanyo W40CD £380	Average Average	Low cost no options package with attractive displays. cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sharp SA-CD800H £700	Average Average-	A superficially high grade, high spec system. The SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 510 £599	Average+ Average+	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system	Remote, twin cassette	R	54
Sony Compact 610 £700	Average Average-	Inconsistent. Same turntable used in much cheaper Sonys gave 'lifty' record reproduction. Cassette likewise	Remote, 'shuffle' play CD, twin cassette		54
Sony FH1215CD £800	Average Average+	Probably the ultimate miniature system. The CD player is particularly good. Best to chuck the speakers away though	Miniature, transportable (AC only) Single auto-reverse cassette	R	54
Sony Compact 710 £999	Good Good	Typically well built and presented but complicated to use except via remote. Record deck poor but remainder good, including speakers	Full remote, auto T/T, twin auto reverse cassette	R	54
Sony Compact Series 90 £1500	Good Good+	The best of a not too wonderful bunch: the excellent compact disc player and pretty good speakers make for reasonable sound quality, though the tuner wasn't of quite the same standard	Twin deck, auto reverse, timer, extra tape socket	BB	Systems
Toshiba V17CD £399	Average Average+	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Audio Technica ATH 909 £54.95	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £64.95	Good Average	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Beyer DT330 Mk II £45	Poor Good	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT990 £130	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones: they have a smooth and yet revealing, neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Jecklin Float Model One £79	Very Good Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Electrostatic £399	Excellent Good	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet timely balance	Circumaural, open-back, dynamic	BB	55
Quart PMB 65 £69.90	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Sennheiser HD30 £13.50	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones	Supra-aural, semi-open back, dynamic		55
Sennheiser HD410SL £26	Good Good	The 410s have a tight clear presentation underlined by a slightly forward top end, and can be a bit raw with less than adequate sources	Supra-aural, open-back, dynamic	BB	55
Sennheiser HD420SL £47	Good Good	The 420s gave a full and tangible quality to instruments and voices; whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £160	Very Good Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony MDR-E272EX £30	Average Poor	These in-ear 'fontopid' type phones are intended for uo-market personal stereos, and sound reasonably good for their size, but are plagued by hiss	Intra-aural, 'open-air', dynamic		55
Sony MDR-A60 £40	Poor Poor	Unusual light weight intra-aural types, the A60s are pretty stylish but failed to deliver the goods sonically	Intra-aural, 'open-air', dynamic		55
Sony MDR V4 £50	Fair Good	These folding closed-back phones are nicely made but didn't sound too great, the tonal balance being on the 'cold' side	Supra-aural, closed-back, dynamic		55
Sony MDR V6 £70	Good Very Good	A lot more civilised and dynamic than the V4s, these were pretty good for their type and fold up to boot	Circumaural, closed-back, dynamic	R	55
Stax SR34 £140	Very Good Fair	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR Gamma £199 (SRD-6 Adaptor £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £360 (SRD-7SB Mk 2 Adaptor £185)	Excellent Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55

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PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony Walkman in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals; some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape compatibility on many machines and

some even record, but usually only from a microphone or built-in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub-£50) players.

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £30	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/FM		56
Saisha 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
Sony MGR-77 £35	Very Poor Very Poor	Rather a basic machine with a raw edgy sound, not helped by poor speed stability	Graphic EQ, AM/FM		56
Sony MGR-87 £50	Very Poor Fair	The 87 came up with a slightly fast but rhythmic sound. Although lacking in finesse, it worked OK with pop material	Autoreverse, graphic EQ, AM/FM		56
Sony MCP 600D £50	Average+ Average—	With styling aimed at the fairer sex the 600D sounded a little better than the similarly priced MGR-87. Lacking in clarity, it was still quite enjoyable	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sony JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating	Dolby, types I, II & IV	BB	56
Sony WM-F63 £100	Average— Average—	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good+ Excellent	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, variable speed	BB	52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most unsubtle music	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful	Dolby, autoreverse, graphic EQ, types I, II, AM/FM	R	56

CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/FM radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some. In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson RCD02 £300	Poor	A large, slightly tinny midi system-esque unit with removable speakers and a slightly brash sounding CD player	Twin cassette, graphic equaliser, spare input (DIN)		53
Fisher PH-D473F £300	Average	The Fisher is quite a neat and compact player which is nice to use but doesn't offer particularly great sound quality	Autoreverse, AFC		53
Hitachi CX-W800 £300	Average+	This meaty Hitachi lives up to Blaster expectations, its super woofer bass speaker giving maximum street credibility	Twin cassette, graphic equaliser, phono input	R	53
Memorex CD-3300 £280	Average	A little bit tacky, the Memorex put in a plausible if unenthralling performance, and will work with external speakers	Spare input		53
Panasonic RX-FD80L £300	Average—	Shiny in a glitzy way, this Panasonic features a reasonable cassette deck but a below par CD player with tiny transport controls	Autoreverse, spare input		53
Sharp WQ-CD15 £250	Good	A reasonably compact machine with a quite impressive CD player and a novel twin cassette mechanism	Twin cassette, graphic equaliser, spare input	R	53
Sony CFD-66L £350	Good	A very attractive player in the true yuppie mould of white plastic with silver details, it even sounds OK	Spare input, shuffle play, AMS (tape search system)	R	53
Toshiba RT-7096 £250	Poor	Quite a large box for the money, the Toshiba isn't too special when it comes to sound quality but does have partly wooden detachable speakers	Twin cassette, graphic equaliser, spare input		53

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THE DIRECTORY

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Apollo AB20 £40	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Apollo A10 £47.25	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Foundation Fred £65	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £250	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Heybrook Point 5 £50	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent – a good value stand.	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £75	4 leg Very Good	With its new aluminum base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £74	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £80	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Mordaunt-Short IS1 II £45	3 leg Good	Suited to low mass speakers, preferably using spikes to effect coupling, they sounded slightly 'jazzed up' but the overall sound was quite unaddled.	18 x 15cm 56cm	R	58
Origin Live £117	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
Partington PP4 £50	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
Partington Dreadnought II £120 (filled)	1 leg Very Good	Ideal for systems on the light/bright side of neutral, the Dreadnought IIs nevertheless still need some careful re-examination by Partington.	17.5 x 16.5cm 63cm		58
QED TS22 Tristand £50	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
RATA Torlyte £190	2 panel Excellent	Suited to low mass speakers, these unusual stands are hardly discreet but offer transparent and clean sound – much like the Torlyte table!	25 x 21cm 48cm	R	58
Target HS20 £53	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £83	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Apollo CT2 £38	Shelf Fair	A sturdy 18 x 37mm rectangular section frame with four adjustable spikes supports a dual coloured board.	20 x 45.5 x 38cm		57
Apollo AT1 £50	Table Fair	This two-layer table didn't quite make the grade on sonic grounds and build quality could be improved.	46.3 x 45.5 x 38cm		57
Audioquest Sorbothane Feet £10 each	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS5 £50	Table Very Good	A little too close to the ground for comfort, perhaps, but this novel and stylish little table is certainly worth seeking out.	29 x 43 x 33cm	R	57
Cornflake TCS6 £50	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Deltac Isolation Base £135	Platform Good	Designed for all CD players, amplifiers and separates, but not suspended sub-chassis turntables, the isolation is second to none.	50.5 x 40cm	R	57
RATA Model A £125	Table Very Good	A three-legged Torlyte turntable support that has become something of an industry reference.	46 x 46.5 x 38.5cm	R	57
RATA Amplat £40.25	Platform Very Good	A lightweight and rigid Torlyte slat with spikes for floor or shelf mounting, it works well in conjunction with the Target T12.	4 x 44.5 x 35cm		57
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Target TT1 £46.50	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money.	26 x 46.5 x 35.5cm	BB	57

THE DIRECTORY

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Target TT2 £47.50	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57
Townshend Suspension Base £145	Platform Fair	Designed to complement the Rock turntable, this platform will bring subjective improvement to a wide range of electronics.	43 x 36cm	R	57

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence the quality of that

signal.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, Rf characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The

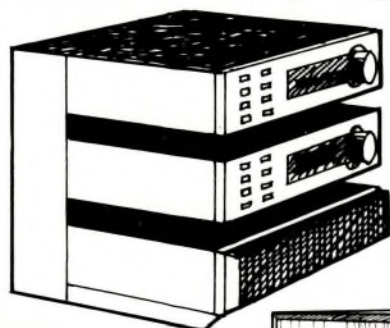
interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate to that length – some cables may well perform differently when used in longer lengths.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Apature LSD N/A in UK	Poor Fair	Faint resonant boom was audible at very low frequencies, but otherwise this cable sounded remarkably neutral.	Silver plated copper, PTFE dielectric		59
Audioquest Reference 2 £29	Good Fair	Ultimately Reference 2 simply damped much of the atmosphere and emotional charge of a musical performance.	OF copper		59
Audioquest Livewire Topaz £29	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £45	Fair Good	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 Quartz £65	Good Good	Quartz has an ideal, neutral balance that embodies sparkling clarity without the drawbacks of harshness or compression.	3 piece plugs, PTFE dielectric	R	59
Audio Technica AT6115 £50	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59
Audionote Copper ANC £35	Fair Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies.	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £85	Fair Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened.	Silver signal & Copper screen	R	59
Audionote Silver ANV £140	Poor Fair	Fair weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Aural Symphonics N/A in UK	Poor Good	This cable enjoyed an open and transparent midband and sounded remarkably neutral and faithful to the source.	OF copper PTFE dielectric	R	59
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltec Black Slink £152	Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of factuality.	8 silver plated OFC strands PTFE dielectric	R	59
Denon LC-OFC N/A separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £15-£25	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £4.60 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Kimber Kable PSB £32	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £47	Very Good Fair	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy.	Multi-gauge PTFE dielectric		59
Kimber Kable KC-AG £375	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
MDM Interconnect £14.95	Good Fair	The subjective performance of MDM did appear a little imprecise at the frequency extremes, but a worthwhile upgrade on budget interconnect.	Coaxial, solid core, gold plated plugs		59
MIT PC-Squared £75	Fair Good	This multi-gauge cable produced a very open and buoyant midband but sounded slightly 'peculiar' at frequency extremes.	OFC, multi-gauge	R	59
MT Spectral M1330 £193	Poor Fair	M1330 displays a marvellously open and enticing midband quality, bass is warm and rich but this character has a tendency to dominate.	Multi-gauge balanced bandwidth		59
Monitor PC 0100381 £17	Good Fair	There is more than a hint of instrumental muddling and bass is slightly soft, however, the slightly 'shut-in' sound is par for the course at the price.	OFC, coaxial	R	59
Monster Interlink 400 £30	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
Monster Interlink CD £44	Fair Fair	Low frequency is commendably weighty, but the top-end sounds vague and lacking in image focus. Suited to some systems better than others.	Multi-gauge		59
Monster Interlink Reference £88	Good Fair	Protracted listening indicated a lack of dynamic speed – a subjective sluggishness. It may prove well suited to up-front systems.	Multi-gauge Balanced bandwidth Gold plated plugs		59
Myst 1m £15.60	Fair Good	Fairly neutral with a pleasantly open and transparent midband. Some deep bass detail is lost but treble is sharply focused.	Solid-silver PTFE dielectric	BB	59
Origin Live Soli-Core Super £60	Good Fair	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains.	Solid-core gold-plated AT plugs		59
QED Incon P1-Gold £14.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GP1 Gold £18.95	Fair Fair	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though.	OFHC Graphite shielding	R	59
Sony RK-C310ES £40	Excellent Good	Possessing deep firm bass and a sparkling top end it offers a balanced perspective with negligible coloration.	Coaxial LC-OFC	R	59

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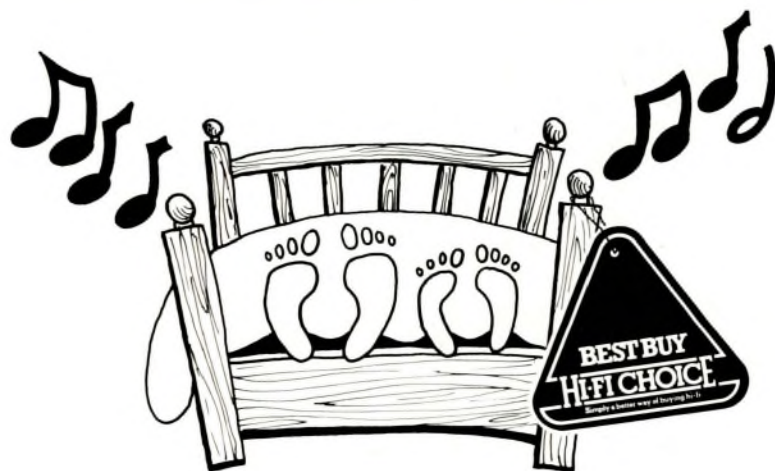
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THE DIRECTORY

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form)	2 silver strands per conductor		59
Thorens SAC 100 £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and fine detail lacks resolution	Silver-plated OFC, coaxial		59
Van den Hul MC-D300II £59	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF	Silver plated single strand VdH plugs	R	59
Van den Hul MC-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
Van den Hul MC-D502 £77	Fair Fair	The tonal balance was 'tilted' by a strong and authoritative bass line, which had the knock-on effect of muting treble detail. A bit dear	Twin axial silver plated copper, teflon dielectric		59
Van den Hul Thunderline £147	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' 'coarseness' bass is tight and dry	Silver plated 'matched copper'		59
Van den Hul MC-Gold £247	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
Van den Hul MC-Silver £747	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble edge is mercifully clean. Very low frequencies were a little lacking in 'siam'	LC-OFc signal & screen	R	59

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier there is a wide variety of in-car machines to choose from, some of

them offering practically every gadget or feature under the sun. The majority of sub £300 players are integrated units featuring a cassette player, AM/FM tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis

is on the frequency modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.



MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
Aiwa CT-23500YL £199	Fair Fair	A nicely designed machine with a flip up lid for disguise purposes. Sound quality from cassette is a bit poor but the radio is exemplary especially on AM	Bass/Treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., 8.4W	R	This
Blaupunkt Paris SQM 48 £253	Average Average	A powerful and sensibly designed player but let down by a very dull sounding cassette. The radio is a bit better	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, 11.5W		This
Blaupunkt Windsor SQR 38 £275	Good Average	Not very enthralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport	5 FM, 10 AM presets, 3.1W		This
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system	Bass/treble controls, 12 FM/6 AM presets, slot-in, 15.1W	R	61
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you – a lot of gizmos for the price and it even sounds OK	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	This
JVC RX-318 £200	Average Average	This JVC sounded quite enjoyable and turned in an impressive performance on FM. It even looks quite nice	Bass/treble controls, 5 FM, 10 AM presets, slot-in, 8.8W	R	This
JVC RX-418 £250	Average Fair	An attractively designed machine with a fair selection of features – even an aux socket for a portable CD player	Bass/treble controls, 10 FM, 10 AM presets, Dolby, chrome eq., slot-in, aux socket, 7.7W		This
Nakamichi TD-400E/PA-300 II £450/£275	Very Good Excellent	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 7.5W	R	This
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging	Bass/treble controls, chrome, NR, 7W		This
Philips 553 £120	Average Average	Not the most ergonomic player on test but sound quality was quite refined for the price. Presets are a bit gauche	4 FM, 4 AM presets uni-directional cassette 3.1W		61
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
Pioneer KE-3030 £150	Poor Fair	A tasty looking, if sonically bass heavy, little box well suited to blasting out rock or dub	18 FM, 6 AM presets 4.2W		61
Pioneer KEH-5080B £230	Fair Good	A chunky and neatly styled player with healthy power output and an easy relaxed sound. Just the thing for pumping up the volume	Bass/treble controls, 18 FM, 6 AM presets anti-theft device, slot-in, 9W	R	61
Sansui RX-3100L £180	Poor Fair	Quite flash looking with a reasonable feature count but FM sound and cassette replay quality could be a bit stronger at the price	Bass/treble controls, 12 FM, 12 AM presets, chrome eq., 8W		61
Sansui RX-5100L £250	Good Very Good	One of the cleaner machines around the 5100 has an excellent AM section and a reasonable cassette player	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., slot-in, 12.5W	R	61
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		This
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		This

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

AYLESBURY HI FIDELITY, 98 Cambridge St, Aylesbury (0296) 28790. Dual, Heybrook, Linn arms, Musical Fidelity, Mission, NAD, Nakamichi, Quad, Rotel, ITI. 2 Dem rooms available, ring for appointment. Open 10.6 Mon-Fri, 9.30-5.30 Sat. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Amex, Diner, Visa. Service dept.

CAMBRIDGESHIRE



CAMBRIDGE HI-FI, 1 Hawthorn Way, Cambridge (0223) 67773. AR, Mission Cyrus, Monitor Audio, Panasonic, Pioneer, Sony ES, Technics, Thorens, Kenwood. Demonstration facilities. No appointment required. Open 9.30-5.30 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Barclaycard. Service dept. available. BADA MEMBER 


STEVE BOXSHALL AUDIO, 41 Victoria Rd, Cambridge (0223) 68305. Quad, Rotel, Dual, Denon, Krell, Nakamichi, Marantz, Monitor Audio, Tannoy. Demonstration facilities. No appointment required. Open 10.00-6.00, Mon-Sat. Home trial facilities, free installation, credit facilities. Credit up to £3,000. Credit cards: Access, Barclaycard, Service dept.

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ASTON AUDIO, 4 West St., Alderley Edge. (0625) 582704. Wide selection of equipment in N.W. Two-year guarantee. Dem facilities. 3 dem rooms, appointment required. Open 10.6 Tues Sat. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service dept. BADA MEMBER 
DOUG BRADY HI-FI, Kingsway Studios, Kingsway North, Warrington. (Padgate 0925) 828009. 1986 Sony/Hi-Fi News Best Dealer in N.W. England and Wales. 'Largest choice of specialist Hi-Fi in N.W. £100-£20K'. All credit cards. 3 Dem Rooms. Dem facilities. BADA MEMBER 
HI-FI CENTRE, Green Lane, Wilmslow SK9 1JQ. Tel: (0625) 522112/524766. B&O, Technics, Sony, Panasonic, Nakamichi, Quad, Revox, Teac, Harman Kardon, Marantz. Demonstration facilities - no appointments required. Open 9-1, 2-5.30 (closed Wed). Open all day

Sat. Home trial facilities, free installation, credit facilities. New customers up to \$500 credit. Credit cards: Access, Visa, American Express, Diners Club, Wilmslow Card. Service dept available.

NEW DAWN HI-FI, 1-3 Castle St, Lower Bridge St, Chester (0244) 24179. Linn, Quad, Technics, National Panasonic, Denon, Rotel, Dual, Meridian, Aiwa, Philips. Dem facilities. 2 dem rooms. Open 9.00-5.30 Mon Sat, closed Wed. Free installation, instant credit. Credit cards: Access, Visa, Trustcard. BADA MEMBER 
SWIFT CF WII MSI CW, 4-8 St Annes Parade, Wilmslow. (0625) 526213. A&R, Aiwa, Denon, Dual, Marantz, Mission, Monitor Audio, Pioneer, Trio, Yamaha, NAD. Dem facilities available. Open Mon-Sat 9.15-5.45. Closed 1-2 Lunch. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

RICHER SCUNDS, 4 Wellington St, Stockport SK1 3RN. (061) 480 1700. Cheerfully small store by BR station with virtually all major 'budget' names, many on special offer. Facilities, expert advice; free 48 page Hi-Fi Guide and monthly Newsletters, part exchange. Open Mon-Fri 10.6, Sat 10-5. Credit cards: Access, Visa, Richer ChargeCard. Mail Order for all Richer Sounds stores from this branch. CHRIS BROCKS HI-FI, 29 Gaskell St, Stockton Heath, Warrington 0925 61212/3. Open Tues Sat 10-6pm. 2 dem rooms. Credit facilities. All credit cards. Total absence of ball****. BADA MEMBER 

CORNWALL

N.C.E. HI-FI, The Bridge, Bosccastle, N. Cornwall (08405) 248. Ariston, Arcam, Creek, Denon, Dual, Gale, Heybrook, Incatech, JTL, JPW, Manticore Mantra, Marantz, Michell (Gyrodec & Synchro), Proac, QED, Rogers, Tannoy. Most cartridges. Dem room. Full credit facilities including interest free. Access, Visa. Evening dems a pleasure (by appointment).

TRURO HI-FI & E.T.S. Ltd, 25 King St, Truro (0872) 79809. A&R, Denon, Dual, Heybrook, Linn, Mission Cyrus, Nad, Quad, Rotel, Thorens. Dem facilities. Single speaker studio. Open Mon-Sat 8.45-5.30. Home trial facilities, credit up to £1,000. Credit cards: Access, ETS Visa. Service dept.

DERBYSHIRE


ACTIVE AUDIO, 12 Csmaston Rd, The Spot, Derby. (0332) 380385. Meridian, Mission, Denon, Yamaha, Rotel, A&R Cambridge, Monitor Audio, Trio, Marantz. Demonstration facilities. Open 9.30-6.00 - early closing. Wednesday Home facilities credit up to £1,000. Credit cards: Access, Barclaycard, Diners, American Express. Service dept.

DEVON

PETER RUSSELL HI-FI ATTIC, 58 New George St, Plymouth, Devon (0752) 669511. Quad, Linn, Mordaunt-Shore, A&R Cambridge, Revolver, Heybrook, Denon, Harman Kardon. Dem facilities - no appointment required. Open Mon-Sat 9.30am-5.30pm. Home trial facilities. Free installation. Credit facilities. Credit cards: Visa, Access. Service dept.

ESSEX

A.T. LABS, 442/4 Cranbrook Rd, Gants Hill, Ilford (01) 518 0915. Open Mon-Sat, 10-6. Two single speaker dem rooms. Credit cards: Access, Amex, Visa.


BADA MEMBER 
RAYLEIGH HI-FI, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St, On the Parkway, Chelmsford, Essex. (0245) 265242. A&R, Audiolab, Beyer, BLQ, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access and Visa. 3 years parts and labour guarantee on hi-fi systems.


BRENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood. (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harmon Kardon, Marantz, QED, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa, Hi-Fi Markets. Service dept.

LYCN 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0206) 560259. QED, Rogers, Denon, Nad, Rotel, J.A. Michell, Mission, Roksan, Gale Quad, TDL. Dem facilities available. Open Mon-Sat 9am-6pm. Home trial facilities, installation, credit facilities up to £1,000. Credit cards: Access, Visa, Hi-Fi Mar

kets, Eurocheque. Service dept available.

GLOUCESTERSHIRE


ABSOLUTE SOUND AND VIDEO, 40/42 Albion St, Cheltenham. (0242) 583960. A-R, Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed). BADA MEMBER 

AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 30046. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon. BADA MEMBER 

ROBBS OF CHELTENHAM, 3 Clarence St, Cheltenham. (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Open 9.5.30 Mon-Sat. Instant free credit. Credit cards: Visa, Access. Service dept.

HAMPSHIRE


ABSOLUTE SOUND AND VIDEO, 4 Feathers Lane, Basingstoke, Hants RG21 1AS. (0256) 24311. A&R, Audiolab, Denon, Dual, Linn, Mission, NAD, Rotel, Technics, Yamaha. Dem facilities. Open: Mon, Tues, Thurs, Fri 9.30-6.00. Sat 9.30-5.30. Closed Wed. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Barclaycard, Connect, Amex, Diners. Service dept.

HAMPSHIRE AUDIO Ltd, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER 

TRUE-FI SOUND AND VISION, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPW, Mission, Mordaunt Short, Nagaoka, Sony, Technics. Dem facilities available. Open 9.30-6.00 Mon-Sat. Free installation, instant credit up to £1,200. Credit cards accepted: Access, Barclaycard. Service dept.

HERTFORDSHIRE

ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts. (0923) 42520. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Dem facilities: 2 dem studios, ring for appointment. Open Mon-Sat 9.30-5.30. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

THE AUDIO FILE, 40 Hockerill St, Bishops Cleeve, Herts. (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Demonstration facilities, no appointment required. Open 9.30-5.30 Mon-Sat. Home trial facilities. Free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Diners, Amex. Service dept. available. BADA MEMBER 

W. DARBY & CO. Ltd, St Peter's St, St Albans. (0727) 50961. B&O, Sony ES, Quad, A&R Cambridge, Revox, Denon, Yamaha, Luxman, Ariston, Thorens. Demonstration facilities, no appointment required. Open Mon-Sat 9.00-5.30. Home trial facilities, free installation, credit facilities. Credit cards: Access and Barclaycard. Service dept.

ISLE OF MAN

ISLAND COMPACT DISC CENTRE, Parliament Square, Ramsey. (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman. Open Mon-Sat 9.00-5.00pm. Dem facilities. Home trial facilities, free installation. Full credit, no limit. Credit cards: Access, Elite. Service dept.

KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury. (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem facilities available. Open Mon-Sat 9.00-5.30 closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa, Creditcharge. Service dept.

LANCASHIRE

CLEARTONE HI-FI, 235 Blackburn Rd, Bolton. (0204) 31423. Best makes, Linn, Creek, NAD, etc. Dem studios. Laser vision and compact disc centre. BADA MEMBER 
HI-TECH AUDIO, 7 Moor Lane, Clitheroe Lancs B5Y 1BE. (0200) 26563. Mission, Audio Innovations, Rogers, Quad,

Rotel, NAD, Elite Rock, B&W, Castle, Wharfedale. Dem facilities, appointment required. Open 9.30-5.00, closed Wednesdays. Home trial facilities, free installation, credit up to \$1,000. Credit cards: Access, Visa, Amex, Diners. Service dept. Mail order.
MONITOR SOUND, 54 Chapel St, Chorley (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spendor, Thorens, Nakamichi, Yamaha, etc. Dem facilities, 2 dem rooms. Open Mon-Sat, closed Weds. Free installation, instant credit up to \$1,000. Credit cards: Access, Visa. Service dept.

LEICESTERSHIRE

SOUND ADVICE. The Sound Factory. Duke St, Loughborough LE11 1ED (0509) 218254. A&R, Creek Linn products, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6.00 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Visa, Amex. Service dept.

ALPHA AUDIO, 13 Guildhall Lane, Leicester, LE1 5FQ, (0533) 518597 or 530330. Open 9.30-5.30 Mon-Sat. Stockists of Aiwa, Adc, Akai, Ariston, Beyer, Bose, Cambridge Celestion, Denon, Dual, Goodmans, Infinity, Harman Kardon, JBL, Jekyllin, Monitor Audio, Musical Fidelity, Rogers, Rotel, Sennheiser, Supra, Teac, Thorens, Van Den Hul and more. Free installation, instant credit up to \$1,000. Access, Visa. Demonstration facilities. Comprehensive repair facilities.

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A.T.LABS, 159 Chase Side, Enfield, Middlesex (01) 367 3132. Open Mon-Sat 10-6. Two single speaker dem rooms. Export worldwide. Service dept, car park. Amex, Visa, Access. BADA MEMBER **300A**

AUDIO T, 190 West End Lane, London NW6 (01) 794 7848. Open Mon-Sat, 10-6. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER **112A**

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1 (01) 631 0472. 10am-7pm, Mon-Sat. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. Excellent demonstrations, 2 demo rooms, full delivery and installation service. Full credit facilities. Credit cards: Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, Philips, A&R, Cambridge, Nakamichi, Rotel. Dem facilities - no appointment required. Open Mon-Sat 10am-7.30pm. Home trial facilities, free installation - to suit the customer. 7.30am-11.30pm weekdays, 9am-9pm weekends. Credit cards: Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 19 Monmouth St, London WC2H 9HB (01) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. Dem facilities. 3 Dem rooms. All credit cards. BADA MEMBER **300A**

GRAHAM'S HI-FI, 86-88 Pentonville Rd, London N1 (01) 837 4412. 'FBA Dealer of the Year 1985'. Linn, Naim, Rega etc \$300-\$3,000 \$13,000. BADA MEMBER **300A**
H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities available. Open Mon-Sat 9.5-3.0, Thurs 9-1. Instant credit up to \$1,000. Credit cards: Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH (01) 486 8262. A&R, Cambridge, Audio Lab, B&W, Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Magnepanar, Nakamichi. Dem facilities available - appointment required. Open Mon-Sat 10am-6pm. Limited home trial facilities. System Design & Installation. Credit facilities - Credit cards: Visa, Access. Service dept available. BADA MEMBER **300A**

SUBJECTIVE AUDIO LTD, 12 Park Avenue, Palmers Green, London N13 5PF (01) 882 4975. Ari Tangent Apogee & Alphason, Audio Research, Koetsu, Krell, Magnepanar, Meridian, Nakamichi, Oxford Acoustics, Tandberg. Dem facilities: 2 single speaker dem rooms. Appointment required. 10-6 Tues-Fri, 9-5 Sat. Home trial facilities. System design & installation service. All major credit cards. Service dept.

TELESONIC Ltd, 92 Tottenham Court Rd, London (01) 636 8177. A&R, B&O, Hafler, Luxman, KEF, QED, Quad, Nakamichi, Rogers. Dem facilities available. Open Mon-Fri 9-6, Sat 9.30-4. Home trial facilities, free installation, credit facilities. Credit cards: Access, Amex, Diners, Visa. Service dept.

THE SOUND ORGANISATION Ltd, No 1, Cathedral St, London Bridge, London SE1 9DE (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME and others. Dem facilities available, ring for appointment. Open Tues-Sat, 10-7. Free installation. Credit cards: Access, Visa. Service dept.

RICHER SOUNDS 2, 6 London Bridge Walk, London SE1 (01) 403 1988. Major names in esoteric hi-fi, usually matched to discount offers and special end of line purchases. Demo facilities, expert advice, free local delivery & installation (\$500+) plus 2 Yr G'tee. Hi-fi Guide and monthly Newsletters; part exchange. Open Mon-Fri 10-7, Sat 10-5. Credit cards: Access, Visa, Richer ChargeCard. Service Department on premises

RICHER SOUNDS, 2 London Bridge Walk, London SE1 2SX (01) 403 1201/4710. The original bargain hi-fi store, now refitted, 100s of regular and special discounts on most budget/mid price major names. By London Bridge. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; mail order; part exchange. Open Mon-Fri 10-7, Sat 10-5. Credit cards: Access, Visa. Richer ChargeCard. Service Department on premises

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W.A. BRADY & SON, 401 Smithdown Rd, Liverpool (051) 733 6859. 'Largest choice of specialist Hi-Fi in N.W. \$100-\$20K'. All credit cards. 3 dem rooms.

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NORFOLK

SOUND APPROACH, 161 Unthank Road, Norwich (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Heybrook, Matra, Musical Fidelity, Revolver, Yamaha. Dem facilities. Open 9-6.30 Mon-Sat. Home trial facilities. Free installation. Credit up to \$1,500. Credit cards: Visa, Access, Diners Club. Service dept available.

WEST MIDLANDS

SOUND ADVICE, 162 Alcester Road, Moseley, Birmingham B13 8HS (021) 449 3328. A&R, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6pm Tues-Sat. Free installation. Credit facilities. Credit cards: Access, Amex, Visa. Service Dept. BADA MEMBER **300A**

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Dem facilities available, appointment required. 10-6 Tues-Sat, closed Mon. Home trial facilities, 3 demo rooms, service dept, free installation, instant credit. Credit cards: Access, Visa, Amex.

FIVEWAYS HI-FIDELITY LTD, 12 Islington Row, Edgbaston, Birmingham (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem facilities. Single speaker dem room. Open 9.30-6 Tues-Sat. Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Service dept.

GRIFFIN AUDIO LTD, 94 Bristol St, Birmingham (021) 692 1359. Linn, Naim Audio, Rega, Creek, Denon, Nakamichi, Quad, Mission, Monitor Audio, Rotel. Dem facilities: 2 single speaker rooms. Open Mon-Sat 9.30-6. Home trial facilities, free installation, interest free credit up to \$1,000. Credit cards: Access, Visa. BADA MEMBER **300A**

NORMAN H. FIELD LIMITED, 35-37 Hurst Street, Birmingham B5 4BJ (021) 622 2323/3619. AR, B&W, Denon Dual, Monitor Audio, Kenwood, Mordaunt Short, NAD, Technics, Yamaha. Dem facilities available. Open 9.15-6.00, Saturday 9.00-6.00. Closed Weds. Home trial facilities on selected systems. Credit up to \$1,500. Credit cards: Access, Visa. Service dept.

RICHER SOUNDS 2, 12 Smallbrook Queensway, Birmingham B5 4EN (021) 643 6664. Popular esoteric hi-fi for upgrades, monthly special offers. Demo facilities, expert advice, free local delivery/installation (\$500+), 2 Yr

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OXFORDSHIRE

ABSOLUTE SOUND AND VIDEO, 19 Old High St, Headington, Oxford (0865) 65961. A&R, Denon, Linn, Mission, NAD, Rotel, Yamaha. Also 256, Banbury Rd, Summertown. BADA MEMBER **300A**

ASTLEY AUDIO LTD, 3 Market Place, Wallingford (0491) 39305/34349. AR, Dual, Kenwood, Mordaunt Short, Mission, Monitor Audio, Philips, Technics, Tannoy, Yamaha. Open Tues-Fri 9.5-3.0. Sat 9.5. Records, tapes and 1000+ CDs. Service dept. Access: Visa, Diners.

WESTWOOD AND MASON, 46 George St, Oxford (0865) 247783. Linn, Naim, Rega, A&R, Heybrook, Dual, Mordaunt Short, Spendor, Tannoy, Quad etc. BADA MEMBER **300A**

WITNEY AUDIO, 28 High St, Witney, Oxford (0993) 2414. A&R, Aiwa, Akai, Dual, KEF, Mordaunt Short, Pioneer, Philips, Sony, Yamaha. Dem facilities. Open Mon-Sat 9.5-3.0. Free installation, instant credit up to \$1,000. Credit cards: Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI Ltd, 12 Barker St, Shrewsbury (0743) 55166. A&R, B&W, JBL, Dual, NAD, Nakamichi, Revolver, Trio, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9.5-3.0. Closed Thur. Home trial facilities, free installation, instant credit up to \$1,000. Credit cards: Access, Visa. Service dept.

SOMERSET

WATTS RADIO - THE ENGINEERS, Jim Badman, 1 West Street, Somerton (0458) 72440. Castle, Dual, Denon, KEF, Mordaunt Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem facilities available. Open Mon-Sat 9.1-2.5.30, Wed 9-1. Home trial facilities, free installation. Credit up to \$1,000. Credit cards: Access, Visa. Service dept.

STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branston Road, Burton on Trent (0283) 33655. Pink Triangle, Systemdek, Denon Audio Innovations A&R, Cambridge, Quad, Rotel, Elite Rock, Snell. Dem facilities - no appointment required. Open Mon-Tues Thurs, Fri, Sat 9.6.00pm. Wed 9-1.00pm. Free installation. Credit facilities. Credit cards: Visa, Access. Service dept.

SUFFOLK

EASTERN AUDIO, 41 Bramford Rd, Ipswich (0473) 217217. Quad, Audio Lab, Denon, Dual, Marantz, Mission, NAD, Nakamichi, Technics, Arcam. Dem facilities available. Open Mon-Sat 9.30-6.00pm. Free installation. Credit facilities - Credit cards: Access, Visa. Service dept available. BADA MEMBER **300A**

SURREY

AERCO Ltd, 11 The Broadway, Woking (04862) 4667. A&R, Ariston, Exposure, HK, A.R., Heybrook, JBL, KEF, Magnum, NAD, Pt. Quad, Revox. BADA MEMBER **300A**
ROGERS HI-FI, 13 Bridge Street, Guildford (0483) 61049. Ariston, Acoustic Research, Aiwa, Akai, Dual, Denon, Gale, JBL, JPW, Kenwood, Mordaunt Short, Marantz, Onkyo, Pioneer, QED, Tannoy. Mon-Sat 9.30-6.00. Dem facilities. Instant Credit. Service Dept. Access, Visa.

TRU-FI SOUND AND VISION, 2 Cromwell Rd, Redhill, Surrey (0737) 66128. Akai, Aiwa, Band W, Nakamichi, Hitachi, JPW, Mission, Mordaunt Short, Napaoka, Sony, Technics. Dem facilities available. Open Mon-Sat 9.30-6.00. Free installation, instant credit up to \$1,200. Credit cards: Access, Visa. Service dept.

UNILET PRODUCTS Ltd, 35 High St, New Malden, Surrey KT3 4BY (01) 942 9567. Mon-Sat 9-6. Thurs 9-7. Credit cards: Amex, Access, Diners, Visa. Dem facilities. Large stock.

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BADA MEMBER **300A**

JEFFRIES HI-FI, 4 Albert Parade, Green St, Eastbourne, East Sussex (0323) 31336. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities.

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HASTINGS HI-FI, 31-32 Western Rd, St Leonards-on-Sea (0424) 442975. A&R, B&W, Mission/Cyrus, NAD, Nakamichi, Quad, Rotel, Systemdek, Tannoy, Yamaha. Dem facilities: 2 single speaker dem studios. Open Mon-Sat 9-6. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Amex, Visa. Service dept.

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