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- ATTENTION VINYL JUNKIES!  
So you can't play the CD - but you've paid for it. Return the coupon on page 127 and we will deduct £1 from any LP or cassette bought through our Record Mailing Section.

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Benchmark Press 0442 891151

Distributed by:

COMAG, Tavistock Road, West Drayton, Middlesex, UB7 7QE  
Tel: 0895 444055

Origination by:

Ebony Ltd., Heathlands Rd., Liskeard, Cornwall. Tel: 0579 46880

Printed by:

Southernprint, Poole, Dorset.

HI-FI WORLD

is published monthly on the 3rd Thursday of the month preceding.

AUDIO PUBLISHING LTD.,

64 Castellain Road, Maida Vale, London W9 1EX. Tel: 071-289 3533  
Fax: 071-289 5620

Queries cannot be answered by telephone.

MAIL ORDER

Tel: 071-266 0461 (24 hours)

Subscription Rates:

UK: £18, Overseas Surface: £25  
Airmail: £38 (Europe & Middle East),  
£48 (USA, Canada & Far East),  
£58 (Australia, Japan & China).

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## SCANDINAVIAN SILVER

Copland amplification, designed and built in Copenhagen, has been widely acclaimed in Europe since Ole Moller started the company in 1986. Their latest amplifier, the first to be generally available in this country, is a 26W integrated model, known as the CTA401.

Although simple and elegant looking, the CTA401 is designed to be a very rugged valve design, using three ECC83's in the input stage (two in the RIAA phono section and one for line level), two ECC82's and two pairs of EL34 output pentodes. The valves used are good quality Shuguang Golden Dragon versions, a testament to the quality of the amplifier itself. The accent on reliability, without compromising sound quality, appears to be uppermost in the designers' list of priorities. In addition, the CTA401 is destined to sound as refined and as sophisticated as it looks, due to its careful and precise engineering, using high quality and almost over specified components.

The Copland CTA401 amplifier will cost £1498 and is distributed by Absolute Sounds Ltd.

## RUARK'S NEW RHAPOSDY

Ruark have a reputation for building fine sounding loudspeakers that are finished as well as they sound. The latest in their range, the £799 Rhapsody, places emphasis on aesthetics, but without sacrificing sound quality.

The Rhapsody is a floorstanding design, with a neo-classical, period look, finished in walnut, mahogany or yew, with a burred inlay on the top of the cabinet. Both the adjustable loudspeaker spikes and the bi-wire terminals and connectors are hidden from view by the use of elegant cabinetry, contoured feet in the case of the spikes, and a moulded pelmet covers the connecting posts.

Although the Rhapsody stands only 660mm high, the problem of listening position is overcome by Ruark angling the drive units upwards, using a 30mm medite front baffle to allow this contouring without compromising rigidity. A two-way, free standing design, the Rhapsody uses a soft dome tweeter and incorporates audiophile components in the cross-over network.



## DENON NEW PRODUCTS

The lads at Hayden Labs have been busy beavering away at their product range. They have announced a range of new cassette decks, Compact Disc players and a new baby mini system.

The cassette machines, which replace existing models, comprise the £139.99 DRM-510 and the £229.99 DRM-710. These are conventional two and three head devices, while the later models, prefixed 'DRS' are drawer loading machines, using technology developed for their DAT machine and the D-100 system. Both 'DRM' machines feature a new Dolby chip that is said to offer a more stable high frequency performance. The twin capstan transport used on the 710 has only been used on more expensive units, prior to this launch.

The new CD players, the £149.99 DCD 480 and £179.99 DCD 580, display many features rare in low-cost players. The solidly built DCD 480 features 20 bit 8x oversampling digital filtering, a 20 program memory and a full Infra-Red remote control. The more expensive 580 is Denon's first with what they refer to as AI-DAC. In this case, AI stands for Advanced Interpolative, not Artificial Intelligence. In collaboration with chip designers Burr-Brown, Denon have produced a DAC that is said to have the smoothness of good one bit designs, with the drama of the finest multi-bit versions.

Finally, following in the footsteps of their successful D-100 system, Denon have announced a smaller and possibly sexier version, the £579.99 D-70. Featuring British loudspeakers and a 30wpc receiver, the D-70 eschews all topical controls and displays, opting for a sleek titanium finish.



## SINGLE-SPEED ROKSAN

Roksan announce a 33 1/3 rpm only Xerxes turntable in black ash at £550, making use of a new in-line power supply, the XPS33, developed while working on the design of that used in their new amplification systems. The Xerxes 33 can be upgraded to full Xerxes specification (and dual speed) by adding the £295 XPSII power supply. Teak or rosewood finishes are also available.

## TECHNICS AHEAD

Technics must have had the Hi-Fi World office bugged; no sooner was the first-ever review of the new three-head RS-BX606 completed and we were wondering if they could produce an even better marvel for two hundred pounds, than they announce it.

The £199.95 RS-BX707 also has three heads, Dolby HX-Pro, B and C, a two-motor drive, and, best of all, an internal calibration tone so that correct biasing for tapes doesn't have to be done by ear as it must on the RS-BX606.

We can't wait.



## AUDIOPHILE INTELLIGENCE

Technics join the 'lifestyle' brigade with a sleek three unit E10 system plus speakers to sell for under a thousand pounds, £999.95 to be exact. Described as 'a serious audiophile hi-fi', it comes with a two-way 'intelligent' remote control. Not only will it confirm the instruction sent to the system, it will guide the user through the various steps required to use a facility like Technics' 'auto-

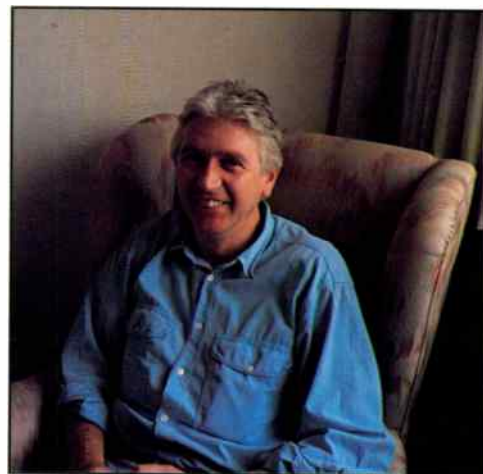
edit' displaying each instruction on the LCD display. The intelligence comes into its ability to learn other remote control commands, so it can be used to work video recorder, TV and anything else the lazy audiophile prefers not to leave the armchair to turn on.

The three aesthetically matched components are a 65W per channel tuner-amplifier, the tuner section offering 24 presets, a MASH one-bit CD player and an auto-reverse cassette deck with Dolby HX-Pro, B and C. A pair of Technics SB-EX2 speakers with pure mica diaphragms completes the line-up.

## BERLIN QUIZ

This photo was taken during a spare moment at the Berlin show (see page 101). It struck us as a wonderful opportunity to indulge in a bit of innocent fun.

All you have to do is wend your way through the following quiz to win a **FREE YEAR'S SUBSCRIPTION TO HI-FI WORLD.**



1) Is this a bat in the seated position? **YES or NO**

2) Is this the editor of a rival magazine wondering why Hi-Fi World is turning him upside down? **YES or NO**

Make the right selection from the above, then -

3) Identify the person in the shot (yes, a clue exists in another part of this magazine and just whereabouts is staring you in the face).

4) Make up a funny caption which is not insulting, 'cos we'll probably bump into the poor old sod at the next press reception. Twenty words maximum should do.

Send your answers to:

Hi-Fi World Magazine,  
Silly Competitions Department,  
64 Castellain Road,  
London W9 1EX.



## KENWOOD BY REMOTE

Kenwood have come rushing up from behind some of their Japanese compatriots and brought out two remote control amplifiers, the 60W KA-4040R at £219.95 and the 80W £269.95 KA-5040R. The infra-red remote controls inputs and the motor-driven volume control, and can be extended to control a number of Kenwood CD players, cassette decks and tuners. Kenwood have eschewed electronic switching in the control circuitry, and isolated it from the audio path using gas-filled relays and a pulse-controlled rotary encoder for input selection.

Other new products from the same company include the £199.95 KT-6040 FM/AM tuner, with, they claim, the performance and facilities of ones costing much more. Presets are available for thirty-nine stations, all of which can be programmed with identification to read off a display when they're selected. There's even a 28-key optional remote control for the real armchair station-hopper.

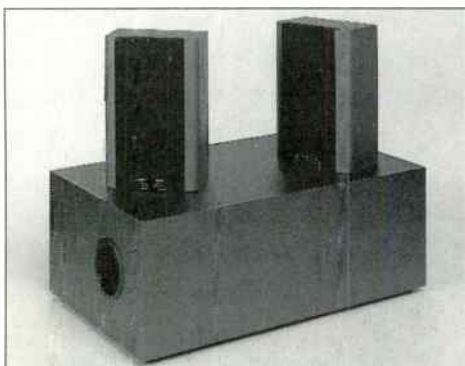
A range of midi and mini systems complete the early autumn releases. The midi systems, the M-45, M-65 and M-85 range from £549.95 up to £899.95, with power output increasing along with the model numbers from 40W to 70W. Choose a system which includes a Graphic Equalizer (the model numbers are then suffixed with a G) and the price range runs from £649.95 to £1,049.95. Each includes amplifier, three band tuner with thirty presets and twin cassette deck. Styling, while standard Henry Ford black, is strikingly curvaceous, extending to speaker baffles that look as though they might need to be inflated with an air pump.

The existing range of Kenwood mini-systems is also being replaced with three new units, the UD-50, UD-70 and UD-90. The 'budget' UD-50 at £499.95 offers a 24W amplifier, equaliser, three-band tuner, twin cassette deck and one-bit CD player. The UD-70 adds a cassette deck with Dolby C, and features something called 'Hit Master'. Buy this mini-system for £699.95, and you can plug in a microphone and turn it into a Karaoke player. The £849.95 top UD-90 has an additional 'presence' output from the amplifier which feeds presence drivers tucked into the main speakers; DSP circuitry provides some kind of surround sound through these without the need for rear speakers, according to the press release.

## BARGAIN BASS BIN

Studio Power of Keighley have produced a small-speaker/sub-woofer system, which, at £129 they claim is the lowest-priced available in the U.K. The three units

are finished in metallic deep grey, with black grilles on the satellites. Each contain a one-inch tweeter and three-inch mid-range driver, while the Bass Bin holds two six-inch bass units in push-pull configuration. Power handling is 60W.



## MORDAUNT SHORT LAUNCH NEW LOUDSPEAKERS

Launch is the operative word, as you can see from the picture. Motor launch in fact, across the briny in Pompey to a very niece Marina development where residents - when they find some - park their motor cruisers outside the front door. Wonder how the clamp squads will deal with this parking problem when it becomes all the rage?

Having tied up le bateau we all trooped into an empty house reputed to cost a cool £1 million. Mordaunt Short took out a mortgage to hire it for a day so they could show off their new Series 5 range. In a somewhat ironic twist to this tale, considering the extravagance, we ended up listening to just one new loudspeaker, the budget MS5.20 (£150), in a children's bedroom measuring about 8ft by 10ft. Luckily for Mordaunt Short, the acoustics proved unusually good and everyone liked what they heard. In typical MS fashion, the 5.20s sounded very smooth, well integrated and relaxed in their musical presentation. They veer toward warmth, whilst retaining detail - a Mordaunt Short strength I appreciate. Hopefully, the rest of the loudspeakers in the new range, stretching from MS5.10 at £120 to MS5.50 at £400 will sound just as good. **NK**



Editors all at sea. Mordaunt Short managed to coax Andy Benham (Hi-Fi Choice), Steve Harris (Hi-Fi News - again!) and Liz Hughes (High Fidelity) onto the briny using enhanced orange juice.

## IN BRIEF

### PASTE:

Audio Technica warn of counterfeit and thus sub-standard diamond styli being sold, especially for the AT95E and AT110E. The genuine product should have the A-T triangle logo, the full name, and the company address in Japan clearly marked on the packaging. While you're inspecting the box, ignore all offers of a Rolex for twenty quid as well.

### SWEET SMELL OF SUCCESS

Naim have cured any collywobbles contingent on lowering their ARO unipivot arm onto the record by bringing out the £99.88 ARO-MATIC arm lift. The device is made from glass reinforced plastic with a damped piston and is operated through a flexible cable from a stainless steel lever which fits between the arm-board and plinth of an LPI 2. Finished in black to complement the ARO itself, don't expect one to be scent (sic) through the post; it has to be fitted by a Naim dealer.

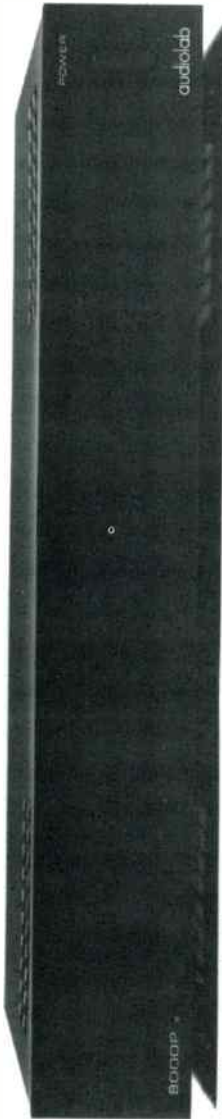
### MUSICAL OVERTURES

Overture, hi-fi specialists of Banbury, are holding an Arcam musical evening, with Arcam's 150 Nicam tuner, the Alpha III amplifier Delta 100 Dolby S cassette deck and the range of CD players on demonstration. Tickets for Tuesday 12 November are available from Overture, 0295 272158.

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**TANNOY TRIP**

I was pleasantly surprised to see one columnist question the concept of spending a disproportionate amount of the overall budget on the source, remarking that like all things in life it all depends.

A subsequent issue killed another holy cow of Hi-Fi with a contributor's comment that when it comes to speakers you have to 'get big to get real.' I still recall the bitter disappointment when auditioning numerous £300 speakers for my first step into true hi-fi. Where was the 'genuine bass extension' the reviewers raved about? Ultimately, I was lucky enough to be present when a friend auditioned a pair of TDL Studio 3s. Now they are good, and as they've since gone up from £700 to £1000 they're sounding better by the day.

Having said all that, the pages of your magazine have mentioned a couple of things which have me mightily confused, and I have a cautionary tale that has me deeply worried, given your fondness for M.F. equipment. I've split them onto separate sheets in the hope that it makes it easier when deciding which to bin/pass on to the letters page/circulate for comment.

First though, how about some 'serious creeping' to Tannoy, so that you can offer as a competition prize a trip to their factory to audition those orgasmatronic Westminster Royals... and since I never win anything, can I cheat?

What about a series of short reader-contributed articles outlining their hi-fi history from the first music centre to where they are now? I'd be happy to throw in my two-pennyworth, which should raise a few laughs.

I'm in need of enlightenment on a couple of points...

1) I'd appreciate a simple explanation of how a single-bit, 256 times oversampled player can ever achieve more than 8-bit accuracy? I accept that such single-bit machines as I've heard seem to have cleaner treble than their multi-bit competitors (down to resistor-ladder errors in multi-bit?), but this seems to be at the expense of dynamics as their sound lacks any real 'urge'. Is it possible to select dynamic range as the information to limit when doing digital sampling? If so, then this is possibly why single-bit machines are more acceptable to vinyl aficionados. 2) Until recently the Hi-Fi press had endorsed the almost obsessive pursuit of light-tight compartments for CD players, coupled with magic ink tech-



niques to cut down refracted light at the disc edges. Suddenly the Naim CD player appears, to rapturous acclaim - and it has a smoked glass cover to the CD tray. Surely those nasty little photons will be streaming through that in trade quantities, and since Naim frown on the idea of edge treatment will refract like crazy through the sides of the disc.

So do I hear "sorry, we were totally wrong" from whoever it is?

Some time ago before Hi-Fi World was born, a friend purchased a Musical Fidelity B200 amp. Shortly afterwards this amp developed a ... (Naughty Bits).

*(The next episode will be continued in our December issue. We spoke to Musical Fidelity and they pointed out that no 'phone number had been given, the 'friend' had no identity and they had no knowledge of the problem we didn't print. So we'll try and contact the friend, get MF to comment and publish the caboodle in next month's issue).*

**D. Reynolds  
Kingswinford,  
West Midlands.**

Genuine bass extension hardly exists, especially in small (£300) loudspeakers, as you rightly point out. But deep bass from box loudspeakers is a contradiction in terms, because boxes are high pass filters. Box loudspeaker manufacturers are basically wasting their time fiddling around with all those ports, tunnels, tubes, vents and what have you. Still, it keeps us all amused and gives us something to listen to and discuss. I hope you'll be interested in the theory behind the (box-less) dipole sub-woofer in this issue,

which does produce real bass.

Having peremptorily dismissed box loudspeakers, your idea of visiting Tannoy to hear the biggest boxes in the world - Tannoy Westminster Royals - struck as a good one. Tannoy thought so too, we are glad to say. Consequently in the DECEMBER ISSUE, we'll be featuring a competition and the winners get a free trip to Glasgow to visit the factory and hear the monstrous and wonderful Tannoy Westminster Royals. Mr Reynolds comes free - so there's no need to cheat!

The outline arrangement is that the trip will take place sometime during January 1992, probably after the 10th. Everyone will be flown into Glasgow from their nearest airport. We will be sending Eric Braithwaite, 'cos he wouldn't stop pleading to go.

To answer your other questions. Oversampling 256 times doesn't result in 2 to the power of 8 resolution. You have reckoned without the noise shapers, which regenerate a sixteen bit effective range in the audio band. One bit machines don't have limited dynamic range, but they do have cleaner treble. The new DAC 7 chip gives more slam and better dynamics.

CD players that expose the disc to flying photons may well suffer as a result. We'll have to investigate this further. Doubtless it'll be controversial.

If you had included your friend's name and address and, preferably, telephone number, Musical Fidelity would have contacted him - and so would we of course. **NK**

# readers' reply

**Send your letters to:**

**Hi-Fi World Letters**

**Page, 64 Castellain**

**Road, Maida Vale,**

**London W9 1EX.**

**PEN THEORY**

The theory behind the Lasaway green pen completely escapes my comprehension, I'm afraid. Surely the idea of a digital system such as Compact Disc is that it maintains consistent quality of replay reproduction because the musical information is encoded onto the disc in a series of 'ones' and 'noughts'. The laser reads these 'ones' and 'noughts' but cannot discriminate between a good 'one/nought' or a bad one. Therefore, how can green ink on the CD improve sound quality?

An asset which CD has in its favour over other mediums is repairability when considering damage to the surface of the disc. To demonstrate my point I took a CD and attacked the surface with coarse sandpaper. Needless to say the disc was rendered completely useless! To repair the damage I polished the surface of the disc with Autosol metal polish until I could remove no more damage. To finish, the surface of the disc was finally polished with toothpaste (this is an extremely fine abrasive) in a radial fashion from the disc centre. Hey presto, enjoy the CD once more. This method of repair is slow and laborious, but certainly effective.

**Tony Taylor,  
Leicester**

Well, we tried the CD you enclosed, and it stuck three seconds into Track 3 and set the track display gibbering on Track 4, while no sound came out. I don't think we can recommend the treatment! We have tried this sort of restorative treatment for damaged discs, albeit using Brasso instead of toothpaste. It didn't work either.

It has been proven that the Green Pen increases light intensity reaching the laser. Exactly what happens then is argued about. Benefits may come in reduced jitter. The translation process from disc to digital through Eight-to-Fourteen modulation code is complex. Who knows what all those electrons are up to? **NK**

**MOVEMENT IMPROVEMENT**

Thank you for your feature in the August issue regarding the positioning of loudspeakers. Because of lack of space in my room I used to have my B&W DM4 speakers placed right up to the wall on stands and thought they sounded great - until I read your article. I have now moved them approximately two feet away from the wall and what a difference! The stereo imaging and depth is better and the bass is a lot clearer and deeper. The cheapest upgrade to my hi-fi system ever.

**Stuart C Swaine  
Bradford,  
West Yorkshire**

**OLD KIT**

I would like to say how much I appreciate Hi-Fi World and why. No hi-fi magazine can be all things to all (hi-fi) men. However, you come closer to most in my opinion. Your record reviews may not be as extensive as some, but at least you only report on what you like. I'm sure many have written in praise of your two articles on older pieces of kit still worth seeking out, and your articles on basics, such as setting up turntables and the effects of components on sound quality. This helps people to feel that hi-fi is not about 'flavour of the month' or megabuck systems.

I also think your more catholic approach to equipment reviews represents a healthier style than your predecessor Hi-Fi Review. Reading the latest edition (September) I was pleasantly surprised at the list of recommended equipment. The range of items was surprising in its range and scope.

Any complaints? Well, maybe a bit more colour and more

reviews of European equipment. I would like to know what hi-fi buffs in France, Germany and Italy listen to. Also some of the more outrageous Japanese silly stuff from the small manufacturers.

Carry on the good work.

**T M Wood  
Lytham St Annes,  
Lancashire**

Thanks for the praise. We all got bored reading about megabucks systems too and that's why we started Hi-Fi World. This magazine is run, written and published by hi-fi enthusiasts - and no one else! We are going to broaden our coverage and some of your suggestions correspond with our own ideas. **NK**

**KLIPSCHORNS**

Two recent events have prompted me to write to you concerning horn loaded speaker systems - your visit to Tannoy to hear the Westminster Royals and my own system.

I own Klipschorns that I feel compete very well with your Westminster findings, yet are more appropriate and suitable for the average home.

Although the Klipschorns were patented in 1943, they have undergone numerous modifications including driver and cross-over technology. Too many 'know-it-alls' in the hi-fi world (small 'w!') have old set opinions stemming from many years ago.

Paul Klipsch learnt that sensitivity was directly proportional to modulation distortion. Fully horn load systems generally have superb transparency and detail because the sensitivity detects and reveals the inner voice of instruments and human voices. To this end, I feel the limitation or weakest link in my system is the software.

Klipschorns are often thought of as 'coloured'. I have lived with mine since last October (I imported them myself; they were built July 1990) and find no aspect of their sound to be objectionable. It has to be pointed out that nearly fifty years has passed in which to criticise them, yet they are still popular in many countries except Britain today.

The knocks that horn-loaded systems take are not really justified. Knowledgeable people who have heard my system are quite shocked to hear such a wonderful sound. The real point is that for all the weaknesses of horn loading these weaknesses are far less objectionable than those of alternative designs. I feel the wrong emphasis has been

put on sonic values and 'flavours of the month'.

I am puzzled by 'shoe boxes on stands' that do not deliver true bass and dynamics. People kid themselves that they can do without certain sonic information and call it high-end hi-fi. Remember, Klipschorns fit right into corners and use the walls, ceiling and floor to extend the bass horn. The speaker literally becomes part of the room. Yet 'shoe boxes on stands' generally have to be placed out into the room and end up taking up more space.

My speakers have a sensitivity of 104dB/watt/metre - very high. The 15 inch woofer has a cone excursion of 1/16 in maximum! As you say, my room moves in unison with the sound and some dynamics really bend the ear - not what everyone wants, but then not everyone wants to get as close as possible to the original sound.

CD systems make horn-loading so very relevant - in fact horns are more 'CD ready' than others! Many people just won't accept that there is much more information on a CD waiting for retrieval.

I find my system both exciting and emotional and it gives me enormous pleasure - without knob twiddling or tweaking. I listen to the music, not to the system itself and I never fail to relax and enjoy it.

**Peter E Yates  
Huntingdon,  
Cambridgeshire**

**Horns have a unique sound, but the 'slam' they possess is due to the fact they effectively couple into the room's air load more efficiently than ordinary loudspeakers. This means the drive unit controls the air better, and the air also damps the drive unit better - hence the very small cone movement you mention.**

**Perhaps Klipschorns in corners do take up less useable floor space than boxes on stands, but then the stereo stage is fixed at the room width, which may or may not be suitable. All the same, we're glad that you enjoy your almost-unique loudspeakers. There's no doubt that horns are an all but forgotten breed, yet they can have a wonderful sound. NK**

**DIRTY CLEANING**

In your article on cleaning LPs (September), no mention was made of the simple method of washing LPs in tap water and domestic detergent, although it was stated in passing that both

of these liquids leave deposits.

I have a large collection of LPs bought second hand and many of them have benefitted from being washed to remove thick dust and sticky deposits.

I use ordinary, cool (London) tapwater to which is added a small quantity of washing up liquid. LPs are washed in this solution using a record cleaning sponge, with care not to introduce any dirt or grit and avoiding getting the record label too wet.

The record is then thoroughly rinsed under the cold tap and excess water shaken off before being stood vertically to dry at warm room temperature.

After cleaning in this way, visible 'deposits' on the LP surface are rarely a problem. When they do occur, they nearly always seem to be on the ungrooved centre section where small droplets of water may dry, leaving faint ring-shaped deposits. These can be avoided by gently mopping the nearly-dry LP surface with a clean handkerchief. During draining and drying, water seems to be 'rejected' from the grooved section of the LP. This is presumably a surface tension effect which is overcome by the detergent during the washing stage, allowing the cleansing solution to penetrate to the bottom of the LP grooves.

Washing LPs results in visibly clean discs, and usually there is a marked audible improvement as well, depending on the original condition. Sometimes quite clean looking LPs can be made to sound better, presumably because invisible deposits in the grooves have been removed.

Occasionally, washing seems disappointingly ineffective in cleaning up the sound from previously dirty LPs, presumably because the imperfections are too ingrained, or represent groove wear or pressing faults. However, after several years and many LPs being treated in this way, I cannot recall a single instance where washing has caused any audible deterioration or other ill effects.

**P. Harrison-Read  
Neasden, London**

I did not mention tapwater and detergent as a cleaning method because, despite your experience, it is really not advisable. The vinyl LP is self-lubricating and washing-up liquid, especially the lemon-flavoured variety, is not a pure detergent. Over a period, it is possible that the surface will deteriorate. Nor is tapwater pure - it contains any number of minerals, and is very variable from one part of the

country to another. The combination, unless used with great care, is liable to be deleterious, and if the user is unlucky, those 'ring-shaped deposits' may dry and be stubbornly difficult to remove. We were warned against this popular cleaning method by the experts at EMI's pressing plant at Swindon, no less.

Washing by hand is best done using Isopropyl alcohol and distilled water in the proportion of 1:4 or, for stubborn deposits 50/50. It is done by holding the LP vertical in a bowl, sweeping with a carbon fibre brush following the groove, and ensuring that time is allowed for the dust and debris to settle after it's shaken out of the brush. This avoids a sludge being washed around the groove into a different place - which is why some LPs will apparently not respond to the treatment you describe.

The LP can then be left hanging on a rod through the hole, vertically, and not touching anything else, in a flow of air. The liquid will then evaporate.

Both Isopropyl Alcohol and distilled water can be obtained relatively cheaply from the local chemist, but must be kept well away from children and any risk of being taken internally. **EB**

#### WETTING AGENT

I enjoyed your article on 'Cleaning LPs' in the September issue. I used to clean my LPs with a Goldring Exstatic lightly dampened with distilled water. It worked, up to a point, only the large particles sometimes getting lodged in the grooves. What definitely didn't work were the carbon fibres! They caused more problems than they solved as they left behind a line of dust and created static.

However, all that was years ago as I am now the lucky owner of a second-hand Keith Monks machine for £150 (Irish Punts). It's a marvelous if somewhat archaic machine. I use a 3:1 ratio of distilled water to Isopropyl Alcohol as I'm afraid the recommended ratio of 1:1 might be too strong. Incidentally, in the manual they recommend distilled water with meths! Now a hi-fi dealer tells me that I should mix in Kodak Wetting Agent - used for developing films - to enable the water to get into the grooves of an LP. As the Kodak stuff is a form of detergent, could you put my mind at rest and let me know what you think.

**Derwent Bell,  
Dundalk, Co. Louth, Ireland.**

As I wrote, a carbon-fibre brush needs a deft twist of the wrist to lift off the line of dust. In fact, there's nothing wrong with using Wetting Agent, in the small amounts recommended on the label for developing. I know many swear by it, but I'd be inclined to increase the proportions of the alcohol/water mix up to 50/50 for stubborn grooves, because this also reduced surface tension. I hope that the reference to Methylated Spirits is a misprint, or the print is faded - it was Methyl alcohol...**EB**

#### CREAKY REELS

Seeing your article, 'Veteran Valves', in this month's Hi-Fi World, prompted me to enquire whether you know of a dealer, club or society dedicated to the preservation of vintage reel-to-reel tape recorders. I take an interest in my old ones every few years but have no recent knowledge of dealers etc. Perhaps you would be kind enough to bring me up to date.

**A.C. Baldwin  
Yeovil, Somerset**

Funny you should mention that. Kelly and I were ferreting around the trestle tables at a recent British Vintage Wireless Society Meeting and we saw no fewer than three vintage tape recorders. A report on our visit to this meeting will appear next month, in the December issue, with pictures of some superb vintage items. In the meantime, you can contact -

**Robert Hawes,  
The British Vintage Wireless Society,  
63 Manor Road,  
Tottenham,  
London, N17 0JH.  
tel: 081-808-2838 **NK****

#### UNDER THIRTIES

I write to thank you for your taste in music. So many hi-fi magazines always use either classical recordings or 'thirtysomething' types (eg. Phil Collins, Dire Straits, Tina Turner, Chris Rea etc.) These records are fine to review a new piece of equipment as they are presumably the most well produced and played.

That is as maybe, but not everyone listens to these records. Therefore, my understanding of how a new speaker, for instance sounds is hampered, as I have no idea what 'that flowing bass line from the new Chris Rea song' sounds like! So, it was with great relief that, when I first read an Alan Sircom review,

I discovered he was mentioning bands who I know and love. In the past few months he has mentioned The Velvet Underground, Danzig, Janes Addiction, The Cult, The Rolling Stones, Love, Neil Young, The Cramps, Bob Dylan, and Husker Du. Wonderful!

Although the final test of any piece of equipment is to listen to it with your own ears his musical taste does help me identify equipment that I think I would like and would suit my preferences in music.

**David Wright  
Kings Heath, Birmingham**

You'd be surprised what heathen art forms pass through the systems we test. Only Sircom mentions them in print, because he doesn't know there's anything different yet (throw another bone in the cave Eric). **NK**

#### HUM DINGER

After reading the excellent article in the May issue on the Leak Troughline tuner I was impressed enough to track one down.

A couple of weeks ago I managed to get hold of one for £25 privately. I have since had it overhauled by Mike Solomons of London Sound with whom I am also very impressed.

The reason I am writing is that although on Radio 2, Radio 1 and local commercial stations, the sound is perfect (understatement), I find that whilst listening to Radio 3, which I like to do being a classical music lover, I can hear a distinct hum. Although this is only heard in quiet passages of music or when the announcer is speaking, I find it too distracting to listen to Radio 3 at all, or only at very low listening levels.

The hum I refer to can also be heard on Radio 4, so I can only surmise that it is coming over the air with the transmission.

With this in mind I connected up my original tuner (Hitachi FT-5500 MkII) only to find the hum had disappeared. Needless to say after hearing the Troughline I can no longer listen to the Hitachi for longer than five or ten minutes.

So do I have to put up with the hum on Radio 3 or only listen to Radios 1 and 2 and Locals, or is there a remedy?

I have tried moving the tuner away from the amp but this seems futile, as the hum is still audible, and anyway it's only on Radio 3 and 4.

In conclusion if the sound which I get out of my Trough-

line was not so good I wouldn't be bothered, but I wish to keep it and be able to listen to Radio 3.

My system: Fisher X100A valve amp, Troughline Stereo, Marantz CD65, Heybrook HB2s (originals), connected with solid core house wiring 2.5mm cable.

**T.R. Betts  
Walsall, W. Mids.**

We suspect that you are hearing hum in the small silences and times of low signal that Radio 3 and 4 have. Others stations run continuous, compressed music and leave no silences as a matter of policy. Our Troughline has no audible hum, even on Radio 3. Measurement confirms that it is as quiet as modern tuners (-70dB hiss at full quieting). It is most likely that there's something wrong with the power supply smoothing; possibly one of the electrolytics has gone. A diagnosis and repair should be quick and inexpensive. **NK**

#### DEDICATION

I refer to your article 'The Differences of Being Direct' (September) which reported on the DCO 150 from Sound Design Studios. There is an error of fact in it which I must point out.

Peter Bruty did not 'go his own way' to produce 'his own' DCO 150s. My late husband Michael Watkins-Baker joined forces with Peter Bruty in 1985 and the two of them worked in partnership on the development of the OTLs for the company. If anything, the fact that your reviewer described them as resembling traction engines is due to my husband's input into the conception and design.

He died of a heart attack a few months before the first launch of the Sound Design OTLs at the 1990 Hi-Fi Show. They were called the Dedication Series in his memory.

Unfortunately I have never seen the material issued at that show in which the dedication series was described and if by any chance any of your readers might have this literature I would be most pleased to hear from them.

**Mrs M Watkins-Baker,  
21 Eastlake Road,  
London SE5 9QJ.**

It's called an obsession - but they can be fun. The idea of the box-less loudspeaker is something I raise continually in this magazine and I suppose I am a bit obsessed by it. The subject crops up again in our piece on the room alignment of a dipole loudspeaker. It is a fascinating subject in many different ways, because it is novel and it will, in the end I dearly hope, result in a new type of loudspeaker - one that should display distinct benefits over today's boxes.

I want to try and describe here how I see the end result, or what the end result could be. Although I use modified Quad ESL-63s which are electrostatic panels, anyone reading my review of the Heybrook Sextets will gather than I can and do appreciate some box loudspeak-



## Reflections from Noel Keywood kaleidoscope

ers. I wouldn't for one minute deny that they have some strengths, but precisely what these strengths are and how they might be best exploited is another matter.

It's a simple truth that panel drive units, such as electrostatically or electromagnetically driven diaphragms (e.g. from Quad and Magneplanar respectively) have great benefits, ones that cannot be ignored. They also have considerable hidden problems of a highly complex and intractable nature. Naim found this out when they tried to develop an electrostatic loudspeaker. Every time I ask them about it, another horror story is related. For example, the speakers ran at an extremely high voltage, in order to be able to play louder than typical members of the breed. Unwittingly placed on a nylon carpet capable of supporting a static charge, there was a huge Crack! from the prototypes whilst they were being run. A giant spark leapt across the carpet from one loudspeaker to the other! Julian Vereker swears he'll never, ever try and develop another electrostatic. "They're lethal!" he insists.

I recently asked Tim De Paravicini of EAR whether he could and would design me a valve stage capable of direct drive to each panel, eliminating

the audio transformers. Tim can design anything and the nuttier it is the happier he is. It was when he began talking about the need to swing 10,000 volts and how this could be achieved that I started to get cold feet.

There's got to be an easier and less dangerous way to listen to music. There is - it's called the dynamic drive unit. Every box has one. What we need to learn to differentiate between is that drive unit and the box it so commonly sits in. The two seem inextricably related. The real point is - they are not. A box is a box, it is not a loudspeaker. Dynamic drive units are better off bolted to a sheet of wood where they will work very well, except at low frequencies. The benefits are a sound free from return echoes and box resonances. Eliminating the box simply throws away a lot of problems and, generally, results in a clearer, more open sound.

The best thing to do with the rear radiation is damp it down as much as possible I believe. My own Quads have rear felt 'curtains' placed about six inches behind. This absorbs much of the backward radiated sound. By stopping it bouncing off the rear wall, it results in less muddled treble. By doing this, in effect I operate the Quads as monopoles. Experiments show that rear images are not beneficial and

they do not, contrary to popular speculation, make a panel loudspeaker sound more spacious.

So dynamic drive units can be bolted onto a simple baffle and have some felt, sound absorbent foam or possibly even a sound absorbing labyrinth put behind to absorb rear radiation. It is not essential to totally eliminate the out-of-phase rear signal and in the past, when open baffles have been made, their designers have usually decided against doing so. The reason is, I suspect, that having broken with boxes they feel that returning to the notion of trying to control the rear signal is contradictory to their apparent basic aims. It is not. I think open baffle loudspeakers should be operated as monopoles at high frequencies, which is

that the box they use to get bass prevents them from getting bass! It is a little joke I play upon the poor souls every now and then. Needless to say, loudspeaker manufacturers don't necessarily like to see me coming!

It is all part of the realisation that boxes are not loudspeakers. A good loudspeaker does not need a box. The problems that have to be solved are considerable, I'll admit, but so are the rewards. A boxless loudspeaker, which might comprise just three drive units on a flat baffle (in essence at least), plus some electrical equalisation, should offer a mid-range clarity unsurpassed by box loudspeakers and more akin to open panels. Bass performance must, almost by definition, be better - for two main reasons. An open dipole interacts with a room in a constructive manner: it can be aligned to not suppress, or even damp out, room resonances (honks). Monopoles always have their bass increased by rooms; putting them on stands is an act of desperation, an attempt to minimise the unwanted but unavoidable. And dipoles have no lower frequency limit to their bass. Box loudspeakers are self limiting, a conceptual contradiction in terms. They can never produce really deep bass (down to 10Hz or less), unless they become enormous. So a room aligned, bass dipole will have smoother deeper bass than is possible from a box.

Why haven't we yet seen the emergence of a full range dipole loudspeaker using ordinary drive units? It's a totally novel concept - one of the few left in high fidelity. As far as I am aware, only Celestion have the same vision in their heads as I do in this fascinating little area. It seems probable that such an animal will reach the market eventually. When it does, a rich and fruitful path in loudspeaker development should open up. Its exploitation will bring us better loudspeakers ●

quite contrary to what might seem like common sense. It isn't though. My objection is to boxes, not to monopole operation.

That a boxless loudspeaker can be made to work at low frequencies, below about 200Hz, as well as high frequencies, was quite beyond my imagination until Celestion released the SL-6000 sub-woofer. Even having got one in for review, I remember it took me a long time to really appreciate what it was doing and, especially, what it represented. In conceptual terms, it is one of the most advanced loudspeakers I have ever come across. Perhaps it is no coincidence that Harry Olson managed to chart and explain the working principle of just about every loudspeaker type going in *Elements of Acoustics* (1947) - except the room-aligned bass dipole.

And what a peculiar animal it is. I hope our explanation of it in this issue is not so obscure or complicated as to be beyond easy comprehension. It was the realisation that a box actually prevents deep bass being produced and that for really deep bass, the box must be eliminated is perhaps one of the most contrary conclusions I have ever reached. It was prompted by musing upon the SL-6000. Try telling loudspeaker designers

This month, I was considering falling back on the old "accuracy versus enjoyment" argument, always a good one for getting you out of a tight spot when column time comes around. Somehow this did not feel right, striking me as a bit of a cop out on my part. Then I discovered my angle.

I was arrested. Well, I was stopped by a policeman. It was Monday morning; it always is. Mondays were only invented to get mankind's dose of hatred and loathing over with quickly and I hate them for it. This was more savage than usual, as I had to carry a Compact Disc player back to the office. The brand is immaterial, but the pre-breakfast burden is heavy enough without having a heavy white cardboard box under your arm.



Feedback from Alan Sircom

## sircom's circuits

I moved, with both eyes and limbs unfocussed, through the morning flow of humanity. Then we saw each other and instantly recognised The Enemy for that morning. He, in his smart blue-black tunic, white shirt and pointy black hat with its bright shiny badge; me, in clothes too bastard for description: ripped Levis, shoes that that used to be Doc Martens and once knew polish, Fashion Cares T-shirt (from 1985; Fashion and I have since been divorced and I make my alimony payments through the Grattans catalogue) and a summer sports jacket that, although creased, still kept its shape. The shape was that of a sack of potatoes with a few beer cans thrown in - my kinda shape.

As we approached one another he looked at me and my nice new box under my arm. The magic words were then then spoken: "Excuse me, sonny."

Sonny? SONNY? I looked at the police-child, who appeared to be fresh from the Hendon Police College Kindergarten Squad. The poor boy obviously has perception problems, I thought, best not to make him feel inferior this early in our relationship.

"A word in your small shell-like, chief. What's in the box, then?" said the youth.

A Compact Disc player. Well,

most of it. I've left a bit behind. I couldn't carry it all, you see." As the mental mists of the morning cleared, I realised this was not the correct procedure. What I should have said was: "It's a CD player, Sir." They always like the "Sir" bit.

As I gave the wrong response, a tirade of questions followed. "Is it yours, then? Have you got a receipt for it? Buy it new, did you, then?" Each successive question, that curiously always ending in 'then', had me coming ever closer to being Public Enemy No 1, especially when I answered coldly, "Of course not, it isn't mine."

At that moment, I felt the full weight of the law pressing in on me; my colleagues would laugh as the gossip spread; it would reach the papers for sure. I will be acquitted... but by then they may have subjected me to torture: iron coffins with spikes on the inside, Max Bygraves records, things like that.

I wanted to confess all my crimes at that moment. Yes, guv, I masterminded the devastating Jelly Tot Heist of 1971 and I did the Last Sausage Blag while I was at college, but I'm goin' straight now, honest.

The icy hand of fear gripped me and shook me around a bit: and I knew I would never want to face the nightmare again.

Either, I thought, I must never deliver products by hand, or I drink Jack Daniels neat for breakfast. That way, if I was questioned, I wouldn't notice.

Just then, a little chink of light shone through the morning gloom. I had a bank statement proving who I was, and the delivery note, still in its envelope, was addressed to me. Police-boy took my name and address all the same, the light sadly gone from his eyes. The prospect of taking me to the Station lost, he seemed to pall visibly, as though his batteries were going flat. I'm sure he'd had visions of throwing the Charge Office doors open, to the accompaniment of The Ride of the Valkyries or the 1812 Overture, with me under his arm, saying "Book him, Sarge" in a real grown-up voice.

His hopes of an early pinch dashed, we parted company. There was no acrimony; I was glad he was keen and I hope the rest of his colleagues are as eager, in some respects. After all, if I had your CD player under my arm, he would have been a hero. I felt so sorry for the crestfallen lad I was going to spray something on a wall so he would feel secure in his job. I didn't, because, firstly, I didn't have a spray can, and secondly, because the only thing that I could think of to spray was "Mafeking Must Be Relieved". Being done for graffiti is a heresy, but being nicked for graffiti past its spray-date is unthinkable.

On later reflection, I realised that all this could easily have happened to almost any other hi-fi reviewer. As a breed, most of the subjective reviewers tend to fall in a slightly "alternative" category. We all seem to be hankering after college life in some way. Levis, pony-tails, alcohol, music and very late discussion-nights (mostly the topic is hi-fi, but occasionally there are snippets from the outside world) abound.

Because of this, reviewers can look a little different, particularly during the daylight hours. Before I joined the industry, I thought the people I knew connected with it behaved like vampires. They were rarely seen before

dusk. I still have my doubts about some of them.

Reviewers fall into different camps. There are the objectivists, who place measurement high on their list of priorities, and the subjectivists who listen to the equipment before looking at the figures. Both have their place in hi-fi society. Their tastes in equipment and their stance on musical appreciation seem to match their subjective/objective view.

Most of the objective reviewers seem to place accuracy as the ultimate goal of a system, suggesting that if a disc is poorly recorded, it should sound bad. At the other extreme we have the subjective reviewer who wants his system to sound great regardless of recording quality. Over the years these positions have become more and more polarised, almost to the point where each sees the other as The Enemy.

This polarity also affects dealers and their customers just as much as the reviewing community. An individual, a shop, or a reviewer sometimes defends the stance they have taken up by attacking everything outside their narrow experience. If you adhere to the same view, all is well. Deviate from it and all hell breaks loose.

All that is needed is a sense of balance that has been rare in these latter years of polarising and posturing. I happen to like valve amplification with box loudspeakers. This doesn't mean I cannot appreciate the joys of an amplifier like the Deltec, or a rhythmical model like the Naim. I have my preferences; so do most people in this business. But I would hope that I am never polarised so much in one direction that I become blinkered and cannot see the other side.

### ERRATUM

Nowhere in my 'Whizzer and Chips' Bumper Book of Editing does it say you can add another tribe to Frankie Goes to Hollywood's legendary 'Two Tribes'. Whoever did will suffer the Death of a Thousand Vibrating Stylus Cleaners. For those of you who did not notice, read harder next time, there will be a test after class ●

I know what I am about to say amounts to a heresy in some people's minds but I'm going to say it anyway. There's nothing inherently wrong with tone controls. I had to swallow hard before I said it. Now I'd better justify myself.

I've gradually come around to this opinion because of the tricks I have to play on my hi-fi (which has no tone controls) in order to get the tonal modifications I occasionally want. For instance, in the process of my work as a producer I get sent a number of cassette tapes to listen to. I accept that cassette is not the "highest of fi" but nevertheless its ubiquity means that I (and a great many other people) listen to good deal of music from it. For a hundred reasons many of the tapes I listen to are downright



# recorded message

Left by Richard Brice

dull. Sometimes they have not been recorded "hot" enough so there's inadequate level on tape and what little treble there is, is swamped in noise. Often the azimuth of the recording head was radically different to my playback head and that really mutilates the top-end. I've adjusted my playback-head azimuth to the IEC reference tape but it really is not practical or desirable to readjust this for every tape I listen to.

So what do I do? What I suspect everybody else does: I switch off the Dolby decoder and revel in the treble. I end up with reproduction with heavily compressed high frequencies and about 40dB signal to noise ratio. It sounds like American A.M. radio. Depending on the tonal balance without Dolby, I then mess with the 120us/70us equalisation switch. In other words I end up with a grotesque approximation to a flat frequency response by inappropriate means. How much better it would be if I had a tone control which would provide a temporary brightening of the sound.

When I was a boy, my grandmother had a large valve radio in her kitchen which had a volume control and a knob

marked "mellow" in the fully anti-clockwise position and "bright" in the fully clockwise position. That radio must have been thirty years old thirty years ago. I find it hard to accept that in the intervening sixty years, we have not had time to develop a tone control circuit which doesn't mutilate musicality and still copes with lousy cassette tapes.

Other more prestigious media can occasionally do with a little "tweaking" too. Maybe you're luckier than me, but I have many vinyl records where the tonal balance is capricious. Yes, even the occasional Compact Disc has a tonal balance which is obviously downright wrong.

There are two tenets to the purist's argument against tone controls:

- 1) Less is always more; all circuitry, no matter how good, will always corrupt and veil the sound to some extent.
- 2) The music is what counts, so we shouldn't fiddle with the sound of a record or C.D. since this might be an incorrect and ill-informed judgement.

There is a great deal of merit in both these arguments. At worst, tone controls can be awful. They can add noise and, certainly in the early days of transistor

amplifiers, they often produced plenty of distortion in the boost regime. Perhaps the worst incarnation of the tone control was the dreaded "loudness" button.

I once worked on a recording session where the studio was temporarily relying on a domestic hi-fi amplifier for monitoring because the professional amplifiers had gone to be fixed. No matter what the engineer did, the mix sounded dreadful. I took a DAT copy home to listen to. Far from the flabby, sloppy bass that seemed to beset everything in the studio, there was hardly any bass at all when I listened at home.

Investigation unearthed the fact that the temporary hi-fi amplifier had a "loudness" button and this had been accidentally switched on during the session. The whole session had to be junked. In my opinion there ought to be an article in the Charter of Rome forbidding the inclusion and use of this hateful feature.

One really mustn't, however, write off all tone controls because of poor examples from the past. It is possible to engineer good controls with useful and musical response modifications. After all, virtually everything we hear on record has passed through equalisation tone-controls in the recording studio of such devastating audio power it would make a hi-fi designer's eyes water. The golden rule, as far as domestic controls are concerned, is that the extent of the spectral manipulation must always be modest and appropriate. Many of the cheap "treble" and "bass" controls of the past (and sadly of the present) have vicious levels of cut and boost and characteristics that are not suited to modern response errors.

The purist's second argument, that it is the music that counts - not features or the whim of the listener - is much harder to fault. Few would dispute that it is a hi-fi's job to reproduce as cleanly, faithfully and transparently as possible the music recorded on the disc. My defence here is to say, "Yes, but that music is captured in a recording process. This is distributed via a production process, which, like everything else, is prone to engineering failure, subjective judgement and poor software duplication." If you care about music and you own a favourite tape, record or C.D. by a singer you admire, singing songs you love but the tonal balance of the performance is shrill, woolly, or bass thin, and that detracts ultimately from the performance, then I think you have the right to

turn the treble or bass up or down to suit. And you have a right to expect that engineers can provide you with controls that will do it without introducing perceptible noise or distortion.

The sad fact is that tone controls will always be standard on cheap and cheerful equipment where features matter, where it's least likely they will be well designed, and consequently where the potential customer will be least able to adjust them to give genuinely musical results. On the other hand, they are increasingly lacking in equipment where there is an adequate budget to ensure their correct circuit implementation and where their inclusion would be of most benefit because the listener is able to judge the sound quality accurately.

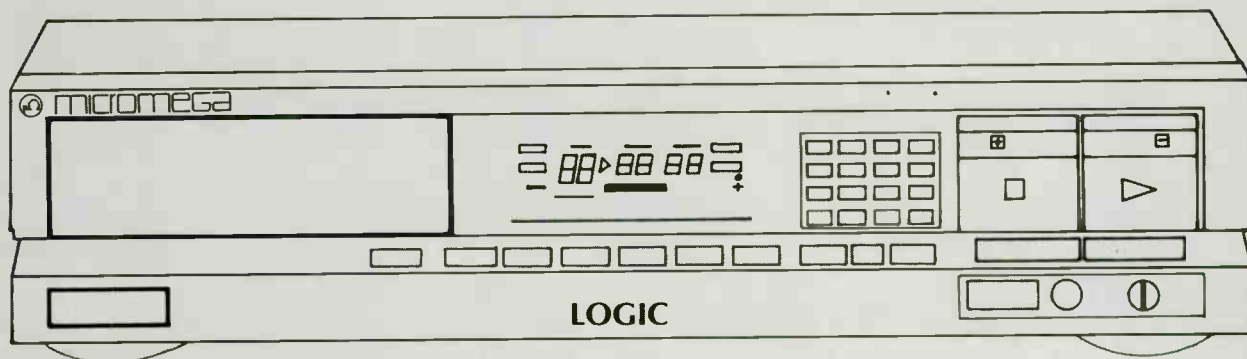
Don't you think there's some inverted snobbery going on here? If I was to produce an audiophile pre-amp, do you think it would be taken seriously if it had tone controls on it - no matter how well engineered? I don't - and that has to be more to do with marketing fashion than engineering.

For as long as people hold onto treasured record and tape collections that sound like they have been recorded through a sock, or mastered on speakers borrowed from the dog-track, there will be a need for tone controls for some of the people, some of the time. It's true that a collector of well-recorded C.D.'s with very little in the way of rogue recordings from the past, owning a well set-up system, has little use for tone controls. A minimalist pre-amplifier will suit this paragon of purity down to the ground. But I suspect there are lots of people like me, who want to listen to the best of their music collection as cleanly as they possibly can, but who also want to listen to the not-so-good as well as it is reasonably possible to hear it.

Tone controls have got lumped in with L.E.D. power meters as a gimmick and they're not. Designed and used intelligently, with discretion and with a provision to by-pass without disrupting overall phase coherence, tone-controls can provide the listener with a means of enjoying that tip-top software without sacrificing audiophile status. Extracting musical merit and providing enjoyment from all forms of electronic and mechanical recording is what hi-fi in the home is all about. Anything that provides or increases that enjoyment, or unlocks that merit, has got to be a good thing ●



# MICROMEGA



## MICROMEGA AND MUSICALITY

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

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

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

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

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

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

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

## THE LOGIC

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

## DUO BS II



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

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# THE ONLY LOGICAL DIGITAL CHOICE



# SPECIALIST SELECTION

Specialist hi-fi amplifiers start at £200. Six rivals are pitted against each other in this report.

The trenches around the £200 - £300 mark for amplifiers have been the scene of some of the most pitched and bloody battles in hi-fi to date. Why? Surely, the most fiercely fought over area in amplifiers should be the budget market, where volume is of greater importance than sound quality. The £200-£300 area is not expensive enough to create prestige products that would reflect favourably on those lower down in the product catalogue. Nor is it cheap enough to cause upward defections from the budget or midi-system market.

While so-called entry-level amplifiers costing little more than £100 still grace many students' systems, the 'first time buyer' of hi-fi equipment is now looking

further afield. The market that we are investigating here is populated with products that could be classed as 'up-market' entry level equipment. It would be rare for someone who already had the hi-fi bug for many years to look at an amplifier in this price bracket. It is equally unlikely that the neophyte would buy a more expensive amplifier readily. I would suggest that the amplifiers we have tested for this report fall into the area of the first upgrade, either from the budget or the midi system.

The sample we have selected shows a cross-section of amplifiers from all walks of life. Under the microscope comes the long-standing £299.90 Arcam Delta 60 amplifier, the effective replacement for the

popular A60. There is Musical Fidelity's Mk2 version of their classic A1 Class A amplifier, at £299. The acclaimed and somewhat controversial Pioneer A-400 amplifier at £239.95 has been included and there is a classic British amplifier, in the guise of the £229.90 Creek 4140 s2. This is accompanied by the tweaked Marantz PM40SE. Finally, staying on the subject of tweakery, we included Sonic Link's £299 DM20 amplifier, from the suppliers of fine tweaky cables and electronic components.

Some of these amplifiers differ quite markedly in quality between different inputs, according to the effectiveness of the engineering in each case. Disc inputs in particular use an extra amplifier stage that has an exacting task. Various design philosophies can be adopted, some proving more successful than others. We tested all six models comprehensively and listened to them using our own facilities. Loudspeakers used were a pair of Heybrook Sextets, with Epos ES11s as alternatives. The CD input was fed by an Arcam Delta 170 transport and a Deltac Little Bit D/A convertor. A Linn Axis and Akito arm with Goldring 1012 cartridge were used for moving magnet inputs. Moving coil inputs were fed by a Linn Sondek with Ittok arm and Asaka cartridge.

Report: Alan Sircom. Listening tests: Alan Sircom and Eric Braithwaite. Tests: Noel Keywood.



## MEASURED PERFORMANCE

This is the successor in spirit to the A60 - the amplifier that set Arcam on their way. That model measured well and sounded supremely smooth and civilised, without lapsing into blandness. The Delta 60 is more powerful and has more punch. Inside, there is a massive toroidal mains transformer that allows it to deliver 60watts into a normal loudspeaker and up to 100watts into a low-load four ohm model.

The CD input is wideband in frequency response, extending from 3Hz up to 63kHz, so this amp will reproduce CD subsonics properly. The disc stages have the warp filter Arcam and most UK manufacturers favour, limiting bottom end response to 30Hz on both MC and MM. Our review sample had a buzz on the left channel of the Moving Coil disc input but otherwise there was less hiss on the Arcam MC input than any other model in the group. It has been designed for high quality, low output types. The MM stage was quiet too and it had low input capacitance. Arcam have quite obviously put some effort into the LP performance of the Delta 60; it was a pity about the buzz.

Distortion was low in the mid-band at 0.005%. It rose at high frequencies to around 0.04% but interestingly this comprised second harmonic only, as our analysis shows. This is very difficult to detect even at 1%. The Delta 60 will sound smooth in its treble as a result.

## TEST RESULTS

Power 60watts

### CD/tuner/aux.

Frequency response 3Hz-63kHz  
 Separation -76dB  
 Noise -96dB  
 Distortion 0.005%  
 Sensitivity 250mV  
 dc offset 2/3mV

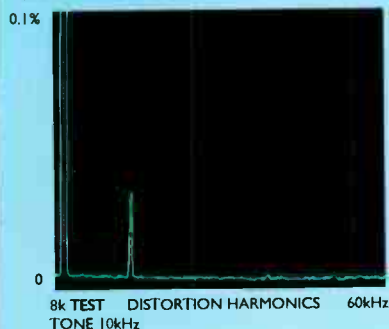
### Disc MM

Frequency response 30Hz-57kHz  
 Separation -85dB  
 Noise -76dB  
 Distortion 0.007%  
 Sensitivity 1.8mV  
 Overload 110mV

### Disc MC

Frequency response 30Hz-57kHz  
 Separation -73dB  
 Noise -68dB  
 Distortion 0.008%  
 Sensitivity 0.16mV  
 Overload 10mV

## DISTORTION



A little second harmonic distortion at high frequencies (0.03%)



## ARCAM DELTA 60

£299.90

comparison review

When Arcam were best known as A&R Cambridge, their big success story was the popular A60 amplifier. Reliable, sweet sounding and slimline, the A60 survived well into the 1980's. When it was finally discontinued, Arcam felt that there was still a need for an amplifier that met those requirements, so the Delta 60 was born in 1988.

Apart from a revision about a year into its life, the Delta 60 remains unchanged to this day. Its design is simple, yet well executed. No superfluous functions have been added, although the addition of the second set of loudspeaker terminals, either for using headphones or two sets of eight ohm loudspeakers, could be construed as such by the 'flat earth' brigade. A button on the front panel, marked 'SP 2' switches these loudspeakers on or off.

Styled and finished to match the Delta range of tuners, CD players and Black Box digital to analogue converters, the construction of the Delta 60 amplifier is flawless and appears extremely rugged and hardwearing. The matt black finish is offset by white lettering and a green LED above the Power button, which is the only display light on the amplifier.

Apart from the LED, the front panel has a series of rectangular buttons. These are, from left to right, the selector buttons for Disc, CD, Tuner, Tape 1 and Tape 2, a Mono button and the aforementioned SP 2 button. Further along from this comes the split volume control, which allows the user to correct channel imbalances. Eliminating the usual balance control improves channel isolation, lessening crosstalk. Finally, a headphone socket and a rectangular Power button complete the front panel.

At the rear of the amplifier, an IEC power inlet and two sets of loudspeaker sockets are to the left of the protruding heatsink, while the corresponding phono sockets are to the right, with the moving coil or moving magnet selector button and earth terminal separating the phono inputs from the rest of the inputs. An addition to the disc stage is the optional £10 cartridge loading module which fits

within the body of the amplifier itself. This allows the user to fine tune the phono stage for cartridges with non-standard loads, such as some Grado models.

## SOUND QUALITY

We began with the Moving Coil stage. This had a disturbing and audible hum; Arcam suggested we rotate the mains transformer. It lessened the problem but did not eliminate it. It would appear that improved screening is needed. This is a shame, because the MC input had very little hiss. Initial impressions of the disc stages were a little disappointing. The phono input, whether MM or MC, seems to be too bass light to give any feeling of excitement or drama to the music.

The sound from the disc stage was never offensive; in fact it was almost too polite. Eric rightly described the disc input as 'armchair' listening. Its detail, imagery and articulation were all agreeable and the bass, while light, at least does not become boomy or flabby. Overall, however, I feel that the sound via disc is slightly too 'smothered' for analogue fans.

Performance via the line stages (tuner/tape/CD) was an entirely different matter. It was still a little dry, lean and sterile in presentation, but the excitement and impact, so lacking in the disc stages, was here in full. Very much in the 'neutral' camp, the CD input is delicate, refined, detailed and articulate, with a fine sense of imagery. The instrumental voices that the Arcam produces appear to be accurate, yet are solidly and accurately located within the wide soundstage. This was especially noticeable with the spoken word; not only was the voice accurately located in the mix, but it was instantly recognisable and the material spoken was clear and easy to follow.

## CONCLUSION

For the CD enthusiast, the Arcam Delta 60 is by far the best of the crop. Its phono stage lets the side down, but only in the best possible taste. A good 'un.



## CREEK CAS 4140 s2

£229.90

One of the long-standing favourites in the hi-fi amplifier market, Creek have been a strong part of the British arsenal. The CAS 4140 is the second amplifier in their range, after the evergreen CAS 4040 s3. Both products are to amplifiers what Lassie is to Border Collies; well-known, dependable and reliable (except that I've never seen a Creek swim through a fast-running river to catch the baddies).

Slightly beefier in power output than its little brother, the 4140 is firmly in the Creek mould. Its styling is as distinctive and traditional as its sound. The black fascia, offset by pale green lettering and wood veneer top and side panels match the rest of the Creek range, but little else. As the appearance is rather understated the 4140 does not stand out and blends well with other equipment.

Its styling looks a little dated when compared with the latest amplifiers, but this may be more due to familiarity than to the design ageing with anything less than grace. Its restrained styling is typified by the lack of any tone controls; the smaller CAS 4040 is not as minimalist in its approach and does give the listener the option of bass and treble controls.

What controls are left are six small rectangular buttons on the left and side of the front panel. These are, from left to right, Disc (MM and MC), Tuner, CD, Tape Monitor, Mute and Mono. As with all tape monitor buttons, Creek's overrides whichever input is in use at the time. Beyond these buttons, there is a large stepped volume control, a smaller balance control with a centre detent, a headphone socket and a small rectangular power button, with a green LED above it.

The loudspeaker sockets accept 4mm banana plugs only and operate in switched and unswitched modes. The switched mode allows the loudspeakers to be disconnected when listening through headphones, but allows the purist to by-

pass this circuit altogether. A moving magnet/moving coil switch is situated on the internal circuit board. There is a row of phono socket inputs for CD, tuner, tape and disc.

### SOUND QUALITY

The 4140's principal strength is its sense of 'niceness', regardless of source components. The amplifier has a distinctively relaxing sound that is quintessentially Creek-like. Where it is set apart from the 4040 is the sense of weight and authority to its sound, which makes the latter lacking in guts by comparison.

The 4140 never fails to sound smooth and easy to listen to. It attempts to cover any faults that either the amplifier or the sources display. This is done by means of careful tailoring, giving a rounded performance at the frequency extremes. Where it scores above amplifiers like the Marantz is that this tailoring of the sound is done with a great sense of rightness, much like Rega turntables for example.

In purely subjective terms, the amplifier performs well on all counts, without being outstanding in any one field. It is on the warm side, but does not bathe everything in so rosy a glow that it smoothes over the rough edges in the music it is playing. Creek seem to trade a little of the dynamic range for a silken coherence, but it seems a fair trade-off, at the price.

### CONCLUSION

As with the Musical Fidelity, the 4140's character seems to pervade all inputs. This consistency is enjoyable, but its rounded, tailored sound may not be popular with everybody; those who are looking for the finest in fidelity should try elsewhere. But for most, the Creek 4140 should not fail to please.

### MEASURED PERFORMANCE

The 4140s2 delivers 40watts into a standard loudspeaker load, much like 4040s. However, at 0.2% it has ten times as much treble distortion than 4040s I have tested. Luckily, because this distortion is even-order in nature - as the spectrum analysis shows - it should not be unduly detrimental to sound quality. Creek need to keep a careful eye on distortion performance all the same. Power increases reasonably well into four ohms, measuring 64watts (a 4040 manages 56watts).

The lower frequency limit of the CD input measured 20Hz. Whilst there could usefully be a bit more subsonic extension, I know from experience that the 4140 is best considered a subtle amplifier rather than an earth shaker, a role in which this limitation can be seen as being of little consequence.

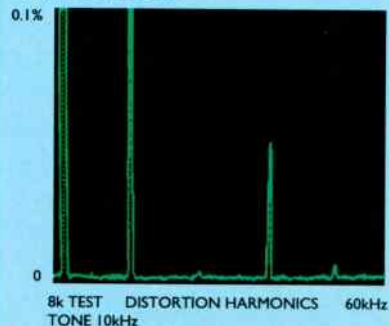
A small amount of plateau treble lift has been built into the disc equalisation characteristic which is likely to add some detailing into LP reproduction.

Disc input sensitivity was 2mV with MM and an unusually low 0.1mV with MC. The MC input overload ceiling was commensurately low at just 1.5mV but a very low input impedance of 12ohms will pull down the signal of high output MC cartridges automatically. It is an odd arrangement all the same. The MM input sensitivity increased to 2mV, which again has commensurately reduced MM overload to the now very low value of 28mV, which is poor. Hiss and hum were satisfactorily low on both MM and MC. Input capacitance was satisfactory at around 260pF on MM.

### TEST RESULTS

Power	40watts
<b>CD/tuner/aux.</b>	
Frequency response	20Hz-43kHz
Separation	-72dB
Noise	-92dB
Distortion	0.02%
Sensitivity	300mV
dc offset	22/10mV
<b>Disc</b>	
Frequency response	30Hz-58kHz
Separation	-63dB
Noise	-70dB
Distortion	0.02%
Sensitivity	2mV
Overload	28mV

### DISTORTION



High treble distortion of 0.2%; second and fourth harmonic in structure.

## MEASURED PERFORMANCE

The Marantz has much the same measured performance as its immediate competitors, all lined up in this report. It offers a good, solid power output of 60watts into eight ohm loudspeakers that increases to 100watts into four ohms. This increase shows that good power supply regulation has been provided, which in turn allows the amplifier to drive low impedance loudspeakers with ease.

The CD input is inappropriately tailored. The high frequencies extend too far - up to 164kHz. The low frequencies don't extend far enough, just down to 12Hz. Distortion was well controlled, measuring a low 0.005% in the mid-band, with a rise to 0.01% at high frequencies. Like the Arcam, it was mainly second harmonic in nature and innocuous sounding as a result. The PM40SE doesn't have coarse treble.

The disc stages were all limited in low frequency extension because Marantz fit a warp filter. This can lighten bass. Otherwise, equalisation proved accurate, but it differed for MC and MM, the latter reaching 90kHz whilst the former reached just 30kHz. This suggests a lack of design rigour.

Hiss levels were low on both Moving Magnet and Moving Coil, but low sensitivity marks out the moving coil stage as unsuitable for low output MC cartridges. This stage was also hissier than those of the Pioneer and Arcam amplifiers. The moving magnet stage gave a better all-round performance.

### TEST RESULTS

Power 60watts

#### CD/tuner/aux.

Frequency response	12Hz-164kHz
Separation	-85dB
Noise	-99dB
Distortion	0.005%
Sensitivity	180mV
dc offset	10/18mV

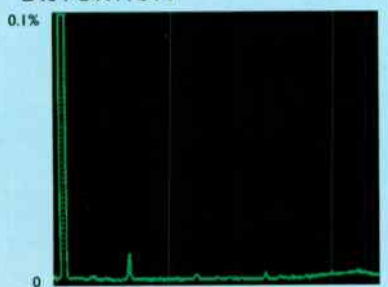
#### Disc MM

Frequency response	44Hz-90kHz
Separation	-79dB
Noise	-87dB
Distortion	0.006%
Sensitivity	2.7mV
Overload	150mV

#### Disc MC

Frequency response	47Hz-30kHz
Separation	-65dB
Noise	-70dB
Distortion	0.007%
Sensitivity	0.3mV
Overload	17mV

### DISTORTION



A small amount of second harmonic distortion at high frequencies



## MARANTZ PM40SE

£230

Having been highly impressed by the commercial success of the Pioneer A-400, Marantz decided that they wanted a slice of that very lucrative cake. This created the latest Special Edition of the Marantz PM40 amplifier, tweaked to the specifications of Doug Randall, the man originally behind the Pioneer A-400.

Modifications made to the PM40 include a second set of terminals to aid bi-wiring, a slightly improved signal path that comes from removing the tone control circuitry, a new configuration of output stage and the use of high-grade components in key areas. This has not caused dramatic changes to the circuit topology, but the Special Edition tweaks do not mean butchery has been performed on defenceless circuit boards. While the tweaks are audible, few visual clues are given, save for the 'Special Edition' logo where the tone controls used to be.

The front panel, stripped of spurious detailing, follows a simple design line. Even so, it still has that distinct look and feel of a Japanese amplifier. In the bottom left hand corner the rectangular power switch, together with a small red LED, sits next to the headphone socket. Along from this, past where the tone controls used to sit, comes the source/direct switch and tape selector buttons. These allow the user to specify tape machines for recording, playback or dubbing, dependant on the input selector knob directly above which can select from Phono, CD, Tuner and Aux.

Next to the two tape buttons comes the button to select Moving Coil or Moving Magnet for the phono stage. Then there is the balance control and, finally, a large volume control, pretentiously marked in dB from infinity to 0. All the knobs and buttons have a slightly plasticky feel, without much resistance to them.

Moving to the rear, the phono sockets are moderately well laid out, but run vertically instead of horizontally. This makes removal of components slightly more difficult than usual. To keep costs down, only the inputs for the CD and

phono are gold plated, with the rest coming in standard nickel plated form. As mentioned before, two sets of chunky loudspeaker terminals are fitted, to aid bi-wiring. Finally, a grey, two-core captive mains lead is fitted to the bottom right hand corner.

### SOUND QUALITY

The Marantz seems to need a good warm up before it starts to play properly. Then it begins to sound mannerly and smooth, to the point of excess, regardless of the source and music playing.

There appears to be a little tailoring at the lower end of the sonic spectrum. All of the inputs seem to be polite and restrained in sound quality, suiting smaller loudspeakers well.

As such, this amplifier appears to lack the confidence and authority that some of the others have. While easy to listen to, the PM40SE lacks some of the fine detail that sets better amplifiers apart. This appears as a sort of cotton-wool softness to bass drums and percussion. The Marantz covers its tracks well however, and also helps to mask some of the problems that beset cheaper CD players.

Detail apart, the amplifier has good lateral imagery, but appears a little two-dimensional in depth. It is nicely coherent, but lacks dynamics and impact. There is no great differentiation between disc and CD stages, save that the level of softness and bass lightness gets progressively more intense as we move from CD to MM and finally to MC. In addition, the MC stage is very insensitive, so that the volume control has to be turned up disproportionately high to play at decent levels.

### CONCLUSION

While producing an amplifier to sound good with similarly priced ancillaries seems a good idea, the Marantz is a little too good at the job and suppresses the verve in music a little too much. It always sounds 'nice' though. ▶

## MUSICAL FIDELITY A1 MK2

£299

One of Musical Fidelity's most successful lines, the hot (literally) little A1, has recently been upgraded to cope with the rigours of modern day life. Today's A1 is claimed to run at 25 watts per channel, all of which are in Class A mode.

Class A suggests the amplifier will sound clean and open, but the downside is that it will run incredibly hot. The original A1 could only run at 20 watts; much more and before long the heat dissipation would cause long-term problems.

To overcome this, the latest chassis has been drilled on the base and sides to improve ventilation. Therefore the new A1 can run at higher voltages without turning the ribbed top plate into a griddle. It still runs hot, however, and as it overlaps the phono sockets at the rear, this can cause singed fingers to those who wish to regularly chop and change components.

For anyone not well versed in Musical Fidelity products, this new version looks virtually identical to the original A1. From left to right, the front panel controls are simple in the extreme. First comes a semi-circular On/Off switch, with a red display light making up the second half of the circle above it. Next comes a larger volume control and a tape monitor button which is the same size and shape as the power switch. Finally, the large channel selector switch is on the right of the amplifier, allowing the user to select Phono, CD, Tuner, Aux and Tape. The volume control has a more positive feel to it than I remember from the original A1 days, although the tape monitor button is still as wobbly as ever.

At the rear of the amplifier, the layout is neat and tidy. On the far left, there is a button that selects whether the cartridge input is Moving Coil or Moving Magnet. Above this is the earth tag and then come the phono sockets for the inputs. These are gold plated, in the same order as the channel selector, and are evenly and adequately spaced. The amplifier's loudspeaker terminals, although not gold plated, are functional and are ideally designed for 4mm connectors. They are

true binding posts, although bare wire enthusiasts could find them a little flimsy for use with the thickest cable. Finally, the fuse holder and two-core captive mains lead make up the final part of the rear panel.

### SOUND QUALITY

The new A1 is definitely in the 'performance' group of amplifiers, as opposed to those that profess neutrality as their raison d'être. Its overall sound, while not colored, is very idiosyncratic and tonally shapes the music to put the Musical Fidelity seal on it. This is a distinctive sound that is both attractive and civilizing on certain pieces of music.

Musical Fidelity founder Anthony Michaelson's love for the clarinet seems evident here, as the new A1 appears almost tailored to the sound of woodwind. This propensity can sometimes leap over to strings, which can take on a distinctly 'woody' air. This characterful sound is followed through consistently on CD and both phono inputs, although the disc stage did sound a little more tailored in the bass regions. The MC stage did appear to be a little noisier than most, but this did not appear to be too problematic in use.

Soundstaging was wide, but the images within did not have the 'bolted-down' solidity of the Arcam. Musically coherent and possessed of good timing, the A1 generally portrayed music well, although low piano notes became muddled and rolled into one another. At times, this slurring spread into the upper registers, creating an effect not unlike a notch filter with certain instruments.

### CONCLUSION

The new A1 had a sweet, alive sound that beguiled, although for some it was too characterful to be acceptable. A 'love it or hate it' product, its sound is reminiscent of a 'Just William' schoolboy; a bit dirty around the edges, but with a great sense of fun.

### MEASURED PERFORMANCE

Form follows function with the A1. Being a Class A amplifier it runs hot, so the ribbed top acts as a big heatsink. It gets hot to the touch, but it does not burn.

Class A amplifiers have a reputation for sounding sweet, but they have low power output, heat being the limiting factor. The A1 in new MkII form, tested here, delivers a paltry 28watts into normal eight ohm loudspeakers. It does not like low loads, output actually diminishing to just 16watts (instead of increasing) into four ohms. Because of these characteristics, the A1 must be matched and used with care. We used Heybrook Sextets because they are an easy load, but because of their average sensitivity the A1 was run at 'normal' volume to be certain it was not clipping.

The CD input has a wide bandwidth at 8Hz-62kHz. Distortion hovers around 0.04% right across the audio band, innocuous sounding second harmonic components being dominant. I wouldn't expect this to be detectable. However, an increase to around 0.5% at high output levels may result in slight roughness if the A1 is pushed hard.

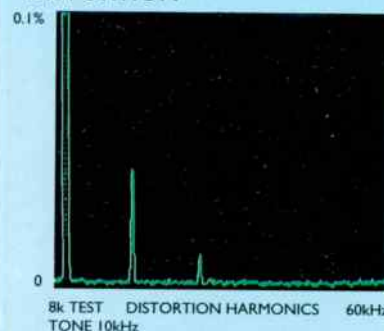
The moving magnet disc input had a bit more hiss than most, plus early bass roll off. The moving coil input was hissy but had more bass. Both could usefully be improved. Otherwise they measured well in terms of sensitivity, overload, input capacitance, etc.

The A1 measures well within certain limits. It needs to be matched and used with care.

### TEST RESULTS

Power	28watts
CD/tuner/aux.	
Frequency response	8Hz-62kHz
Separation	-67dB
Noise	-82dB
Distortion	0.04%
Sensitivity	150mV
dc offset	-15/5mV
Disc MM	
Frequency response	80Hz-50kHz
Separation	-73dB
Noise	-76dB
Distortion	0.04%
Sensitivity	2.5mV
Overload	140mV
Disc MC	
Frequency response	40Hz-50kHz
Separation	-82dB
Noise	-65dB
Distortion	0.06%
Sensitivity	0.22mV
Overload	12mV

### DISTORTION



Second harmonic distortion remained at 0.04% across the audio band

## MEASURED PERFORMANCE

With amplifiers in particular, it is very difficult to correlate measured performance with sound quality, except in certain areas. There has been a lot of argument about this over the years. The Pioneer has been widely acknowledged as a fine sounding amplifier, but the reasons are barely hinted at in its measured performance. This is not to say that it is anything other than highly competent, as I would expect. Note that it costs £80 more than the A-300, yet produces little more power: 66watts against 50watts. The extra volume would be barely noticeable. The money has been spent on better internal components and build quality, as it is on UK amplifiers.

Power increases healthily into a low load, up to 110watts, so the amplifier will deal with awkward loudspeakers and should have good bass wallop. The CD input is flat from 4Hz up to 70kHz and distortion remains at a low level of around 0.02% at all frequencies and outputs. That this figure should be so invariable with operating conditions and consist of third harmonic only, which has a sharpening effect, is an interesting sign.

The disc stages proved very well engineered. They are wideband though; no warp filter is used. The moving magnet stage was unusually quiet, and so was the moving coil stage. However, Arcam's was no less than -6dB less hissier in practice (i.e. in equivalent input noise).

## TEST RESULTS

Power 66watts

CD/tuner/aux.

Frequency response 4Hz-70kHz  
Separation -96dB  
Noise -94dB  
Distortion 0.02%  
Sensitivity 160mV  
dc offset 25/31mV

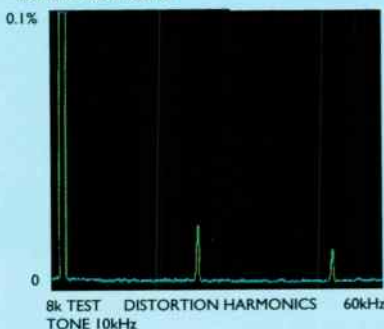
Disc MM

Frequency response 6Hz-60kHz  
Separation -81dB  
Noise -89dB  
Distortion 0.02%  
Sensitivity 2.8mV  
Overload 160mV

Disc MC

Frequency response 8Hz-58kHz  
Separation -74dB  
Noise -71dB  
Distortion 0.02%  
Sensitivity 0.25mV  
Overload 14mV

## DISTORTION



A small amount of third harmonic distortion at 0.02%



## PIONEER A-400

£239.95

A commercial hot potato in today's marketplace, the A-400 has sold around 20,000 units since its introduction last year. What is so special about this amplifier?

First, the A-400 is one of the select few Japanese amplifiers that cater for the British audiophile's apparent hatred of tone controls, eschewing them completely. Secondly, within the heart of the amplifier there beat innovations that few smaller manufacturers could incorporate at the cost. Finally, its line stages have been built to maximise sound quality, giving it a greater emphasis toward CD than is usual even in Japanese amplifiers. Many manufacturers closer to home have expressed dismay over this product as it shows what the Japanese can do when they get their priorities correct.

Regarding facilities, the A-400 is spartan by Japanese standards. The front panel has only one red LED, above the rectangular Power button. Below this, there is a headphone socket. To the right of the power switch is the Record Selector. This allows the listener to record from a source, dub from one tape to another or even switch this section out altogether. Along from this is an identically sized knob that selects the source. This runs Tape 2, Tape 1/DAT, CD, Phono, Tuner and Line, for use with videos or separate phono stages, such as the Michell Iso. Finally, there is a large split volume control, which negates the need for a balance control, and a button to switch between Moving Magnet and Moving Coil cartridge for the turntable.

At the back of the A-400, the nickel plated phono sockets are laid out logically, with the disc and its attendant earth tag set apart from the line stages. A single set of speaker terminals are placed next to these sockets. They are a little flimsy, but they do readily accept bare wire and banana plugs with equal ease. Finally a captive lead exits at the bottom left hand corner; a solidly constructed three core mains lead, that displays for all to see that this is a 'made for the UK' amplifier.

Overall, the amplifier and its manual

are well laid out. The casework is slightly flimsy and both the amplifier and its manual have that distinctly Japanese feel to them, but there is little to complain about.

## SOUND QUALITY

The Pioneer's sound appears to be the epitome of 'hi-fi'; shiny and detailed with instruments very separately defined. On first listening, the A-400 appears impressive. The mid-band in particular is unusually sweet, open and involving in its sound. Imagery, although a little constricted laterally, is precise and deep, with good inner detail. There is no apparent bass overhang, although there is some slight emphasis that marginally raises its prominence. On the whole, the A-400 gives out a sound that is impressive and dynamic, with a good impression of detail.

Closer scrutiny begins to show up sonic flaws in the A-400. While the amplifier is involving, in an emotional sense, the sound appears somewhat detached, as if looking down on the performance. Secondly, the disc stage is not as articulate as some of the others in this test, sounding cluttered and muddled by comparison. This seemed especially noticeable on MC, although the MM stage did not lag far behind.

On highly synthesised pieces of music, the A-400 sounds clean, clear and crisp. Playing something a little less antiseptic caused one listener to suggest that it sounded incoherent, saying that bass, mid-range and treble were all distinct entities. All commented on its lucid mid-band, but opinions were divided as to the merit of its overall sound quality.

## CONCLUSION

I feel that the A-400 has been cleverly engineered to suit English ears; the slight amount of third harmonic distortion that Noel has measured adds a sharpening effect to the signal. This could sound very 'hi-fi', but sometimes at the expense of the music. ▶

## SONIC LINK DM20

£299

Undoubtedly the smallest of the manufacturers represented in this test, Sonic Link products are essentially the work of Graham Nalty. Apart from the standard DM20, he produces a 'hot rod' version, the £600 DM20 Gold, which uses the same circuit layout but far better components throughout. In addition, Sonic Link produce a range of audio cables and can also supply top specification components for re-vamping existing equipment.

Graham suggests in his literature that the loudspeaker cables and interconnect cables should be of a specific type. Obviously, as a supplier of these cables, he has his best interests at heart, but it shows the tweaky nature of the DM20.

The amplifier is a little 'cottage industry' in construction; while it is solidly built, its finish is nowhere near as slick as the others in the test. The same is true of the photocopied manual. This goes into great lengths about cables, interconnects and even the fuses, which are special 'audio' models, but little is said about the mechanics of plugging the system together. In fairness, the manual is concise and relatively informative, but the total newcomer to hi-fi may be left a little confused.

The DM20 comes with Moving Magnet phono input only; Graham Nalty suggests use of a transformer for Moving Coil cartridges. The front panel of the amplifier is finished in brushed black with pale pink lettering. From left to right, there is a large rotary Power knob and matching Volume and Balance controls, with a headphone socket and a power-on display LED separating the Power and Volume knobs. To the right of the Balance knob are five small buttons. The first is a tape monitor button, while the rest are more standard channel selectors for Video, Radio, CD and Disc.

To the rear of the amplifier, the solid earthing post is in the far left corner, followed by a set of standard plated phono sockets for the relevant inputs. On the far right are the single set of loud-

speaker terminals and an IEC socket for a mains lead. This end of the amplifier was a little deformed, due to the weight of the toroidal transformer inside.

### SOUND QUALITY

Unfortunately, the Sonic Link amplifier's strongest point - its 'characterful' performance - is also its greatest weakness. Not only is this amplifier heavily system dependent, it is also music dependent; certain genres of music fall apart due to the amplifier's lack of integrity.

On the positive side, the amplifier was surprisingly good on guitar-orientated rock music, although this was tempered by a cluttered, overblown feel to the lower regions. This turned graunch into grunge, mudding the low end considerably, although this must be tempered by an enjoyable warmth that pervaded some rock tracks. Cymbal sounds became tinny, bright and splashy and not very cymbal-like. Vocals were quite easy to follow, but appeared a little recessed and lacking in focus.

Imagery was good, lacking in precision but with a width that was better than expected. Instruments did not seem to wander around the soundstage, although it was difficult to determine their exact location. The biggest problems with this amplifier were its lack of detail, precision or clarity. This became most noticeable with classical programme; whereas rock music had much of the nasties glossed over by the euphony, the clarity needed for earlier classical music was not available. What appeared in the place of the clarity and detail was a brashness to the strings, giving rise to an overbright sound.

### CONCLUSION

I was hoping for more from the Sonic Link DM20. Its more expensive brother has a lot of potential and falls into the 'interesting' category. The standard DM20, by comparison, falls short.

### MEASURED PERFORMANCE

The essence of this amplifier is that it uses no feedback. The benefit is said to be a better sense of 'life' in the sound, alternatively described as 'enhanced dynamism'. One value of this approach is - or should be - that it demands a very good basic circuit arrangement to minimise distortion. It is proven that distortion colours sound quality, the precise subjective effect depending upon the type of distortion and its amount.

The DM20 produces a lot of distortion. Its designer says this is not audible; we thought it clearly was. At normal outputs of a few watts, levels hover around the 1% mark. If this was second harmonic only it might be tolerable, but the harmonic structure was very extended, as the analysis shows. Such a structure adds coarseness and reediness into the sound, something we heard with the DM20.

As output increases up to a limited maximum of 28watts, distortion increases considerably as well - up to 3% or more. So the DM20 looks none too impressive in this important area.

High frequency response has been rolled down early, reaching just 15kHz. This affects both the CD and disc stages.

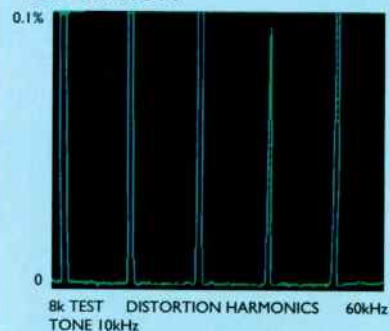
The moving magnet disc input was insensitive and a little hissy compared to many. Disc equalisation was accurate from 30Hz up to 15kHz however, and input conditions correct at 47k/260pF capacitance.

### TEST RESULTS

Power	28watts
CD/tuner/aux.	
Frequency response	23Hz-15kHz
Separation	-60dB
Noise	-93dB
Distortion	1%
Sensitivity	160mV
dc offset	none (capacitor coupled)

Disc	
Frequency response	26Hz-15kHz
Separation	-72dB
Noise	-73dB
Distortion	1%
Sensitivity	4mV
Overload	160mV

### DISTORTION

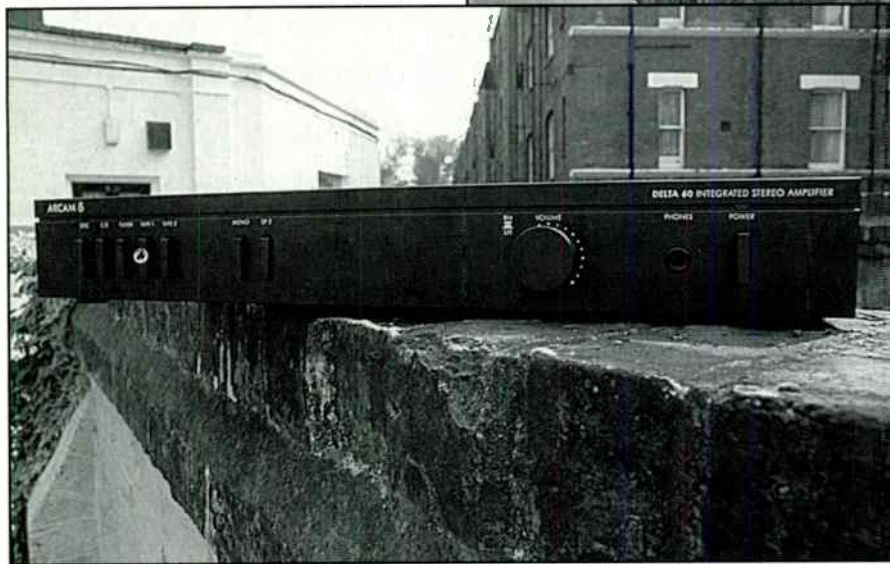
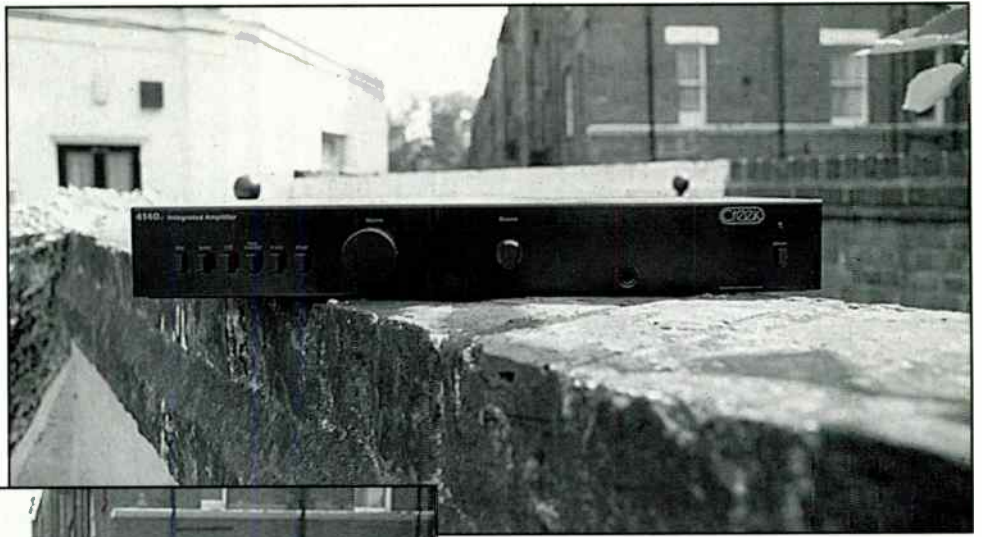


Extended distortion harmonics at a high level of 1%

# CONCLUSION

There is wide diversity within the amplifiers that we feature here. One would expect greater similarity at this level. At the higher end of the market, where the lack of price constraint makes differences more apparent, it is easier to perceive the tastes of the designer. In this range, where price is still an important issue, the products should sound similar, at least by normal standards.

Nothing could be further from the truth. Each amplifier in the group sounded very different from its peers. Some opted



for the path of neutrality, while others added their own character and interpretation to the music. This made choosing a clear running order difficult, as individual listeners could find merit where others might find fault.

The amplifier we least favoured was the Sonic Link DM20. Graham Nalty, its designer, has some very distinct views on hi-fi sound - views that none of us happen to share it seems. At best, the DM20 could sound fun, but its character was too obvious for it to receive recommendation. Use of Sonic Link cabling throughout would improve matters, I believe, but if an amplifier is so cable dependent, then I cannot accept it as a viable commercial proposition suitable for general acceptance. Measured performance was unusual too.

There was a bunch of amplifiers best described as the 'middle four'. They fall into the 'horses for courses' camp. Not one of the amplifiers in this category has any major faults and I believe all have their place within the market. There was much healthy discussion between us on this matter.

First, the Marantz PM40SE. Its tailored sound will not suit all, but its coherence and sense of delicacy does set it apart from most other Japanese amplifiers. Both vinyl and Compact Disc performance was adequate, but I feel the Marantz favours CD. Its sound has a nice warm quality which makes bad CD sound pleasant.

Lovers of deep bass and fine detail will not be too impressed, but it will be popular with those who are looking for a system that seldom offends. If you do not want to spend a fortune, this amplifier, partnered with a source like the new Marantz CD52 tested last month and loudspeakers such as Celestion 3's, would integrate well.

Next comes the Pioneer A-400. Frankly, we all expected slightly more from this amplifier. I don't think the A-400 is a bad amplifier; far from it, but I do feel that it has been misunderstood and hyped up a little too much. It is very good in most respects, although it is a little too 'hi-fi' for some tastes. Lacking coherence and also sounding a touch bright, it did have a sweet mid-band that appeared almost artificial, it was so pronounced. The strongest inputs are its line stages, with the phono stage coming a poor second. I think the A-400 amplifier will suit those who like things clean, clear and a little 'hi-fi'. Its clarity lends itself more to expensive equipment. While I do not think that the Pioneer quite deserves the extremity of praise it has received in the past, I can see why the amplifier is so popular.

Arcam's Delta 60 and Musical Fidelity's new A1 are about equal, but in radically different ways. Starting with the Arcam Delta 60, it tries to be the most neutral of the amplifiers in the test. In this respect it comes very close to being the best of the bunch. On CD, the Arcam was the finest

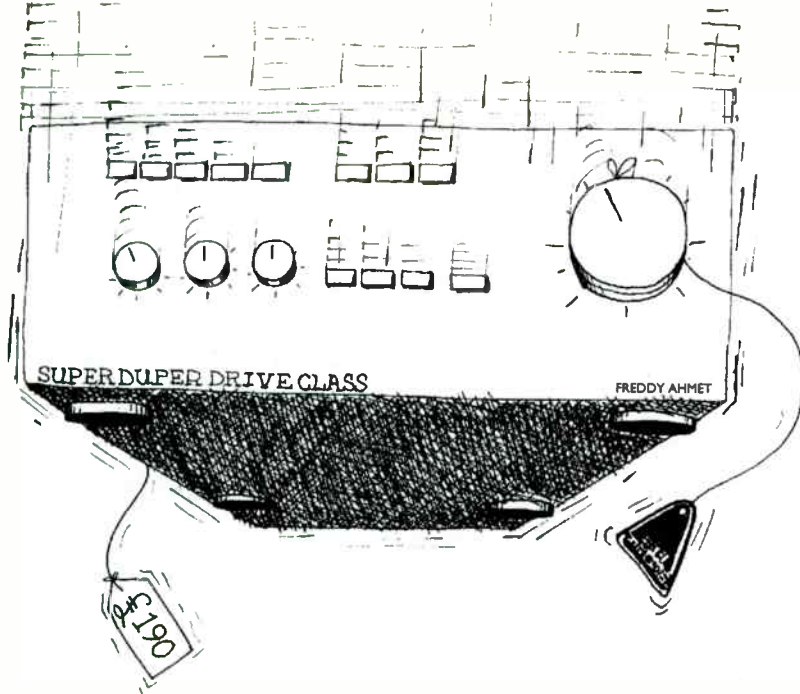
of the group, surpassing all by nature of its coherent, clean and accurate sound. This would suit those who appreciate such a presentation; a natural and complementary system to this amplifier would be something like the Arcam Delta 70.3 CD player and Epos ES11 loudspeakers.

Unfortunately, the Arcam was seriously let down by its phono stage, which sounded dull, flat and squashed. Our sample had a noticeable hum on the moving coil input too. Should the buyer have no intention of using phono to any great degree, then the Arcam deserves to be listened to. If, on the other hand, the potential buyer intends to use the amplifier with a mix of formats, then the Arcam fails to give the best that is possible.

The Musical Fidelity A1 works equally well on all formats. Its inputs all work with equal grace in terms of sound quality, never making a mess regardless of the quality of source. The amplifier works with both cheaper and expensive sources with equal aplomb. The A1's idiosyncratic sound and its low power prevent it from being universally recommended, but for some the sound will be so seductive that there may well be no other choice.

This leaves one last amplifier, the Creek 4140. It is far from perfect, sounding a little polite and 'rolled off' at the frequency extremes. However, the Creek wins out in this test almost by default. Its politeness is a great strength; there was plenty of grunt to be heard on both Moving Magnet and CD when needed, but the amplifier never sounded out of control or nasty. The 4140 is, subjectively, warm and relaxing. It is also detailed and coherent in presentation, which ensures that none of the others can manage better in an overall sense.

Some of the amplifiers in the test were more dynamic, some have better imagery, but none can beat the Creek for pace and life. It is one of those amplifiers that has an almost inbuilt sense of rightness to it that provides a strength the others lack. This will be proven in value by the length of time before upgrading. I believe that the Creek will resist that bug longer than any of the other amplifiers in this test ●



# buying an amplifier

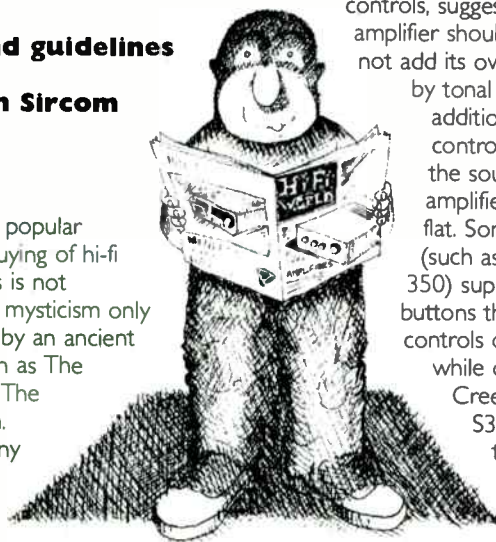
## Hints, tips and guidelines

from Alan Sircom

Contrary to popular belief, the buying of hi-fi components is not shrouded in mysticism only understood by an ancient order known as The Keepers Of The Specification. With so many products around, I admit

that it can be a little daunting for the layman to feel confident in making a choice, but with a little commonsense and a few weapons in your arsenal, the process becomes far easier. One of the areas that seems to be the most confusing is that of amplifiers.

The amplifier is one of the key parts of a hi-fi system - ask anybody who's had a model that frequently broke down. Unlike cassette decks and tuners where, for the most part, a failure is inconvenient, a poorly amplifier has a crippling effect upon your hi-fi system. It is also one of the few parts of the set-up that can damage another component: the loudspeakers.



Technically, all that an amplifier is supposed to do is turn a minute signal, from a turntable, Compact Disc, tuner or whatever, into something powerful enough for the loudspeakers to reproduce at respectable sound pressure levels. This is one of the reasons why many audiophile amplifier designers produce models with no tone controls, suggesting that an amplifier should merely amplify, not add its own interpretation

by tonal alteration. In addition, most tone control circuits affect the sound quality of the amplifier even when set flat. Some amplifiers (such as Denon's PMA-350) supply 'tone defeat' buttons that switch the controls out of circuit, while others (such as Creek's CAS 4040 S3) try to produce tone controls that do not cause any effect when at their central positions.

Tone controls still exist, however, for a variety of reasons. First, many people like to 'beef up' the sound of their recordings by adding bass or cutting treble and so on. Secondly, some think that it is possible to dial out the acoustics of a room by using tone controls (while this is possible in principle, the gross shifts in tonal balance they produce usually preclude a good sound). Finally, tone controls are good selling points for the manufacturers; as they add a plethora of knobs and faders, they also add tangible value for money.

The upshot of this is that when looking for your new amplifier, examine the front panel. Do you

really need all those tone controls and loudness buttons, or can you survive without them? This is not meant as a criticism of every amplifier with tone controls, but only to suggest that they are not as vital as you might be led to believe.

While looking at the functions on the front panel, ask yourself how the amplifier's facilities match up to your needs. It is pointless to buy a purist amplifier with two or three inputs and no headphone socket, when you have six sources and listen through

It is pointless to buy a purist amplifier with two or three inputs and no headphone socket, when you have six sources and listen through headphones at least twice a week.

headphones at least twice a week. This may be an exaggeration, but to attempt to buy an amplifier without working out your requirements first can end with an annoying omission, that could so easily have been avoided.

## Listening

If it is possible, arrange to listen to the amplifier, preferably in an environment similar to your own. This would hopefully avoid having comparators and banks of equipment all singing in harmony with it. Ideally, this should take place either at your home, or in a room set aside for such demonstrations. Either way, the equipment used (turntable, CD, loudspeakers and so on) should approximate to your own equipment as much as possible. Do also make sure that the dealer has an alternative or two for you to hear as well. No two ears are alike: you may prefer another amplifier to the one that has been suggested. Only by listening and comparing can a reliable choice be made.

If this option is not available, then we only have magazine reviews and the manufacturers' specifications to go on. When looking for a review on an amplifier, or any other product for that matter, try to find more than one reviewer's comments on it. Individual reviewers can have wildly different



tastes and are more than capable of writing polemics on products that are undeserving of the praise (or venom) heaped on them, although a good product should stand out regardless of the writer involved.

### Specifications

Manufacturers' specifications are a more complex area. At times, it seems that there are lies, damned lies and manufacturers' specifications. While most of the established companies publish specifications that are both true and accurate, the more unscrupulous will attempt to blind people with science. The figures most often quoted are Power Output, T.H.D. (total harmonic distortion), Frequency Response and S/N (signal to noise) Ratio:

a) Power Output. This figure states the maximum possible transfer of power to the loudspeakers, usually measured using a 1kHz signal through a specific load impedance (normally eight ohms, to approximate a conventional loudspeaker). Unfortunately, this power output can be quoted as r.m.s. (root mean square), peak output or music power, all of which are very different.

Rather than get overly technical, let us just say that figures quoting, say, "100 watts r.m.s. into eight ohms" are infinitely more reliable than figures such as "100 watts music power," as there are no standards to compare music power against.

Many people inadvertently confuse the amplifier's power output with the amount of volume the system will produce. As the sound pressure levels are related to the efficiency of the loudspeakers as much as to the amplifier, this is fallacious. A good 30 watt r.m.s. amplifier will produce bigger SPL's with a loudspeaker that has a sensitivity of 92dB/W at 1m than a 60 watt r.m.s. amplifier with a loudspeaker of only 80dB/W at 1m.

b) Total Harmonic Distortion. Music consists of fundamental tones and a series of overtones, or harmonics. Unwanted harmonics can distort the sound coming from the system and as such are best eliminated. This figure, expressed as a percentage, should be as low as possible, with 0.03 the current standard.

Certain amplifiers, particularly valve models, flaunt these figures successfully, not due to any magical properties, but because the amplifier only produces distortion in the second harmonic, which has little audible effect.

c) Frequency Response. This figure is usually quoted as "15Hz to 20kHz  $\pm$ 1dB", giving an effective frequency range of the amplifier, its limits and the amount of variation within that range. Usually, the frequency response chart shows that the variation

is at the frequency extremes, but there are exceptions that have a response looking like a map of the River Thames.

Generally, these figures should be pretty similar from one amplifier to another. Go for the one with the widest frequency range and smallest variation.

d) Signal to Noise Ratio. Expressed in decibels (dB), this figure expresses the output of the music, set against the amplifier's background electrical noise. It is measured at full volume, with flat tone controls and the noisiest input, usually the phono stage. The higher the figure, the lower the noise.

Aside from the manufacturer's specifications, the reviews and the actual listening tests, there is little else that we can say with regard to the performance of the actual amplifier. Although an amplifier might look good in terms of statistics, this is no arbiter of how good or bad it will

Although an amplifier might look good in terms of statistics, this is no arbiter of how good or bad it will sound in real life.

Many amplifiers perform terribly on the test bench, but sound wonderful, while others will produce exemplary measurements, but sound poor. The specifications should be used to confirm or add credence to your judgements, based on listening tests.

### Servicing

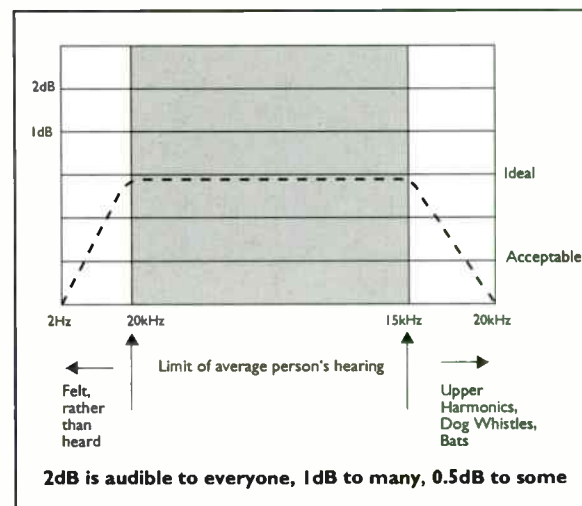
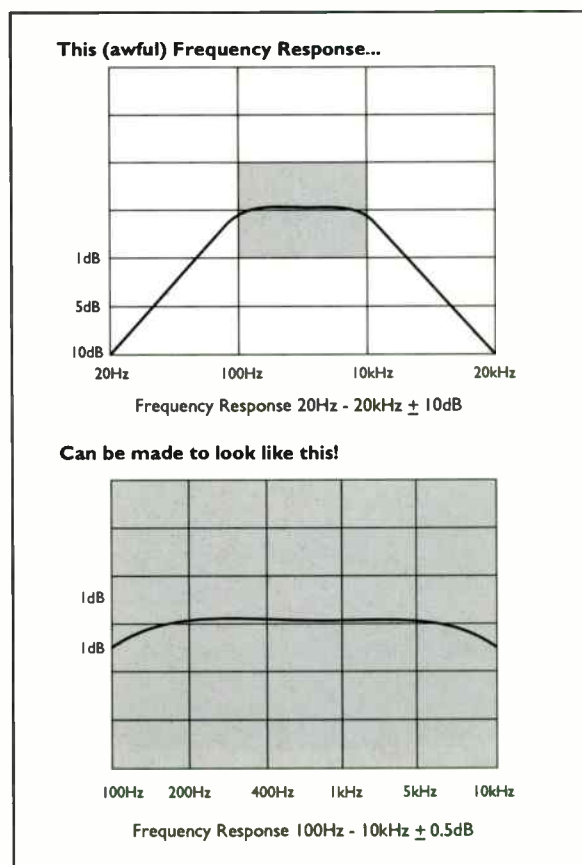
Finally, before committing yourself, check out the service backup the manufacturer offers. This is one area where the magazines are of little use. We get products in for testing for no more than a few short weeks. In that time, they rarely fail on us, and even if they do, we can be sure that the manufacturer will make a speedy repair. The same cannot always be said for the ordinary customer, although there are many companies that do not make any distinction.

For the same reason, we cannot pass comment upon a product's reliability: only time will tell. If the company supplying the amplifier and

the manufacturer behind the product have service departments that are well stocked and thorough, this usually means there will be little difficulty in having it repaired, should any problems arise. It seems a strange paradox, but those companies with the finest service departments are often also the companies whose equipment has an enviable reputation for reliability.

It is not as daunting to make a successful purchase of an amplifier as it first seems. There are pitfalls, but armed with a little knowledge, most can be overcome easily. Listening tests are by far the best way of choosing, but if this is not possible, buying an amplifier feeling confident about its performance and back-up is far more rewarding than buying one because it looks pretty and has lots of functions ●

Understanding  
Frequency  
Response



**I**n June 1989, Robert Dowse, Guy Sergeant and myself made an almost historic trip to Japan, with the purpose of bringing back the technology and rights of manufacture to the Audio Note cartridges, I say historic, since this to my knowledge is the first time this type of knowhow has been transferred from Japan to the UK, it normally happens the other way round!

The Io cartridge design appeared first in late 1978 and achieved wide acclaim as one of the absolute references in terms of dynamic range, tonal balance, lack of colouration, timbre reproduction, etc. etc.

The Io design incorporates a number of key elements that contradicts past and present accepted design practices as such it provides an interesting study into how careful research, and meticulous execution of the results, can lead to a design that is not just very different, but also better than all accepted references, new or old alike.

Several features in the Io's design have been studied and copied by other manufacturers, but in spite of that and the fact that it has remained unchanged from the day it was introduced the Io design has maintained its sonic superiority in comparison to what is available today as it did when it was first launched. So much for development.

The Io cartridges are available in two versions, the IoIv and the IoLtd. They differ significantly in the way the magnetic field is generated. Where the IoIv uses two high quality ALNICO magnets combined with pure iron yoke to make a very powerful, well focused and extremely "stiff" magnetic field around the coil. (Easily the best conventional magnetic circuit used in any available cartridge), the IoLtd.'s magnetic circuit is even more sophisticated as it uses an energized field. This is generated by an electromagnet inside the cartridge, which takes its supply from an external power supply via two extra wires in the arm, but despite the fact that the field strength is slightly lower than the IoIv's, it is much more linear, due to its greater "stiffness" and evenness.

The two Io models share the same Titanium cantilever, van den Hul stylus, gun metal body, Audio Note silver wire and exceptional non-resonant body structure which combine to make these cartridges final analogue statements.

The IoIv will set you back £ 1,295.00 and the IoLtd. £ 2,950.00 including power supply. There is an economy version of the IoIv on the way, dubbed the IoIv it is planned at £ 895.00.

### Matching Transformers.

When you look at buying a quality MC cartridge one aspect that is often overlooked is the quality of the matching input stage used to amplify and/or impedance convert the signal from the MC-cartridge. This subject is very controversial, as most amplifier manufacturers will tell you that their MC-input stages are not only adequate but ideal for most MC-cartridges and whilst there can be some truth in this, it is even more significant that all the MC-cartridge manufacturers that market their product under their own name, only offer transformers. So who is more credible? The amplifier manufacturers or the people who actually design and make moving coil cartridges? (I am here excluding the considerable number of companies that market MC-cartridges under their own name which are made by an external supplier.)

The economic facts speak for themselves. It is much cheaper and simple to make a small amplifier stage and tag it on to a phono stage to cater for low output cartridges. In the current facility-oriented market it adds to sales, but beware, when an amplifier manufacturer says "better" he might mean "cheaper".

Transformers, on the other hand, are costly to make and require considerable technological skill to design, on top of that it is only really possible to design them with two input impedances, so they generally offer less flexibility at a higher price (except for the inexpensive and excellent Ortofon T5s), but what about the performance and sound quality?

As a general rule a well designed transformer is far superior in bandwidth linearity and dynamic transfer to an active amplifier, no matter how quiet, and as such normally sound better, but not all transformers are ideal, the relationship between a given cartridge's impedance and the input impedance of the transformer is very critical and not all cartridge manufacturers disclose their coil impedance, which makes it very difficult to determine matching input impedance. Therefore for practical reasons it is in some cases better to stick with the MC-input provided in your pre-amplifier. You can always check the quality of your amplifier's MC-input by buying a pair of Ortofon T5s, if they sound better then you have a problem. You could also consult a knowledgeable dealer, the cartridge manufacturers representative, or buy a transformer (only after having tried several to ensure longterm satisfaction).

If you are buying or already own a top flight MC cartridge, however, you really must use a transformer, and with an Audio Note IoIv or IoLtd. it is an imperative for optimum performance. Fortunately Audio Note make a couple of very good transformers, the AN-6D and AN-7D, offering both switchable in- and output impedances. They are the best and most versatile MC-transformers available (what else did you

expect from the designers of the ON-GA-KU?), but, being silver wired both inside and out they carry the usual "penalty" for ultimate quality; price. The AN-S6D costs £ 1,995.00 and the AN-S7D £ 3,495.00, you may want to look at a less expensive alternative. The Audio Innovations Series 800 and Series 1000 MC matching transformers will prove the best choice for most cartridges.

Lastly, following in the vane of last month's letter in Hi-Fi Choice, I think it is appropriate to draw some conclusions from the observations made there.

Change for the sake of change and not improvement or advancement proves worthless in the long run, and this is amply demonstrated by how well a given piece of equipment survives the test of time. We all like to own quality, to most people a Mercedes or BMW represents a desirable car to own, they generally maintain their value very well and are sought after secondhand. In common with these cars the audio equipment that is sought after features a product philosophy that aims at a longer performance window, which results in an end product containing less "fashion" and more real world performance engineering.

The lessons that can be learned from all this are therefore obvious, buying a valve amplifier of good quality, or buying a speaker that contains less "POP and fashion features" guarantees, in more cases than not, a product whose basic performance stands the test of time very well and therefore represents a far better investment (not just in terms of sound quality) than the equivalent "trendy, latest gadget, flavour of the month technology" product that could be acquired for the same price at the time.

Quick model changes do not advance sound quality and are diametrically opposite to longterm product value and viability. Fundamental research and development does not advance very quickly, despite what manufacturers' advertising will have you believe.

Increasingly, the music is left to serve the sale of the equipment, not the other way round. I think it is high time the whole audio industry reviewed its priorities.

Enough said?  
More later.

*Peter Qvortrup*

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# *transmitting the information*

The BBC's 'White City' building, built on the site of the old White City Greyhound Stadium. This is the new home of the Engineering Information Department and the Panorama team, among others.



The people who can advise on perfect reception - the BBC Engineering Information Department - visited by Eric Braithwaite.

Looming large just a hundred yards from White City Underground station in London is a new seven-storey white block which, with its dark windows, looks as though it's the strayed upper works of a huge ocean liner. The area has always been known as White City, so it seemed obvious that the name should be transferred to this giant building: it has become known as BBC White City.

Up on the fourth floor is the BBC's Engineering Information Department. It has recently been moved from Portland Place into this cool, grey-corridorred and blue-carpeted building. From this base they now serve the BBC, the listener

(or viewer), and the trade. The most obvious part of their business is dealing with the public's complaints and queries about broadcasting and transmission quality. They reply to around five thousand letters and twenty thousand phone calls a year.

Most queries relate to the quality of reception at home. This isn't new. Back in the mid twenties, when scheduled broadcasting had barely begun, the number of complaints reached fifteen thousand in one year. Those were the heady days of wireless, and most of the moans were connected with oscillators in neighbours' sets creating howling and whistling interference.

Now it's more likely to be a taxi service or police station's transmissions. "Our engineers have been practically everywhere in the country," said Peter Lonsdale, Head of Liaison, "so they quite often know what's wrong. You can sometimes hear them listen to the problem on the 'phone, then say, 'Oh, you must live near-so-an-so's fish and chip shop' and go on to explain how the problem can be fixed." Apparently, the callers often find it hard to believe their problems are being sorted out in London and not from a mobile phone at the bottom of their garden.





**Above: A BBC Range Rover back at base after covering the length and breadth of the country in search of reception difficulties and listeners' (or viewers') problems.**

**Right: Inside the Range Rover. Left of the TV monitor and frequency analysers is the unexpected slim black fascia of our Hitachi tuner.**



Alan Lasserty, Manager, of the Engineering Promotion and Publicity Section, said many people have trouble with their aerial, or lack of it. "They're still dangling their bit of string out of the window, and wondering why it doesn't sound very good," he said. Peter Lonsdale was quick to emphasise that a good aerial was essential. "It doesn't need to be expensive," he added. "A fairly cheap four or five element aerial is sufficient for most people. We reckon you should look for a gain of 4 or 5 dB; if it's a difficult reception area, it's usually better to add a masthead booster amplifier rather than put up a bigger aerial. One more element will only add about 1dB, and they become bigger and more liable to come down in a gale. A masthead amplifier could increase the gain by 10dB."

The BBC Engineering Information Department does provide an instruction leaflet on a DIY aerial for FM reception. "And a TV aerial?" I asked. "No. The measurements have to be much more exact; just a millimetre or two out, and it won't work properly." The most expensive part of it is the aluminium tubing, but as Peter pointed out: "There are a lot of the old H type aerials from the VHF television days kicking about. Clean that

up with wire wool, and you have a lot of the tubing for free." Generally they recommend professional installation.

"Look for the letters C.A.I. (Confederation of Aerial Industries) in an installers' advertisement. Using one of their members should guarantee a good job."

"We did have one caller who put his own aerial up in the loft, and it wasn't sounding any good. It turned out he'd put it up back to front." For those still unsure, and willing to nip out and take a look at the chimney, the widest rod should be furthest away from the transmitter, and the narrower ones nearest to it.

It helps to know where the transmitter is, of course. One wall of the BBC office was lined with files and Ordnance Survey maps showing the area every transmitter covers, and any blackspots. (or red spots - they're marked in red ink) Each area has been surveyed by one of the six engi-

neers who are constantly on the road in the three adapted Range Rovers, and on average at least seventy checks are carried out on the performance of transmitter from points all around it. The results are put on a computerised map - if you don't know the best direction to point your aerial, Engineering Information can tell you.

Maps are available for the consumer, too, showing the area every transmitter covers, but there are always additional local factors to consider. "The most obvious are things like new tall buildings which get in the way, so the nearest transmitter as it appears on the map might not be the best," said John Penniger, Senior Engineer Promotions, as he led the way to the car-park to look at one of the Range Rovers the engineers use in the field.

"It's a bit embarrassing, but to show

you the sort of thing we do," he said, looking over towards an estate of two-storey houses, "when this building went up it created a shadow and mucked up those people's reception from Crystal Palace. We had a little relay put up for them." The same applies even when it isn't the BBC's fault!

The Range Rovers are fitted with a mass of test equipment and a telescopic aerial array which extends up to a height of ten metres. "That's the height of the average chimney," said John, "and the aerials are the same simple ones we'd expect the ordinary householder to have." The vehicles are Police Specification - no walnut trim or carpets inside like our Editor's - bought because they have a rugged no-nonsense approach to out-of-the-way places and awkward climbs. "We expect them to last about six years; they exceed the length of the country. The one you're looking at has done 24,000 miles in the last fourteen months."

Inside they're stuffed with test gear and one little item that had a familiar domestic appearance. Leaning over the operator's seat for a closer look, I discovered it was a Hitachi tuner, the same model - the FT5500 - which we use as one of our references. The BBC reasoning is the same: it has superb separation, is very sensitive, and, said John, "we know exactly what we're listening to." It's used to check whether domestic reception from the transmitters is as good as it should be.

### Tuning Clinic

A different array of equipment met my eye a few yards across the car park when I entered the 'Tuning caravan'. Anyone who goes to the County shows will have come across it between March and September. "We used to take it out in the winter," said Peter Lonsdale, "but it gets very cold in there." His colleagues looked distinctly blue at the memory.

Inside, there are four car radios, ranging from a "pretty decent, considering the price" £40 model to a £300 Radio Data System model. Ranged on shelves were a batch of portable radios of the sort to be found in the average home, from basic analogue to pricier synthesised digital tuning affairs. "It's all to demonstrate how to get the best sound at home," John explained. To make people feel more at home there's even a Technics rack system installed. "It's not there because it's the BBC's all-time great system," they were quick to explain, "but because it's the kind many people know." Not so common in the home are the speakers. They are - what else? - LS3/5a's, the BBC's own tiny monitor design. "Everyone who comes in loves them," added John. "They sound so sweet and realistic."

"We were up in Hull," reminisced Alan Lasserty later, "and I went to a sandwich shop where the owner had his transistor on top of the deep freeze and complained he could hardly hear anything

for the interference" Alan moved it and turned it around. "He was amazed; he said he'd never heard it sound like that before. But he wanted it within reach back on the deep freeze, so I borrowed a piece of aluminium foil and stuck it to the wall behind the aerial. It worked a treat." Since we all have a transistor in the kitchen placed where reception is far from ideal, it's a tweak worth trying. A sheet of foil underneath the radio will sometimes work wonders too. The engineers did ask me to emphasise

called Eureka 417. DAB will be on stream, as far as our European partners are concerned, from 1995. People with FM tuners need not fear redundancy - FM transmissions will continue to run in parallel for at least two more decades. That leaves plenty of time to sharpen up the pencils for another Analogue v. Digital debate ●

**Below: The BBC's tuning caravan. Familiar domestic transistors ranged above car radios either side of a Technics rack system.**



'sometimes': it's always better to move the radio where reception is best.

I was visiting the day after BBC TV had begun broadcasting in NICAM stereo, and they were all looking slightly haggard after having spent from seven in the morning until ten at night answering questions from viewers about how to receive it. They use a Motion Electronics NICAM decoder/tuner in the caravan, by the way, and one of the engineers had built one from a Maplin kit which, he said, worked well. There was a good deal of sorrowful head-shaking when I admitted I was still living with a good old steam mono telly.

It's not only the public the engineers advise; they are constantly listening to domestic tuners. The week before, they'd been playing with one of Sony's new range of domestic RDS sets, at least one of which we hope to have for review shortly. If you're a regular listener to the BBC World Service, you may have heard one of them reviewing radios and tuners on a programme called 'Waveguide'. They advise manufacturers too, but were rather coy about saying which ones for understandable commercial reasons.

While I was there they were all enthusiastic about Digital Audio Broadcasting, a system which is all-digital from the source in the studio through satellite to domestic receiver. The BBC are involved along with Philips and Grundig, among others, in a European project

#### ● ADDRESS:

BBC Engineering Information,  
White City,  
201 Wood Lane,  
London W12

Tel: 071-752 5040

#### ● Radio Helpline: 0345 010313

#### ● Leaflets and Information Sheets:

- Aerial Installations for FM
- Digital Audio Broadcasting
- Finding that Wavelength
- Improving your FM Radio Reception
- Introducing RDS
- Listening to Stereo Radio
- Long Wave Radio
- Make an FM Radio Aerial
- Medium Wave Radio Reception
- Radio Data System
- Radio Frequency Finder
- Radio Reception on the Move
- Radio Transmitting Stations 1991
- Taking your Radio Abroad

- Colour Maps are available to show the area served by each transmitter and relay - just supply the name of your home town.

In the June issue of this magazine I reported on an excellent little tuner from Ion Systems, the £295 FMT1 which, as well as turning in a rewarding sonic performance, pleased me with its minimalist styling and ease of operation. I realise that my dislike for digital tuners makes me appear to be a Luddite but I have to say that I've yet to hear one whose sound quality comes within a country mile of that obtainable from those of the analogue persuasion. The two-box Ion FMT2, tested here, does nothing to alter my opinion.

The use of analogue tuning doesn't make designs which employ it any less user-friendly or convenient than their micro-processor controlled brethren. The £688 FMT2 is simple to operate and it can be got up and running in a very short space of time.

Setting it up proved uncomplicated and trouble-free. Mains power is applied to the X-PAK1 or X-PAK2 via an IEC

PAK2, costing £259, which can supply both the tuner and another component like a preamp.

I used the manual tuning facility throughout the review period, mainly because I'm used to it through having lived for years with my reference tuner, the Naim NAT-02, which is a fully hand-cranked design. I can live quite happily with no pre-sets but those who can't will find three fitted to the FMT2. These are tuned-in via individual multi-tum preset controls accessed via holes in the underside of the tuner's case, a system which proved far more user-friendly than the complicated and easily forgotten sequences of button pushing which most Japanese tuners demand. Ion recommend that before adjusting the pots the tuner should be allowed to warm up and stabilise for thirty minutes and that it is left powered up thereafter.

Two options are available for aerial connections, a standard 75ohm

quality ain't hi-fi and its inclusion in a tuner with hi-fi pretensions is purely for convenience and perceived value. I'd rather see manufacturers recognise this fact, omit it altogether and spend the money wasted on its provision improving the FM stages.

I chose to compare the FMT2 with my NAT-02 as their prices are sufficiently similar to make them likely competitors. If you're serious enough about listening to radio broadcasts to consider a tuner costing the best part of £700, I can't imagine that a further £150 would prevent you buying another model if it proved to be significantly superior.

The FMT2 seemed slightly, but noticeably, more hissy than the NAT-02 on a live Radio 3 broadcast. This wasn't normally intrusive when the full orchestra was playing but in the quieter passages and when the soloist was featured it became apparent. Perhaps this is related to an experience I had with the station GLR. The NAT-02 would lock onto and receive this station, albeit in poor stereo, with no aerial connected: the FMT2 wouldn't, remaining silent with only one of its eight signal strength meter segments illuminated.

Back with Radio 3, and John Scott playing organ works by Buxtehude, the FMT2 afforded the performance good scale and a subjectively wide bandwidth, the organ's lower registers being clearly expounded. Detail, both playing and extraneous was well recovered and the tuner created a good impression of the venue's acoustic. A pleasing tonal fullness added credibility to the its presentation. Switching to the NAT-02 I became more aware of the organ's brilliance and the fine texture of its sound. The bass swelled with more power and authority and the acoustic seemed richer still, the reverberant sound detaching itself from that which was directly picked up by the microphones. The Naim tuner's extraction of low-level detail also enhanced the impression of close proximity to the performance.

With the spoken word, on Radio 4, I detected a slight emphasis of sibilants through the FMT2. Whilst the NAT-02 didn't cover up the sharpness of 'S' sounds it reduced their annoyance factor, integrating them more readily into the voice rather than presenting them as a separate element. The Naim's strength over mainstream tuners is its ability to convey the substance and solidity of a voice, the impression that it emanates from within a resonant body which contributes to its character and timbre. The FMT2 also displayed this quality, albeit in smaller measure, and sounded more convincing than most. It didn't have that awful artificial air, the transitory quality, that lets down the majority of tuners.

Tommy Vance was playing sixties' rock on GLR and it proved enlightening to listen to these old recordings on both tuners. With Traffic's 'I'm a man' the FMT2 showed good bass drive which maintained the song's rhythmic urge

# out of the ionosphere

**The Ion Systems FMT2 tuner reviewed**

**by Malcolm Steward**

mains lead and either unit converts it to a twenty-two volt supply for the tuner box, sending it through an interconnect cable which is marked for direction. The X-PAK should be left connected to the tuner and a live mains feed at all times: in its 'off' position the tuner's power button only deactivates its display and the audio circuitry, the tuning circuits being kept powered up to prevent drift and ensure a consistent performance each time it is used. The stereo beacon also serves as a stand-by indicator, letting you know that the electronics are in a ready state. When the tuner is fully powered up it reverts to signalling the presence of a stereo signal.

At this juncture it's worth explaining the X-PAK part of the equation. Ion Systems supply two variants of the X-PAK, an external power supply which can be used with the company's preamplifiers, the Obelisk 3X integrated amplifier and the FMT2 tuner. The tuner, which costs £499 without this supply, can be used with the single output X-PAK1, which costs £189, and this would seem the best arrangement for a system in which it was the sole component from Ion. Someone using or considering the company's amplifiers might do well to use the dual-rail X-

female coaxial socket and a 75ohm J-type connector suitable for use with one of the Magnum Dynalab aerials which Ion Systems import from the Canadian manufacturer. Be sure that you use a decent aerial because you'll need one to obtain the best performance from the FMT2. That doesn't necessarily imply something complex or extravagantly expensive. I used a roof-mounted, three-element Antiference design aimed at the Wrotham and Crystal Palace transmitters, the first of these being more than forty kilometres from my home, and found that the Ion's signal strength meter went to maximum on Radio 3, a station which positively demands the best reception conditions.

I listened to the FMT2 through my regular system which comprises Naim amplification - NAC52 preamplifier, NAXO 2-4 electronic crossover, NAP 250 stereo power amplifiers - and active Naim NA SBL loudspeakers. The system's revealing nature makes it totally unsuitable for use with all but the finest tuners and this is why the resident model is the same company's £853 NAT-02. The FMT2, as if you hadn't already worked it out from its name, is, like the NAT-02, an FM-only design. I've said it before but it bears repeating: AM



well. Donovan's 'Sunshine Superman' sounded fresh and lively too, again with a sturdy underpinning by bass guitar. In both instances, however, the NAT-02 managed to provide more insight into the low frequencies, the Donovan bass line, especially, benefitting from cleaner articulation. Neither tuner showed the dynamic compression of cheaper examples.

### Conclusion

I enjoyed Ion Systems' FMT2 and there's no doubt that it's a respectable design. But I wasn't convinced that it was sufficiently better than the cheaper integrated FMT1 to warrant the extra expenditure... not when placed alongside the Naim NAT-02. I would suggest to anyone who wants a tuner capable of showing a clean pair of heels to 99% of

the Far East's offerings that they should investigate the FMT1. If they want something significantly better I feel that they should save up the extra pennies and look at the Naim NAT-02 instead of the FMT2. That's speaking purely from the sound quality point of view: if they owned Ion amplification and wanted something to match it that would be a different ball game ●

### Measured Performance

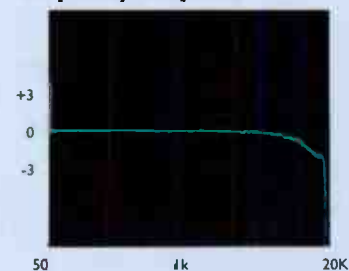
The FMT 2 is a bit of a puzzle: it differs very little from the FMT 1. Treble rolls off a bit earlier, enough to impart a slightly warm sound. The analysis shows this effect. Distortion averaged 0.2% at 50% modulation, which is a mediocre result these days. Good tuners often hover around 0.1%. Channel separation on stereo was acceptable, if not special at -25dB. There was very little spurious output from pilot or sub-carrier, so the FMT 2 won't cause problems when taping. All these figures tally closely with those of the less expensive FMT 1.

I was hoping for improved RF performance, but it looks similar. Full quieting isn't achieved until more than 10mV has been delivered from the aerial - a very high figure. The FMT 2 sample we had was hissy at -67dB; this can be heard on Radio 3. Ion really need to better -70dB. Selectivity was good at 76dB (but similar to the FMT 1). Sensitivity was very good at 16µV for stereo and here the 2 appears quite a lot better than the 1.(28µV).

The nine segment signal strength display has a very wide range. The ninth segment usefully indicates potential overload (60mV); in other words it shouldn't be lit. The 8th segment should light at 10mV, or full quieting. It lights too low at 0.2mV, meaning eight segments remain alight, giving a good impression, even when the aerial signal is too weak to provide good results.

I was disappointed by the FMT 2. It is good, ignoring the hiss, but seems little different from the FMT 1. **NK**

### Frequency Response

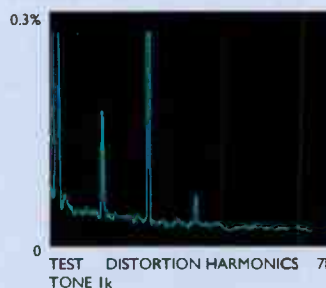


Drooping treble above 5kHz

### Test Results

Frequency response (-1dB)	10Hz-9kHz
Stereo separation	-25dB
Distortion (50% mod.)	0.2%
Hiss (CCIR)	-67dB
Signal for minimum hiss	-8mV
Sensitivity	
mono	1.6µV
stereo	16µV
Selectivity	
alternate channel	-76dB
Signal strength meter	
9 segments	0.3mV-50mV

### Distortion



Distortion at 0.2% third harmonic

A sculpture of a person made of green pipes, holding a smartphone, set against a background of a grid of wires on a metallic surface. The sculpture is composed of several green pipes joined together to form a human figure. The head is a simple circle, the torso is a vertical pipe, and the legs are made of two pipes each, bent at the knees. The arms are also made of pipes, with one arm bent at the elbow holding a black smartphone. The sculpture is positioned in the center of the frame. The background is a metallic surface with a grid of thin wires, possibly a mesh or a screen, with small black dots at the intersections. The lighting is dramatic, with strong shadows and highlights, giving the scene a futuristic or industrial feel.

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*HI-FI REVIEW*



We didn't make the statement that we considered ourselves to be ' Britain's only cassette deck experts' — the statement was made by a leading audio critic in a recent technical report on a number of leading decks. While we were gratified to hear this verdict, we were not surprised. Sonic performance has always had first priority with NAD. The deceptively simple no-frills NAD 6340 may be the only cassette recorder in its price range that can faithfully copy the full brilliance and dynamic range of any recorded source without dulling its sonic impact. Compared to other decks that cost more but don't sound as good, the NAD 6340 sets a new standard for value. Audition one at your NAD stockist today.



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# spectral pioneers

**The new Dolby S noise reduction system covers all of the music spectrum and is incorporated in two new Pioneer cassette decks.**

Report by Eric Braithwaite. Tests by Noel Keywood.

Dolby have developed a new and, they claim, better noise reduction system for cassette. Called Dolby S, it offers around the same amount of hiss reduction as Dolby C, but with improved sound quality. It is a domestic development of the professional 'Spectral Recording' or SR system which appeared five years ago. With it Dolby are hoping to overcome the persistent criticisms of C. They could then ensure a future for cassette as a serious hi-fi medium - even in the face of competition from new digital tape systems.

Dolby S chips are expensive, so the rash of Dolby S decks due to hit the marketplace will all be expensive, up-market models. Pioneer are quick off the mark in releasing the CT-93 at £799.95, and the CT-900S at £499.95. Both are 'S' decks, but they also offer Dolby B and C. Superficially they are quite similar. Both have three-heads (using PC-OCC wire in the coils, says the legend) with off-tape monitoring. In addition Dolby HX-Pro, which can be switched out on the pricier CT-93, is provided. Even the display can be turned off, leaving only the counter illuminated. This latter item can be switched between numerical, elapsed time and time remaining. The display shows the usual information on tape type and Dolby selected and tells the user to 'WAIT' when the deck is first switched on, or that the smooth motorised cassette door is open. The level meter operates on either of two

ranges, clearly segmented and with peak hold, and it is possible on the '93 to input direct.

Each deck possesses Pioneer's 'BLE' system. The initials stand for Bias, Level and Equalisation. It is a sophisticated and fully automatic variant of the fine bias adjustment facility now commonplace. There should be no need to manually 'fine tune' a tape for recording if this system is used, though the CT-93 does have this additional option. On the more expensive machine, when bias is tuned automatically, it's possible to while away thirty seconds by watching the knob turn without the intervention of a human hand. Very ghostly it looks, too, in operation. Variable volume headphone outputs are provided on each deck. Both decks allow synchronised recording with suitably equipped Pioneer players and socketry round the back (where the MPX switch is oddly located) is gold-plated.

Both decks have a fair array of knobs and buttons, the more

expensive CT-93 achieving a higher score. It is also the more eye-catching of the two. Apart from 'Reference Cassette Deck' in gold cursive script on the cassette compartment, the black fascia is glossy against the CT-900S's matt finish, and there are a couple of natty gold stripes on the inner edges of the 'Urushi' finished rosewood side cheeks. This is high gloss lacquer, for those not conversant with Japanese carpentry. The CT-900 makes do with bare metal with three decorative ridges on each side.

In keeping with their up-market specification, these decks also possess the same complex dual-capstan transport. It is used to keep tape speed perfectly stable, which in turn greatly improves sound quality by eliminating the warbling of capstan wow, the pitch shudder of intermittent drift and the 'dirtiness' caused by flutter. There are mediocre dual-capstan transports around, now being rivalled by simpler well built single capstan types. Pioneer's offering on

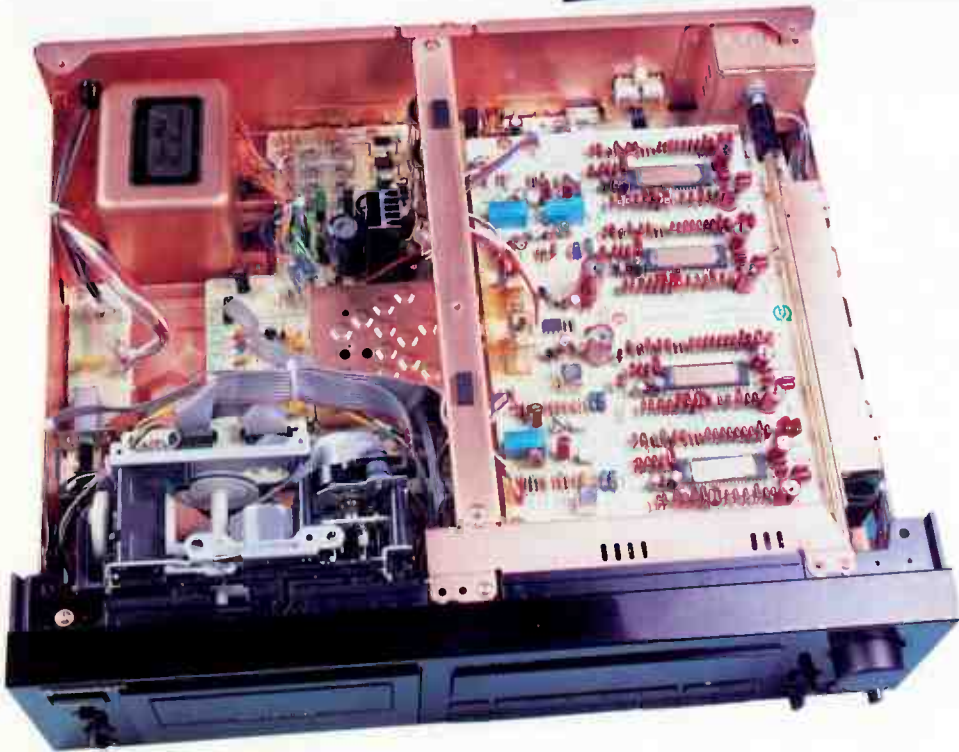
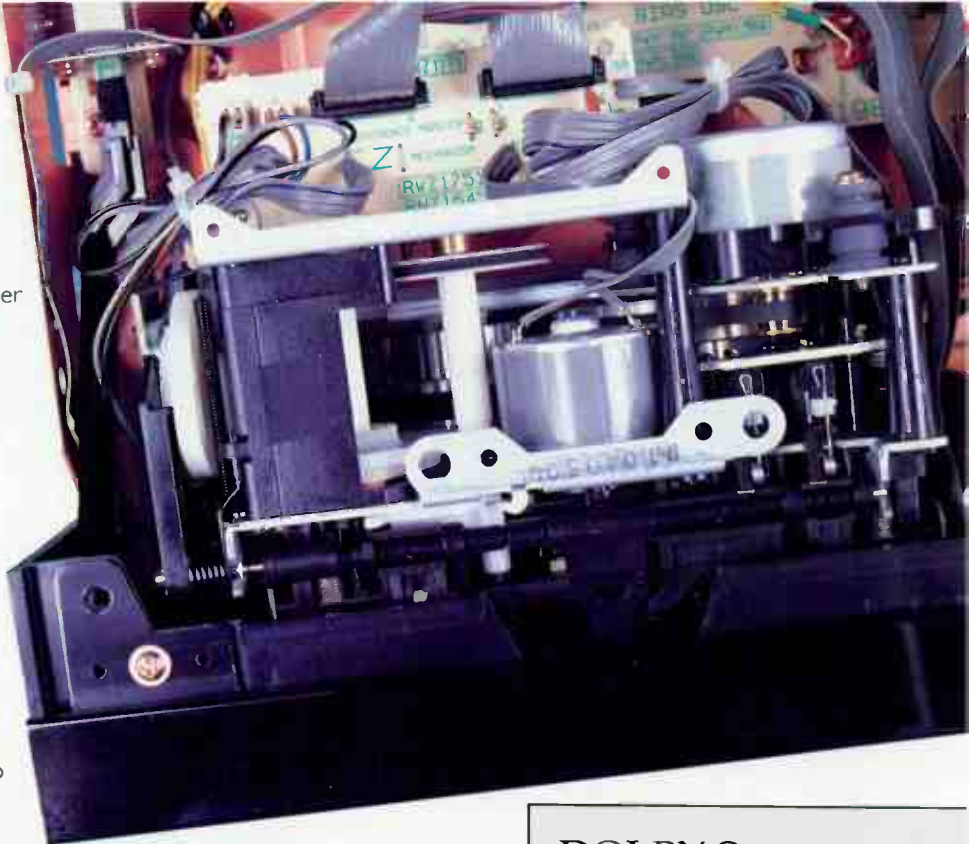
these two decks proved to be somewhat more impressive though.

Both are quite hefty, the top-range model weighing in at 10.8 kg, its brother at two and a half kilos less; internally, the CT-93 glows with a considerable amount of copper plated steelwork. The plating eliminates magnetic eddy currents that can otherwise induce 'hysteresis distortion'.

### Listening

Despite the superficial similarities, the performance of the two decks was markedly different. With prerecorded cassettes, the more expensive CT-93 shone like sun through clouds - delicate nuances in mandolin, astonishingly stable and pure silvery flute, soprano voices precisely positioned,

**Right: Pioneer's dual capstan drive mechanism has belt drive from a servo motor (right) to the main capstan flywheel. The brass pulley of the motor and belt can just be seen.**



**Above: The chassis of the CT-93 is copper plated to avoid magnetic eddy currents.**

sweet, every catch of breath audible. Detail on 'A Feather on the Breath of God' was so clean you could practically hear the sunbeams through stained glass and visualise the singers' chests rising and falling. Orchestral voices - brass, woodwind and strings - had their full force, bite and subtleties within their dynamic range with sharp thwacks on drums and a fortissimo blare making the listener jump off the seat, just as they should.

Rock music was fast, sharp, brilliant, bouncy and with good solid bass lines. This deck proved extremely revealing of multi-track or synthetic music - one had that unmistakable feeling of seasickness as studio engineers overdid their pan-

potting and instrumental tracks swooped in and out of the mix. This is what good recording - and good Dolby B tracking is all about.

What a difference turning to the cheaper CT-900S. All but the most limited mid-range spread was dull, constricted and lifeless. Soft and flabby, with a seriously constricted dynamic range, and fuzzy soundstage, it was as if the window cleaner had been negligent with his chamois leather for years. Vaughan Williams' Fen Country was less an evocation of a bedewed and misty landscape, more of an orchestra lost in a thick fog with clinging mud up to their ankles. Only rock music with heavy equalisation and restricted dynamics

## DOLBY S

"In side-by-side comparisons, sophisticated listeners," said Keith Grundy, Dolby Laboratories Principal Staff Engineer, "were unable to identify which was CD and which was a Dolby S encoded tape." Could this be the final death of tape hiss? Is it the beginning on cassette of that black silence we've come to expect before the music starts on a CD player? Or is it corporate hype like that which gave us the spectacle of Philips claiming CD was perfect?

Will Dolby S be the last noise reduction system before cassette pegs out altogether in the face of Philips' Compact Digital Cassette or Sony's recordable Minidisc?

Originally devised as a dictation medium, cassette was so noisy that a Force Nine could have been blowing in the background. Hiss might have killed off the cassette almost before it opened its eyes on the world back in 1963.

What came to the rescue in 1970 was a method of reducing the hiss called Dolby B, developed by Dolby Laboratories (founded by an American who studied at Cambridge - Ray Dolby) in Balham, South London. In 1980 came a second system - Dolby C - which reduced the gentle swish even further to the slightest breeze.

Some idea of the impact Dolby has had can be seen from the fact that 330 million cassette decks have been sold with Dolby B since it was introduced and this figure is

survived in any listenable sense. Over-bright recordings were tamed, but at the expense of detail and insight. The deck's measured performance was awry and explains this.

The contrast was evident when recording, too; Pioneer's 'BLE' biasing system worked perfectly on the CT-93 on all three tape types. Transients were tight and clean-edged, individual brass players could practically be differentiated by their embouchement, vocals just a little warmer than the original. Depth and precise imagery were practically indistinguishable from the source.

In contrast, the CT-900S simply failed to tune flat, and was noticeably dull and restrained in the treble, with a soft-edged stage and far less impression of depth and individuality in the elements. I did manage to flatten the response by tricking the Auto-BLE into setting itself with one make of tape and then recording on

another brand, but this negates the point of the thing altogether.

Of course, half the point of these two new Pioneers is Dolby S. Though just fractionally quieter than Dolby C, it was rather wasted on the CT-900S. We ran a series of listening tests therefore on the CT-93. With Dolby C, recordings were slightly cleaner in the upper octaves, but a little less solid, slightly more subdued, and with marginally more muddle than with Dolby B though tape hiss was markedly reduced. With Dolby S switched in, inherent tape hiss was fractionally muted over Dolby C, vocals appeared a bit tighter and more focussed, with a cleaner edge throughout the dynamic range, and a drier bass with a spot more bass definition over Dolbies B and C. There was one barely perceptible drawback: cymbals had a trace of added splashiness.

Are Dolby S encoded tapes

compatible with the other two systems? Checked on a Nakamichi ZX-9, 'S' tapes played back with Dolby B were compressed in sound, bass could wallow about, and become woolly, while treble survived; with Dolby C, things were a little better, though lower frequencies were somewhat dulled and mid- and upper-treble more muddled with the delicacy lost.

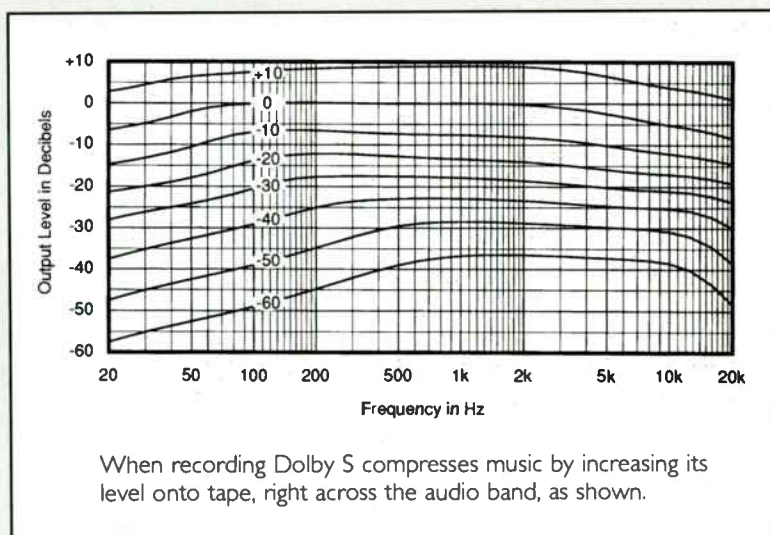
The CT-93 certainly lives up to its 'Reference' legend, and is capable of true top quality recording and playback. Dolby S does show some advantage, too, in being more even across the frequency span than Dolby C with a commensurate reduction of tape hiss. The cheaper CT-900S is simply out of this ball game altogether. With Minidisc and CD-R peeping over the horizon, though, picking a cassette deck like this could mark you out as a confirmed analogue junky. And why not? ▶

being added to at the rate of 40 million a year - about the same number as have incorporated Dolby C since its inception.

There have been alternative attempts to quieten the hiss in the past, but they tended to rely on applying filtering on playback only, and have as a result nearly always produced audible pumping sounds and often a dull treble as well. Dolby is a 'complementary' system. It has to be applied when recording and removed, as it were, when replaying by a reciprocal process.

Noise reduction systems like Dolby rely basically on the fact that loud noises mask soft ones. Imagine sitting in a wine-bar with a crowd of Yuppies guffawing loudly (equivalent to loud music in this analogy) over their third bottle of fizz. The chances are that you won't hear your companion's whispered remarks (equivalent to tape hiss) about them. Just at the moment when they all fall silent contemplating their imminent redundancy, your friend's whisper suddenly becomes a shout. It's at the same level, but it was 'masked' before. The trick is to persuade a noise reduction system to increase soft music in level to mask the hiss when it would otherwise become most noticeable, without taking a swipe at the music's integrity whilst doing so.

At higher frequencies and lower signal levels, where the innate hiss of the tape itself is most noticeable, the signal onto the tape is boosted; on playback the signal is reduced by the same amount. The noise floor, or the hiss, is reduced by the same amount, making it less obtrusive. Dolby S is said to provide a bit more



hiss reduction than Dolby C, namely a maximum of -24dB against -20dB. It also works at low frequencies, in order to lessen swishing effects caused by the exclusively high frequency processing of B and C. And it prevents overload at high frequencies like C, and at low frequencies.

All this talk about Dolby C is in contrast to Dolby's own attitude by the way. As I am led to believe, the fact that Dolby C was never adopted by tape duplicators for prerecorded tapes and was often reviled by tape engineers has resulted in them wishing it didn't exist. Dolby B has always possessed the twin advantages of being first and being tolerable. Dolby C in contrast was the classic advance backward.

What Dolby claim for the new S system is that it is more selective in its processing and therefore it

interferes with the music less than either the B or C system. This reduces noise modulation effects. They claim it is less upset by response and sensitivity errors than either B and C as well. And they say that because it lessens overload at low and high frequencies, bass and treble quality are improved at high recording levels.

As regular readers of our cassette deck reviews will know, there are sometimes reservations about how individual cassette decks perform with both systems, and there are now doubts about whether the record companies will adopt Dolby S for prerecorded tapes, or whether it will remain, like Dolby C, primarily for the home recordist. Dolby Laboratories will say no more at the moment than they are "having discussions" with major software providers about bringing out Dolby S-encoded prerecorded cassettes ●

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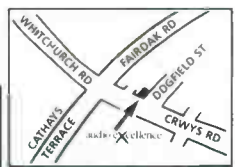
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# PIONEER DOLBY S CASSETTE DECKS

## Measured Performance

I imagined the CT-900S to be a simplified version of the extravagant and slightly kitsch CT-93. The usual marketing ploy is to create a good basic model, price it sensibly and then derive a 'luxury' version. The latter is sold at a premium price to those who must have the best, no matter what. It's cynical, but it is a common practice - outside the hi-fi world as much as within it. The bargain is usually the cheaper model, since it lacks only unnecessary facilities and adornments.

A look inside both Pioneers showed a different situation exists. As expected, the cheaper 900S, whose existence virtually passes unmentioned in the handbook which covers four models, uses the same chassis, transport and head as the 'Reference' CT-93. It also has the same powered cassette door mechanism and it has an automatic tape tuning system - but it is not the same system (I will say more about this later).

The most unusual and surprising difference between the two was the use of updated and improved electronic components in the CT-93 - even down to higher current power supply diodes. The record level control knob drives a shaft in order to eliminate the need for a long wire run and various special screens and bits and pieces are unique to the CT-93. So the latter really is a properly 'tuned up' version of the basic arrangement.

The most significant difference between the two decks lies in the automatic tape tuning system, dubbed Super Auto BLE by Pioneer. Whilst the CT-93 tuned tapes accurately, always achieving a flat frequency response, the CT-900S consistently got it slightly wrong. Treble measured -1.5dB down at 10kHz after tuning, with all three tape types - ferrics, chromes and metals. This results in a slightly warm and bass heavy sound. In typically obtuse Japanese fashion, the handbook suggests that the 900S has a simpler tape tuning system. More obstructive was the fact that it cannot be manually tuned to get rid of errors. The deck would have been better off fitted with a normal manual bias adjustment knob. But I got the impression from the handbook that Pioneer would rather that the existence of the CT-900S wasn't even talked about.

Both decks use the same dual capstan, belt drive transport. Although they look absolutely identical and both have a superb performance, the CT-93 I tested had less cyclic speed drift. It may have been coincidence or it may be that Pioneer select the components for the CT-93 mechanism. Either way, differences were minimal and barely detectable I would say. A wow figure of 0.03% was about as low as is possible from cassette; flutter was almost non-existent too. The analysis shows this clearly by the sharpness of the test tone 'spike' at right, the absence of capstan 'shoulders' either side of it and the complete lack of flutter peaks.

Pioneer don't use a pad lifter, like Nakamichi, but they do have a good, cast headblock platform. However, the adjustment screws were very difficult to access. I needed to adjust head azimuth on the CT-900S because of falling treble output in the replay re-

sponse, but decided not to try, so deeply was the screw buried.

Which brings me on to another, inexcusable weakness of the CT-900S - incorrect replay frequency response. Treble output was no less -3dB down at 10kHz. Being unable to adjust the head, I couldn't tell whether this was due to incorrect head azimuth or a different and incorrect replay equalisation curve, possibly to suit the Japanese market. Whatever, it makes pre-recorded tapes sound very dull and it also results in non-standard recordings. If the replay EQ of the 900S is wrong it will make recordings that sound over-bright on other decks; if the azimuth of the 900S is wrong it will make recordings that sound dull on other decks. Pioneer definitely don't intend to give this model much of a chance in life.

Both decks have the same siamesed record/replay head. It gives very good, if not exceptional results. Technicians have just gone and ruined it for Pioneer and everybody else by fitting a head that is just as good to a £170 deck! (see our review of the RS-BX606 in this issue). The tuning system adjusts sensitivity as well as frequency response. After tuning, frequency response with metal tape (TDK AC-712 factory alignment tape) was flat with the CT-93, but had some treble fall with the CT-900S, as our response analyses

show. Both decks tune metals, as well as ferrics and chromes. A useful variation range is provided with all three. Bias has been set high with metal tape, which allows premium grade metals like TDK MA-XG to give improved results.

The record level meter reaches +12 maximum. The best metals can be peaked at +9 or thereabouts, so some leeway exists. Chromes can be taken to +4 and ferrics to +6. TDK AR can be taken up to +8 or thereabouts. There was some bass distortion (2%) but the head stays flat in its frequency response down to 10Hz. Bass will go a bit soft at very high recording levels all the same.

Last but not least comes Dolby S noise reduction. It offers much the same amount of measured hiss suppression as Dolby C (-76dB), but it is a more sophisticated noise reduction system that has less audible affect we are told. Listening tests are best able to determine this.

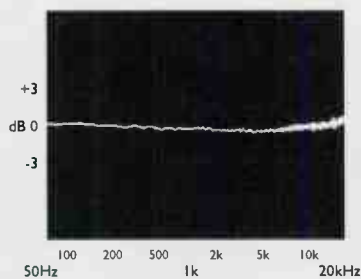
Neither of these decks struck me as entirely sensible pieces of cassette deck engineering. The CT-93 is OTT and lacks Play Trim or adjustable head azimuth. Since I don't trust auto-tuning systems, its flashy gadgetry didn't hold any attractions either. The CT-900S was poorly designed and badly adjusted. In my view, Pioneer have made better decks than these two. **NK**

## CT-93

**REPLAY** (prerecorded tapes)  
 Frequency response (-2dB) 30Hz-18kHz  
 Speed accuracy +0.6%  
 Hiss (70uS, Dolby out) -63dB

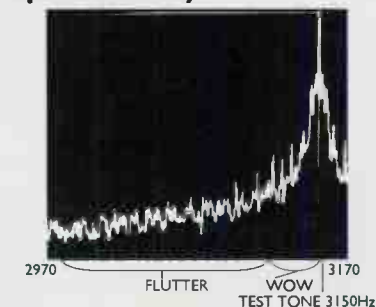
**RECORDING** (blank tapes)  
 Frequency response (IEC Primary Refs.)  
 ferric (IECI) 10Hz-20kHz  
 chrome (IECII) 10Hz-20kHz  
 metal (IECIV) 10Hz-20kHz  
 Separation (1kHz) -48dB  
 Distortion (315Hz) 0.8%  
 Hiss (70uS, Dolby out) -75dB  
 Speed variations (DIN total) 0.03%  
 Flutter energy (3-3.13kHz) -38dB  
 MOL/SAT (IEC Refs) 315/10k  
 IEC I (ferric) +4.5dB/-6dB  
 IEC II (chrome) +3dB/-4dB  
 IEC IV (metal) +6dB/-2dB

### Frequency Response



Flat response after tuning

### Speed Stability



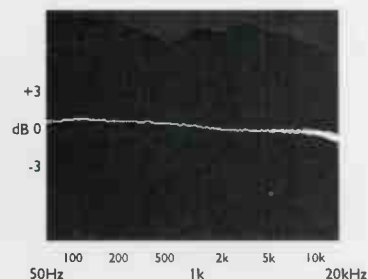
Sharp peak indicates low drift and wow

## CT-900S

**REPLAY** (prerecorded tapes)  
 Frequency response (-2dB) 30Hz-8kHz  
 Speed accuracy +1%  
 Hiss (70uS, Dolby out) -63dB

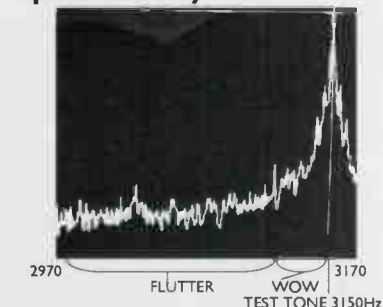
**RECORDING** (blank tapes)  
 Frequency response (IEC Primary Refs.)  
 ferric (IECI) 8Hz-20kHz  
 chrome (IECII) 8Hz-20kHz  
 metal (IECIV) 8Hz-20kHz  
 Separation (1kHz) -48dB  
 Distortion (315Hz) 0.6%  
 Hiss (70uS, Dolby out) -56dB  
 Speed variations (DIN total) 0.03%  
 Flutter energy (3-3.13kHz) -37dB  
 MOL/SAT (IEC Refs) 315/10k  
 IEC I (ferric) +3.5dB/-5dB  
 IEC II (chrome) +2dB/-4dB  
 IEC IV (metal) +5dB/-1dB

### Frequency Response



Falling treble output after tuning

### Speed Stability



Same performance as CT-93

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# dual personality

**The French Micromega Duo transport and Digital to Analogue converter**

**reviewed by Alan Sircom, who almost speaks the language.**

**M**icromega Compact Disc players are typically French, in much the same way that Citroen cars are recognisably French. Both are very distinctive and both feature innovations and refinements culled from the finest of their peers, mixed in a unique way and with Gallic invention. The end creation is something that works as the antithesis of the norm. The newest variant of Micromega's popular Duo Compact Disc player seems to fit into this mould well.

Everything about the player seems to fly in the face of convention. It is a top loading system, using a thick sheet of clear perspex as a lid, a design as rare as are the hermetically-sealed controls and the small frontage to the digital to analogue converter.

The combination is a £1,745 Duo transport, a logical progression from Micromega's early players, utilising some of the latest advances in transport technology and the £495 Duo digital to analogue converter, which uses the earliest Philips 7321 Bitstream chipset. The accent here is not so much on using the newest chip available for the sake of it as on successful implementation.

From an aesthetic standpoint, the Duo works well because of, or maybe in spite of, its unconventional styling. The black brushed front panel contrasts well with the perspex top giving the equipment a 'hi-tech' look that is not too ostentatious. Now that Micromega are making their front panels with legends in English, the style has become more acceptable. Especially to the eyes of someone like myself whose command of the French tongue is so poor that the last time I was in that country, I asked for a fried orange by mistake.

The latest development in the transport mechanism to be implemented is the new CD-ROM chips that were originally used in the top-of-the-range Krell transport mechanism. This system was originally developed for in-car units, where it is used to help overcome the day to day upsets that road use places on CDs inside cars. One only has to imagine the stress placed on a humble multi-CD transport, when it is housed in the boot of a car, to realise what it must withstand. Throughout the year, it has to operate in conditions where domestic units would hang up their DACs. Even during the course of one day, temperature

extremes and vibration would be enough to kill off all but the hardiest of conventional models.

It was this indestructibility that led people designing for the domestic market to wonder if the CD-ROM chips could have any value. It was found that when correctly implemented the chipset did provide a dramatic improvement to the transport, by allowing more information off the disc. I usually have grave reservations about the use of overspecified or so-called military devices in domestic equipment, as they often make the unit more reliable at the cost of a sound quality that sounds decidedly squashed. In the case of CD-ROM, however, it seems to work perfectly. The Duo transport has a combination of delicacy and solidity that is hard to find in Compact Disc, and shows, along with fine transports such as the Teac P10, just how much the transport can add.

Micromega's Duo B.S. DAC is almost old news today. It has been around for some time, needing only the most perfunctory changes and development to keep it at the forefront of converters at the price. Essentially, the unit contains a well developed circuit, based around the older Philips 7321 Bitstream chip. As



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**SONY.**

Why compromise?

with most convertors, the Duo has only the barest minimum of controls. At the front of the DAC, two hermetically sealed switches select either co-axial or optical links and reverse the phase of the unit. Either my system or my ears are not very phase sensitive at the moment, so I could not detect any difference; but I am not going to be sceptical about it.

While the DAC unit, which sits on three conventional rubber feet, is not particularly fussy where it sits, the transport is less easy to please. Because of the unique arrangement of supports underneath, two soft rubber feet and one hard ball or spike, the Duo must be placed on a flat support shelf, similar to those used for a turntable. When unpacked, the transport mechanism comes supplied with a protective rubber moulding to protect the grounding ball. This looks very similar to the other rubber feet and is easy to forget. If, on first switching the unit on, it sounds as though it is playing through a sock from about two or three miles away, check to see if the protector has been removed.

The transport comes supplied with two clamp devices; one light and transparent, the other white, opaque and heavier. This is not for the sake of aesthetics simply because they can be seen through the lid, nor is one supplied as a spare just in case. Instead the two clamps give the disc a decidedly different sound which varies from disc to disc; generally CDs that sound bass-light will be improved by the heavier puck-like clamp.

### Spikes

Before we get on to the sound quality of the two units, some few words of warning. First, on no account try to use the transport with the rubber cover retained over the grounding spike as described above. Secondly, because of the isolation mechanism, the transport is very sensitive to position. Even on a good support table, the slightest knock can send the transport into shock, popping and mistracking as if the disc has been autographed with a Stanley knife. Finally a similar fate will befall ones played without the puck in place. At best the transport tries to play the disc but hiccups at the first transient it encounters. It can sound like the starter motor of an old Ford.

For the test the Duo transport was sited on my old Audiotech table as I've not had a chance to completely Manaise my entire system yet. The DAC was connected by Micromega's own co-axial lead and to the preamplifier with Audioquest Topaz interconnect. The preamplifier used was the Concordant Excelsior which is to be reviewed in the next issue. Power amplification was Audio Innovation's First Audio and silver-wired Audio Note AN-J loudspeakers were used on their Huygens stands, all connected using Audio Note Silver. In addition, John Shearne's Phase One amplifier system was used, with the ProAc Studio I Mk II loudspeakers all connected using Furukawa cabling.

Even without any warm-up the Duo transport saw off Noel's Arcam Delta 170 transport mechanism without much difficulty. This is hardly surprising considering the large price differential.

The Duo, however, established itself as a remarkable performer among all those who heard it. In the brief time it went up against the Arcam, the Micromega had detail and refinement to spare and a far more subtle sound, without losing any of the impact that the 170 bestows.

## The Duo established itself as a remarkable performer among all those who heard it

The Duo DAC was not run-in at all at that time; I was not able to compare the DAC to units like the new Deltec Bigger Bit directly, but I feel that the two have very different ways of reproducing music. While the Deltec is a paragon of detail and clarity, the Micromega appears to place emphasis on being lively, pacy and musical. While the Duo transport could confidently be recommended as an up-market device, the DAC is not such a panacea. It is, however, very good indeed and will have many followers.

Strangely enough, I believe that many of these followers will come from the land of vinyl. I don't think that this is because of any attempts to make the DAC behave in a 'pseudo-analogue' manner, but due to its strongly musical nature. What both the units definitely do not do is attempt to make the silver disc sound like anything other than a CD. Throughout the test, it was always obvious that both units had a very 'digital' patina. This appeared to heighten the strengths of the medium without waging the weaknesses at the listener. I think that this 'honesty' of sound is what the analogue lovers find attractive in some Micromega products.

Taking the unit as a whole, the Duo combination's strongest aspect was its imagery. I find the imaging qualities of most CD players to be a little vague, with only the very finest having enough solidity to present instruments without any stray wandering of the musicians. In this respect, the Micromega was up with the best. The soundstage created had great depth with the right equipment and an extremely realistic impression of a performance.

In terms of detail and articulation, the Duo was no slouch, either. There was a very slight graininess in the low end, that almost blurred baritone voice, deep bass and synth drums. This was off-set by a glorious mid-band and treble that had little of the stridency that is often associated with the digital medium. I

believe that the fine qualities of the mid-band gave rise to the sense of space and acoustic the combination brought out in Mozart's Requiem. This was in no way artificially induced; it just does not appear on most players.

Nowhere was this ambience more apparent than on 'If I had Possession Over Judgement Day'. Written by the late, legendary, Delta Bluesman Robert Johnson, this track is from a superb Audioquest CD, 'Usin' Man Blues' by Robert Lucas. This disc was recorded and mastered on equipment built by our very own Tim de Paravicini of Esoteric Audio Research and is unusual in being an 'audiophile' recording that is also enjoyable. Any lack of ambience would turn this recording made in the La Casa de Maria Chapel in Santa Barbara flat, dull and uninteresting. The Micromega combination worked well in getting the acoustic of the chapel out of the disc, making Robert's blues sound that bit more real.

From a rhythmical standpoint, the Duo performed almost as well as any Compact Disc player I have heard so far. The slight blurring that I mentioned earlier did not affect the combination's ability to set the feet a tappin'. On discs like Soul To Soul's 'Club Classics Vol 1', the Duo confidently got well down and into the groove. On slightly less outlandish tracks than those by Jazzie B and the Boys, the Duo's timing was always spot on, more than capable of holding together complex Baroque rhythms.

### Resolution

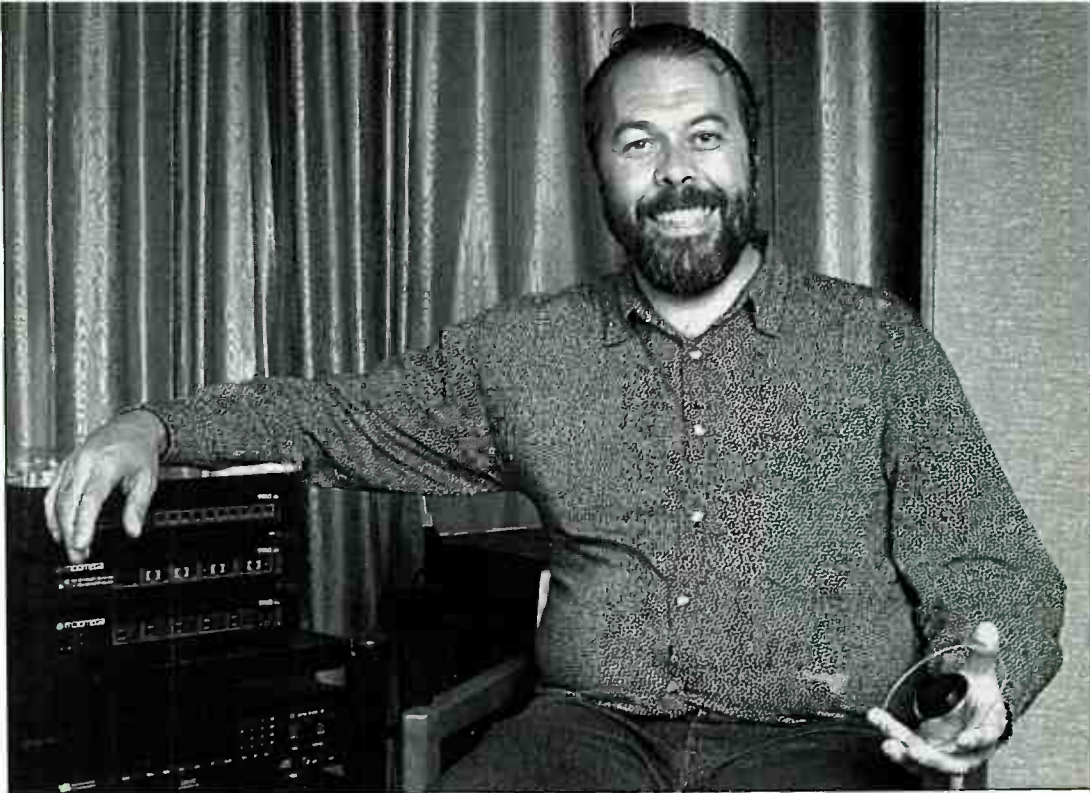
Tonally, I felt that the Duo was slightly relaxed and refined. It did not shout and it seemed rarely ruffled by any music, regardless of its complexity or energy. It did seem to locate different voices almost too well, perhaps suggesting a slight 'hi-fi' sound quality. I believe this is also an effect of the digital medium at its highest levels. Generally, tonal separation, when taken to the extent that the Duo achieves can sound unrealistic; it stays on the side of reality but only just.

This 'hi-fi' quality slightly marred the combination's coherence. While musically the Duo performed well, with a good sense of a performance taking place. It had a tendency to offer what seemed to be an insight into the control room of the studio, rather than into the studio itself. On over-produced tracks, the Duo seemed to get bogged down in the production, delineating every change in the mix. This was a strangely satisfying experience, in that the well recorded passages came over remarkably well, while the poor aspects fared badly. Whether this was because of the the Duo combination's sheer power of resolution, or because of the lucid mid-range and unforced treble I cannot comment, but it bears out Daniel Schar's contention in the interview that accompanies this review that he is ever searching for increased transparency from his designs.

While the Micromega Duo combination is expensive, I do have to say that I

feel that its price is wholly justified by its sound quality. The Duo B.S. DAC on its own is a worthwhile device, as an upgrade from an existing CD player. It may not suit everybody, but few could fault it on musical grounds. The transport, then, is the next logical step for the owner of the DAC. For those with different DACs, however, the Duo transport should not be overlooked as it has a lot to say.

Taken as a complete package, these Micromegas provide an exciting insight into the silver disc. Readers who regularly read my comments know that I am not one of its greatest fans. This player is one of the very few machines that I could happily live with. I'm sure that even if I had never seen a vinyl album, my feelings would not change; as far as CDs go, the Duo is one of the best. As with any hi-fi product, it has compromises, but it is good to find that these tend to function in harmony with the music, rather than merely fitting in with current trends in hi-fi design ●



**Y**ou are the man behind Micromega. What is your background, and how did you start?

I like not to say about the man behind Micromega! I studied Mathematics at university in the South of France for about two years, but I got bored. So, I came to Paris to become a recording engineer in multi-track recording; I used to come quite often to London, mixing at Trident Studios and things like that. After that, I met Mark Levinson, became close friends and finally he asked me to come over to the States and work for him. I worked there for two years, moving back to work for a large company in France. This helped me get a background in marketing, running a company and that stuff. Then in 1984, I bought this dormant company to make loudspeakers with a partner. After a while, in 1987, we decided to split up.

**Did you start making CD's directly after the split?**

Oh yes. The first product we put out was the CDf1 HiTec, with its sloping front. The overall look of the player, I think, was what made us successful, because people looked at it and said "What is this?"

**Was the concept of top loading purely for marketing, then?**

No, more than that. Marketing was part of it, but there were many reasons. First of all, it is quite complicated and extremely expensive to make a drawer-type mechanism that really works, especially for a very small company. We're still small, but at that time we were like, well, nothing.

The second reason was that everything that applied to analogue

could apply also to digital. Ceremony is slightly too big a word for it, but with analogue you prepare your mind for listening by taking the record out of the sleeve, cleaning it and so on. With a drawer-type machine, you lose that. I don't like that.

**So was the first player successful?**

Yes, but it was difficult. The main difference between a CD player and most other audio products is that a CD player is a combination of mechanics and electronics. Amplifiers, tuners and so on, that's electronics. Turntables are predominantly mechanics; the CD player is both of these. We had to learn a lot of things.

**What came next?**

Well, then we came out with two players, much lower in price. The CDf3 was an OEM based player from Philips and the CDf2 was the CDf3 where all the digital to analogue conversion was rebuilt with our own power supply and separate transformer. This was about April/May 1987.

After that, we made the first two-box player, at the end of 1987. We had an enquiry at a show, saying "You know, the CDf1 HiTec is really nice looking but it is a little bit too crazy looking for some people." So he suggested that we do the same player with a vertical (flat) front plate and that's how the CDf1 Pro became available.

From that we derived the CDf1 Digital, which was the first drive unit. This had a new mechanism called CDM1 Mk2 made from aluminium alloy, not plastic. Let me explain. In plastic the vibrations don't transit; they just stay there.

But when you have an alloy and you isolate it, you end up with feedback

# micro but mega

**Daniel Schar, of the French company Micromega, talks to Alan Sircom and offers some unique ideas on Digital.**

loops. Vibrations are like water, or electricity. They take always the easiest way. So we made a channel for them - two soft points and one hard point. That made that transport almost a standard as far as drive mechanisms were concerned, because it was able to read almost anything that other players couldn't read. We were one of the first companies to show that the drive is important.

**Moving back to the history of the company, what followed the transport?**

In about 1988 came the Duo, the first D/A that we made. After that, the Duetto, a simplified version without the extra line stage. Then came Bitstream technology. We tried to push Bitstream as far as we could go at that time in the Trio, in October 1989. Lately, we have used the CDM-3, or CD-ROM transport.

All these players feature the earlier



# Quality is not expensive it's Pricess..



## The Audio File

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7321 chips. I think that many people have the wrong ideas about chip sets.

### Would you care to elaborate on this?

There is a tendency of many manufacturers to jump on the last marvel. When the 7350 chip appeared on the market, they exclaimed "Oh my goodness. This is the wonder of wonders." And the same thing with the new DAC-7. The Philips SAA-7350 has never been designed to be a high-end chip. At least 20-30% of it is for it to be able to interface with any possible standard that exists today - Sony, Yamaha and Matsushita, as well as Philips' own.

## What we are trying to produce is equipment that is more and more transparent

Second, the 7350 has no digital filtering, so it's relating to a four-times oversampling or up to eight-times oversampling digital filter, from outside. The third thing is that the oversampling rate of the 7350 has not even interpolation - it is zero order oversampling. It's not linear, it's not a function, it's just taking samples and then oversampling on a zero order which is a way around the problems, but I don't think is the ultimate. It's not really interesting for the high end.

In the case of the earlier 7321, maybe the digital filter is not the best in the world, but it's always the same - the chip is one thing, the way you use it is another story.

### What about DAC-7?

Well, DAC-7 is only an extension of the 7350. It doesn't change any of the problems. What you are doing with DAC-7 is you are taking out the D/A conversion from the 7350 and putting it into another chip. Granted, this has a lot of advantages, but it doesn't change the fact that the input interface chip is at least 50% of what you use and the noise shaper has zero order interpolation.

The interesting thing about DAC-7 is that it allows people to write software. We will use DAC-7, once we have our own digital filter and noise shaper. I think that it is an extremely good one-bit DAC; but I want to have some control over it and try for the best.

We use the 7321 in the Trio in what we call true time-aligned differential mode. We separate left and right, keeping them perfectly time-aligned. I think that we get extremely good results with that. In the Duo B.S., which is a less expensive convertor, we get good results with a single 7321, with some

techniques around it that make it sound very good.

### The first Duo convertor had a rather unique feature, didn't it?

The original Duo was very interesting. While it was not a pre-amplifier, it did have an auxiliary input and variable output along with the usual DAC facilities. So the guy that didn't have the budget for a pre-amp could use it with a CD player and a tuner or cassette deck. We always said that it was not a pre-amplifier because I don't believe in passive stages.

### Why don't you like passive pre-amps?

Because of impedance ratio. You need to have a very large ratio between the source and the amplifier, otherwise I think that dynamic range is eaten up.

### But what about passive pre-amplifiers with high-gain power amplifiers?

I'm not talking about gain; I'm talking about current gain, which is very different from voltage gain. The cable in a passive set-up almost becomes a dominant factor. Then you end up with serious problems, as connections become as important as the amplifier itself.

### This sounds like an amplifier designer talking. Is this something for the future?

Oh, you mean amplifiers? Well, if we make amplifiers, we will do something in a way that hasn't been done yet. We want to be innovative and bring something new. Interesting stuff, like power DACs.

We have still to fill in some spaces in our line. For example, there is room for a convertor - a Duo and a half, if you like. And we are also working on new transports. Then there's CD-R and we will be in Digital Compact Cassette, because we really want to be ahead, always. We have been copied many times in the past, you see. But we do not mind, because this gives us some credibility anyway.

### You say that you are actively involved with the CD-R (Compact Disc - Recordable) project?

Yes. A few months ago, Philips told me that they were working on CD-R. They asked me if I was interested and I jumped at the chance. I feel that it is a very interesting medium. Aside from ourselves, only Studer and Marantz have the technology, I think. We already have one prototype; we should be able to supply the units in the beginning of '92. There will be two models - the simplest will be line and digital only, the other will also have turntable input, with both balanced and unbalanced inputs and outputs, for professional use.

### How much are these going to cost?

The smallest unit will cost about £3000, the bigger one about £4500. They are expensive because they are the first of their kind; within five years CD-R should represent only about a 20% increase in price over normal CD machines. This means that in five years there won't be any CD players, only CD recorders, except at the extremely low end. I don't think that we will ever be able to make the £60 CD recorder to compete with the £40 player. Other than that, I think that CD-R will take the place of CD, sooner or later.

### How did the Philips connection come about?

Since the beginning, we have always worked directly with Philips. I came to their General Manager of OEM in early 1987. I was quite shocked that such a big company took the time to talk to somebody as small as we were. What makes the relationship between Philips and Micromega so successful is that since Day One, I knew exactly what I could ask, but I also knew what I could not ask. I think they very much appreciated that. It's a 'blue-sky' relationship and I'm very happy about it.

### A lot of your equipment performs well sonically, but doesn't measure equally. Why?

We never try to have a pin-point approach on something. We try to take an overall view, on every part. My philosophy is that there is no such thing as a perfect product; everything is a compromise. My personal feeling is to try to do the best compromise. Measurement is fine, but not if I have to give up something to get better measurements. I would rather stay with a unit that sounds right, but only measures O.K.

### And to anyone who suggests that your equipment is euphonicly tweaked?

No, no. This, it's bullshit. We are doing the opposite of that. The problem is that when you talk about listening, no-one really knows what they are listening to. No one on earth is capable of telling you what goes on inside a groove, or on a disc. Saying to people "Ah! But we have the music!" that's more bullshit; you don't know how the music was recorded. You are listening not to the music, but to the production of recorded music.

The bigger differences a piece of equipment makes between one and another record, the more transparent that piece of equipment is. That's it. What we are trying to produce is equipment that is more and more transparent. This means that one record should sound absolutely gorgeous and the next record should be absolutely awful, depending on the record. Music is not my business - that's musician or conductor business. My business is to get as much information off the record as there is in it. Period ●

The design team at Roksan Engineering are clearly lateral thinkers. That much became apparent when they launched the Xerxes record player back in 1985. At a time when virtually every other top-flight turntable had a three-spring (some oddities had more) suspension system supporting a sub-chassis within a plinth, along came Xerxes with nary a piece of coiled steel in sight.

The deck, which Roksan insist upon calling a record player, consisted of two particle board sections enclosed within a wooden surround. The uppermost section bore the platter and tonearm, the lower the motor. And this was where you found the only spring: the motor was affixed to a spindle, allowing it to rotate, with the spring acting as its restraining influence. So what separated the upper and lower plinth sections? Instead of springs Xerxes' isolation took the form of three 'blobs' - the name given to the tubular arrangements of rubber and steel washers interlaced to resemble a miniature club sandwich.

The theory and practice of Xerxes (not *The Xerxes*, please note: Roksan does not approve of using the definite article in its product descriptions) has filtered down some six years later into a new, cheaper design called Radius. The new player's *raison d'être* is that the company feels that "analogue record replay still has areas in which dramatic improvements can be made. The mid-priced record player is one such area."

It requires only minimal setting up and is intended primarily to be used with the company's own Tabriz

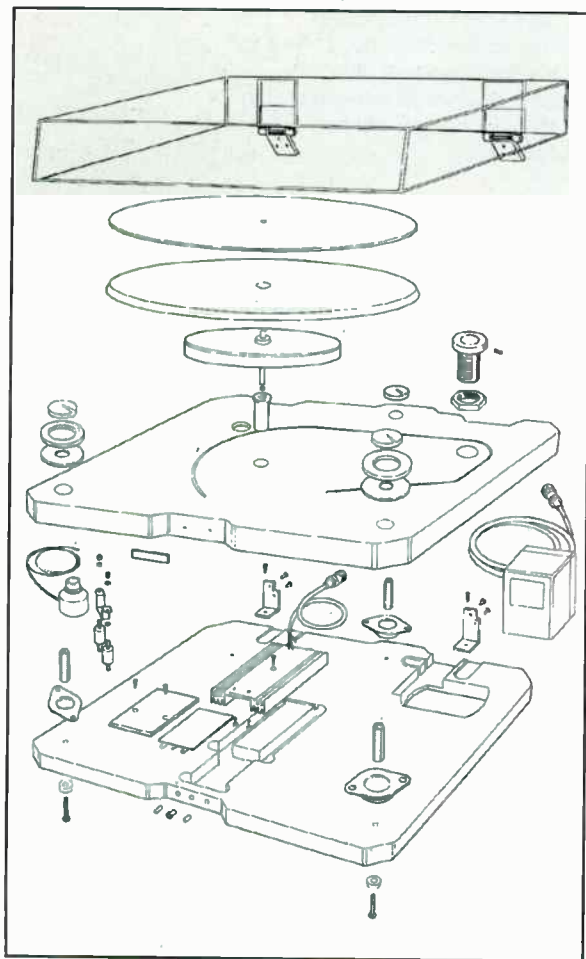
tonearm. Also available arm-less for £399, Radius comes as a complete package with the Tabriz for £550. Buying the arm with the deck results in a cost saving of £14 over buying the two items separately. Cartridge choice is up to the user but no doubt Roksan wouldn't argue if one of its moving magnet Corus models was fitted. The package tested here was completed by the top Corus Black bringing the all-inclusive price to £660, more than £100 less than you'd pay for an unnamed Xerxes.

As our photograph shows, Radius is an eye-catching design. The exploded drawing reveals the intricacy of this outwardly simple confection. The top plinth is routed like that of Xerxes to break up vibrational patterns within it and to allow disturbance to the arm/platter interface to be minimised. It is isolated from the lower plinth by three

yet it took very little time to get up and running. Most of the work involved concerned fitting the Tabriz and aligning the cartridge, a task which will normally be performed by the dealer who sells you the record player. Although the design requires little attention once initially set-up, and is inherently very simple from the user's point of view, it is worth noting that it's usually wise not to tinker with record players unless you know what you're doing. Removing the platter spindle from the bearing, for example, can allow the ingress of dirt into the bearing housing - not a good move if you want the best sonic performance and longevity. The only maintenance that should be required is a change of drive-belt every eighteen months or so, more frequently if the deck sees a lot of service, and regular checking of the tracking force setting.

The front panel controls permit the

The intricate layers which make up the Radius.



# roksandwich

**Roksan's innovative mid-price Radius record player**

**employs a novel sandwich construction.**

**Malcolm Steward has a taste.**

compliant domes arranged in triangular fashion about the platter spindle, topped off with steel-capped bolts which prevent the two plinth halves from completely parting company.

The platter, upon which the record sits, is a two-part fabrication consisting of an inner portion of precision moulded plastic turned on a CNC lathe, and an outer section of aluminium alloy. On top of this is a felt mat which is cleverly arranged to locate into a slot on the platter spindle: this ensures that when you remove a static-charged LP the felt mat doesn't lift off with it. The player's two speeds are provided by a Swiss-made, synchronous AC motor which, in true Roksan fashion, is permitted to move alarmingly if wiggled with a finger. The movement, however, follows a line parallel to the arm when it is tracking a disc, there being little compliance at right angles to the cartridge cantilever. This is reminiscent of the Pink Triangle-modified top-plate for the Linn Sondek, designed to reposition the motor so that noise is channelled in the same plane.

Speed is controlled from two push buttons, with an indicator light, fitted centrally in the front rebated section of the lower plinth which also houses the necessary electronics. Power is fed into the deck via a plug-mounted remote supply.

Radius was delivered to me *sans* arm

record player to be left in stand-by mode, provided that the power supply is connected to a live mains outlet. Its internal electronics are heat-sinked and so no problems should be encountered if the deck is left permanently powered. In fact, by so doing you eliminate the thermal cycling which often results in premature component failure. The remote power supply tends to run slightly warm but gave no trouble during the months I spent with the Radius.

Throughout that period my respect for the player grew. Inevitably its performance is compromised when compared to Xerxes or other top-notch turntables but the designers have been very crafty in moulding its sound quality so that it can be used in very respectable systems without sounding obviously like a budget model. With Compact Disc becoming the primary source for many listeners, newcomers to hi-fi in particular, the market for super-decks is necessarily restricted. Someone who owns a high-flying set-up might wish to add a record deck which won't be disgraced in a system whose main source happens to be CD but may be unwilling to invest too heavily in vinyl replay. Radius could be the answer. Similarly it provides a useful and enjoyable stepping stone for the vinylnut who is upgrading towards a deck of Xerxes, PT, or LP12 standards, giving a taste of what's to come.





At the time of the review I had a system comprising Neat Petite loudspeakers and Heybrook C3 and P3 amplification with an Arcam CD transport and Micromega Duo BS DAC set up in my room, £2600 worth of highly musical and very revealing hi-fi. The Radius was examined through this as a typical example of the better kind of system into which it might find its way.

I teased the player with all my favourite ball-breaking discs and it weathered the exercise well. I began with Jonas Hellborg's 'Elegant Punk' solo bass LP, musically rather sterile but of academic interest for its low, extended bass. This is one area in which inexpensive decks normally show their shortcomings readily. Not so the Roksan offering...

Having played this album, particularly the first cut, 'Drone', extensively on my own wider-bandwidth system I recognised some extreme LF curtailment but this didn't detract significantly from the authoritative view of the music that the Radius gave. It still had the necessary conviction to both surprise and impress. The album was cut with high frequency equalisation (turn down the treble control on your amplifier, says the sleeve note!) but the Radius combination placed no undue emphasis on this annoying factor. Instead it concentrated attention on Hellborg's playing tech-

nique, clearly articulating each and every note of the exceedingly fast runs in 'It's The Pits, Slight Return'. Its responsiveness made for clean spaces between notes, allowing reverb and slight string chatter to be clearly heard. It also demonstrated how the character of notes changed as they decayed or the string was stopped. The individual signatures of the different instruments he uses throughout the disc were clearly evinced, and the Radius showed secure pitch and timing characteristics. In all, a fine start to the proceedings.

### Finely Detailed

Another area in which less expensive decks trip up is at the opposite end of the frequency spectrum, where shimmering cymbals are turned into tizzy biscuit-tins, and high string harmonics make the ears bleed. Hi-fi artifice, you cry. Not if it spoils your enjoyment of the music! A suitable test piece is 'When The Angels Cry' from Jason and The Scorchers' energetic album 'Thunder and Fire'. This ultra high energy rock failed to floor the Radius which kept all the instrumentation separate and distinct no matter how tough the going became. The drum intro exploded violently from the speakers laying down an insistent beat, bass guitar joined in and remained secure despite the welter of frantically grinding guitars above it. The singer's

voice was clear and open and resisted the temptation to fuse with the guitars and ride cymbals as it does on inferior decks. The deck's lack of muddle was very impressive, each element in the turbulent mix retaining its individuality.

On tidier recordings, like pianist Abdullah Ibrahim's 'Voice Of Africa' the Radius continued to offer a well balanced, finely detailed performance which exhibited good cohesion and musical flow. It evinced the human involvement in such discs and made listening to them an emotionally rewarding and enjoyable experience with its communicative abilities. Given suitable material it also threw a respectable sound-stage, where its qualities of spacial separation were highlighted.

This deck has turned out to be a fine performer. For certain it will be beaten by the likes of the Xerxes, PT Export and Linn Sondek LP12, particularly in terms of frequency extension, precision and control but, as I remarked earlier, any one of these motor units alone will cost you several tenners more than a fully kitted-out Radius. It's also gratifying to see a turntable, er, record player, whose styling departs so pleasantly from the mainstream. It might be too post-modernist for reactionary tastes but it's nice to see the occasional splash of daring in the all-too-often stagnant hi-fi pool. Nice one, Roksan! ●



the performance of the I, at a lower price, which could be interesting. Asked about Dolby S, I was surprised to hear from a representative that "we made a separate Dolby S convertor but we weren't really convinced by it. It sounded very nice, especially if you've got good azimuth, but it's not feasible. We are considering DCC (Digital Compact Cassette)." Digital data compression, as used on DCC and MD, is already generating deep suspicion amongst experts.

Roksan, not content with launching just a range of amplifiers and the new Radius record player recently, are also hot on the vinyl trail. Their latest is the £2500 Touraj Moghaddam Signature record player. Touraj is the technical director of Roksan and the deck is said to be his ultimate statement in vinyl. Roksan also created some raised eyebrows by announcing the launch of their two-box Compact Disc player, the RoK-DPI transport and RoK-DA1 digital to analogue convertor. The latest hobby in hi-fi seems to be 'spot the staunch analogue companies bringing out digital products'. Naim were first, others are sure to follow. Roksan have applied their mechanical engineering knowledge to the transport and the skills learnt with their amplification to the DAC.

Attention at the Wharfedale room veered toward the staff's

# The Hi-Fi Show

HEATHROW PENTA HOTEL, SEPTEMBER 1991

**Above: The attractions of the Wharfedale room.**

"I've just cycled sixty miles from Worthing to get here," gasped an enthusiast who was crumpled over the front of our stand. His efforts were equalled by the doctor who travelled down from Glasgow in the morning and was going back in the evening. The Penta hi-fi show, held in the Heathrow Penta Hotel from September 19th-22nd, attracts people from all over Britain - and the world. "It's amazing, so unlike the States," said Bill Low, the man behind Audioquest cables.

**Right: Denon's new DRM-710 cassette deck (top).**

Jostling alongside the dedicated were everyday shoppers for a decent hi-fi, looking slightly bemused and overwhelmed by it all. Penta provides an opportunity to see just about every piece of hi-fi available - if you've got the stamina and the will. Those without the first had my sympathy. We staggered back to our stand gasping at the number of products on display. And we gasped because of the heat and humidity, something that is always a feature of Penta because of its cramped rooms and corridors.

It was easy to be attracted by some of the more monstrous and eye catching products, only to miss seemingly mundane fare. For example, Nakamichi had a new cassette deck, known as Cassette Deck 1.5, whose restrained styling made it all but invisible under the lights and glitter. Priced at £499.95, it is basically a stripped down Cassette Deck 1, featuring the same Nakamichi diffused resonance dual capstan transport and crystalloy heads. Some of the frills of Cassette Deck 1 have been removed, notably variable replay-head azimuth and variable output. The 1.5 will offer



**Below: JBL on the road in a customised Ford Popular.**



natty white dinner jackets and green bow ties - and their "French Maids". Less discernible were the new 515 and 517 speakers featuring ceramic tweeters. Questioning the Cambridge cassette deck 1 was told: "we are stopping all our Taiwanese manufacture." All manufacturing will come back to Leeds, where it can remain under close control. The Linx brand name comprises a Nebula integrated amplifier, (£495, 65watts), Vega pre/power amplifier system (75watts) and the Pulsar power amplifier (£945, 120watts). A new line-only (i.e. no disc input) Sigma digital pre-amplifier costing £955 has been designed to feed the latter. Other models in the Linx range are a Theta FM tuner, priced at £549 and an Orbit CD player priced £495, which would be ready by Christmas.

The Leak name is being relaunched too, attached to some interestingly styled 'audiophile' items. I spotted a top-loading CD transport, the CDT1, which has a Philips mechanism mounted on a ceramic matrix composite for vibration isolation. This has a new standard, high speed AT&T 50MHz optical link (now used by Deltec as well) to feed a digital preamp, the DSP1. This uses Philips' latest and greatest Bitstream chip, DAC7. Most controls, like tone and volume, are in the digital domain. Finally, a massive power amplifier, the MPA1 (see picture) delivers 150watts (275 into 4 ohms) into eight ohms (see pic). These are very advanced design principles and apparently prices will be high too; there was talk of "around £5, 500 for the system, which includes two monoblock power amps."

In addition to Linx and Leak, Wharfedale also own the Cambridge brand name and are releasing a new 4100 CD player, priced at £695, plus an independent transport, the 5100T (£699) and digital convertor, the 5100D (£499). Two new amplifiers, the



50watt 2050A and 75watt 2075A are also due soon.

Ortofon were showing their new MC15 Super moving coil cartridge priced at £99.95, possessing a Norel (high rigidity, non-resonant nylon) body, a boron cantilever and a Fritz Geiger diamond. A spokesman said "we are trying to persuade as many people as we can to come up to moving coil to take more care of their records and improve sound quality too." The new T7 transformer is made in the UK and priced at £79.95. The case houses two individual transformers, rather than two windings on the same bobbin. They went two turntables better than most by using Alphason Sonata, Systemdeck and Space Acoustics turntables, all playing through Albany amplifiers. The Ortofon people were glowing like their amplifiers at the quality of the sound.

More additions on the vinyl front came from Pink Triangle who were showing their new Little Pink Thing Professional, a turntable designed for replay of 16 inch lacquers and 78rpm discs as well as current releases. The combination of a 16 inch platter and a 12 inch arm, sitting on one of the largest plinths around suggests that a name change is in order - how about Large Pink Thing?

The new CD-R (Recordable Compact Disc) players failed to attract the attention everyone had expected. Denon brought theirs over from Japan and recorded acoustic guitarist Clive Pierce playing one of his own compositions on a hand-made Matthew Carter guitar. The recordable CDs (now being produced by Taiyo Yuden and TDK) are housed in a protective cartridge. The machine takes a minute or so to prepare the disc and will record up to 99 tracks for a length of just a little over an hour. The discs are WORMs - they can only be recorded on once - and have a life expectancy of at least ten years. It was impressive, but very expensive at about £12,000. Denon view it as a professional alternative to DAT. I spotted a new and more affordable Denon cassette deck, the DRM-710. It has a dual capstan transport, three heads "and an Eject button" - all for £229.99. Beside it was the drawer loading version of the DRM-800A, the DRS-810, designed for stacking. Cost was £299.99. There was a DRS-610 drawer loader too, at £199, due out late October 1991. Another interesting new item was the DCD-580 (£179.99) CD player with a new AI Advanced Interpretive convertor on board.

DAT was not especially prominent in contrast to the welter of turntables, DACs and weird loudspeakers. Sony were showing their enthusiasm for the format however with the "entry level" DTC-750 full sized DAT recorder, priced at £499.99 I was told. Due in September was a mini-sized recorder costing even less - £399.99. Unfortunately, with so few prerecorded DAT tapes available, DAT is going to remain bogged down in terms of domestic acceptance.

JBL were showing a pair of large K2 loudspeakers with two 14in drivers and a mid-range/treble horn. Cost was a staggering £20,000.

Other new products I found in the Sony room were Esprit tuners, the STS-370LB (£139.99) with Radio Data System (RDS) and the STS-570 (£199.99), also with RDS. They have digital signal level meters as well, which struck me as amazing value. New cassette decks were the TC-K677ES at £249.99, using a closed loop, dual capstan transport fitted with three heads and the TC-K870ES at £349.99 with direct drive motor on the dual capstan transport.

From a Thursday through to Sunday night, Penta thrummed with sound and activity from 10am to 6pm. This was tough on our cyclist from Worthing; he arrived at 5.30pm on Sunday. "I thought it was open to eight," he groaned ●

hi-fi shows

hi-fi shows

hi-fi shows

hi-fi shows

hi-fi shows

hi-fi shows

hi-fi shows



Top left: Sony bring down the price of DAT with their new DTC-750 recorder.

Left: Expensive punch from Leak: their new 150W MPA I power amp.



Nakamichi simplify Cassette Deck I and call it the I.5 (top).



esoteric ears

**W**hen does a valve not sound like a valve? When Tim de Paravicini uses it in a design, of course. If this sounds strange, bear with me and I'll try to explain. Tim is one of this country's most respected amplifier designers and his own Esoteric Audio Research range of products commands both admiration and awe among the hi-fi fraternity.

As all EAR products are handbuilt by Tim himself, his equipment is both rare and expensive. But it is a privilege to have any of his products for review; to put the huge monoblock 549 valve power amplifiers together with the impressively sophisticated G88 valve preamplifier, totalling some £9,618, is a rare but exciting opportunity.

The equipment reflects the designer: larger than life. The 549 monoblocks (£4,372 a pair) are massive both physically and in terms of performance. Giving out up to about 250W, few valve amplifiers come close to them in sheer power. Their front panels dominate any room, only beaten in size by monster amplifiers like Krell, Threshold and the Musical Fidelity SA470.

The G88 preamplifier, at £5,246, looks rather more restrained than the

The preamplifier is called the G88 because it uses ECC-88 valves - eight of them. I'd like to say that the pre-amplifier, like all of Tim's EAR products, is built like a tank, but can't. I doubt if a tank is as well built as this machine. Everything within is made to overkill standards - even down to the use of Military Specification Mullard PCC-88's instead of the more standard ECC-88 from Precision, Shugang or Richardson's. From the outside, the most arresting sight is the row of black tubular cases sitting on a rear ledge. They hold the handwound input transformers. Inside, the sheer engineering that goes into the G88 is apparent by the solidity of the switching and the general quality of construction.

The rear panel, which sits facing upwards a la Mission Cyrus One and Two, is dominated by the four small and four large transformer cases I have mentioned. This makes the back look like some kind of landscape for British Gas in microcosm. Behind the large black gasometers, there is a beefy XLR connector leading to the power supply. Then come the gold-plated phono sockets for the disc stage, Compact Disc, Tuner, TV and two tape recorders. Next to the phono inputs there is a toggle switch

from smoked Perspex, so that the glow of the valves comes through to the outside world.

The same level of build quality that graces the G88 is apparent in the massive 549 power amplifiers. They are designed with one eye on the studio world and made to withstand the rigours of heavy daily use. Tim provides these mighty power amplifiers with unbalanced inputs for the domestic market.

The front panel is solid and designed to fit into a professional rack mounting system. The large handles can alternatively be used as feet when they are installed in the home. A word of warning; do not attempt to lift the 549 by its handles, as the weight is likely to send it crashing either through the floor or into your knees. If you must pick the unit up, the poundage is evenly distributed with one hand on the left handle and the right holding the rear of the case, as the designer demonstrated.

The front of each monoblock has an on/off switch and both a level and bias adjuster with four lights showing bias setting. The two are designed to iron out any mismatches that exist between preamplifier, power amplifier and loudspeakers. This is useful, because these mismatches often destroy the sound of an otherwise healthy and well-matched system. At the rear of the amplifier the left side is taken up by a phono socket, a set of four loudspeaker terminals (earth, zero, four and eight ohm) and a captive mains lead. The remaining space is occupied by the huge transformers and the large, central, ventilated case which holds the valves in place.

The valves used are two ECC-85's, two ECC-83's and four massive PL509 television valves, in each channel. These have a top cap, which is dangerously exposed. This explains the grille over them, as the voltage across this top cap is very high (4-500V). Again, as with the G88 preamplifier, each 549 is hand built by Tim de Paravicini himself, even down to the windings on the transformers. Its finish is as solid and as bold as that of the G88, reflecting the level of dedication of the man behind these products.

In use, the G88 pre-amplifier proved to be as bomb-proof as its build quality. The fact that the MC stage is built into the preamplifier itself is a sure sign of a quiet valve stage, and this is one of the quietest valve preamps I have heard. Although there are eight valves, it is not that hot to the touch. After about half an hour of warm-up, the pre-amplifier begins to perform in the manner one would expect of such a beast.

The G88 behaves like a good transistor preamplifier, except with a

**Alan Sircom - valve aficionado - finally gets his hands on the legendary 200watt EAR 549 valve power amplifiers. Accompanying them was the amazing EAR G88 valve preamplifier.**

big power amplifiers at first glance. It is a two box unit, with a solid state power supply that fits neatly underneath the preamp itself. How Tim can successfully combine the chrome-plated front panel of the power supply, with the gold coloured dials, lettering and dense black of the rest of the device escapes me; from a design point of view, this combination of colours spells a styling accident, but somehow it seems to fit here.

The G88 is not even the top of the range. Legend speaks of a 52 pre-amplifier, so called because of its use of fifty two valves. This is so big and complex that even Tim de Paravicini himself is scared of it and suggests people try a less fearsome model. To call the G88 'less fearsome' is like calling a Lamborghini Diablo 'slow'. While it could never be as physically impressive as the big 549s, the G88 is still one of the most dramatic-looking preamplifiers around, with that over-the-top feel that separates the high end of hi-fi from the stuff of mere mortal designers.

to change the phono input from Moving Coil to Moving Magnet and a chunky earthing post. There is also a facility for output to two stereo power amplifiers, for bi-amping. Biamping with EAR 549's! The very thought must send a shiver down the spine of every loudspeaker designer in the country.

Five gold knobs range along the front panel. From left to right, there is the channel selector and a phase inverting control which allows both relative and absolute phase to be adjusted; in the centre is a dual tape handling knob which allows for tape monitoring and dubbing as two distinct actions. Finally, there are the dual volume controls. These are ganged together behind the panel by means of a pulley and thread. Adjusting balance is simple; one holds one channel control still while moving the other. Adjusting volume is more intriguing: turn one and the other moves in unison, as if turned by a ghostly hand. Tim's ingenuity shines through. The front fascia is made

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better class of sound. Few solid state preamplifiers can match it for warmth and few valve pre-amplifiers can match it for its clean bass. It is the best of both worlds, and has peers and equals, but few superiors. Performing well in almost every subjective parameter, the G88 was stunning in the solidity of the imagery it produced. Reviewers talk of instruments being 'bolted down'; if this is the case, then the G88 uses shipbuilding rivets.

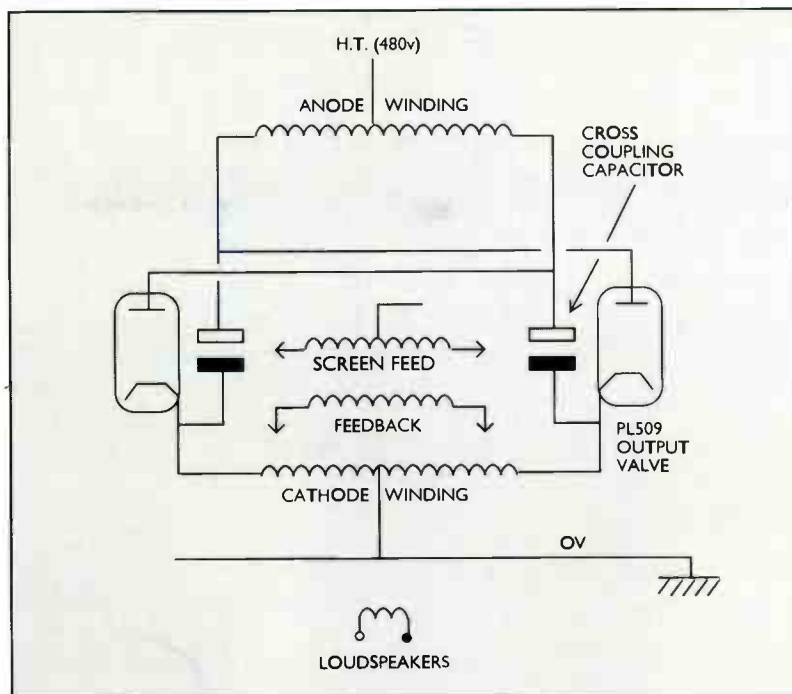
In fact, its solidity was not only its greatest strength, but also its weakness. The instruments began to dominate the performance. I became aware of listening to the production and listening to the musicians rather than the music. I feel that the G88 is impressive 'hi-fi', but slightly misses out in the music. Somehow, it is a little robbed of life and ambience, when compared to some of the finest pre-amplifiers around.

This was only a minor feeling, especially when the sound quality proves as impressive as it often did. When pre- and power amplifiers were in partnership, some tracks became took on a sense of reality that became very difficult to live without, due to the almost tangible solidity to the instruments. Through a pair of Proac Studio 1 Mk. II loudspeakers the closing door on 'One Of My Tums' from Pink Floyd's 'The Wall' had almost all of the dynamics of the real event. The spatial information proved 100% accurate - guitars and voices might move within a mix, but doors shouldn't!

The 549's themselves are capable of producing some of the most incredible sound you will hear outside of the recording studio. The gain and bias controls are vital with this amplifier, as imbalances are almost impossible to live with. As it is, the 549's approach the music unrelentingly; a poor recording will sound vexatious; something that seemed to be especially true of those that seem to be made for airplay.

The most exciting area is the 549's handling of bass. No other amplifier that I have heard comes close to the 549's impressively dry, tight and apparently endless bass. Anyone who suggests that a valve amplifier cannot handle bass as well as transistor amplification has not heard the 549's.

In many ways, these power amplifiers behave as if they were pretending to be solid state devices. They have none of the added warmth nor any of the other euphonic devices often associated with valves. Instead they leave the music stripped bare of artifice. This can often be too intense an experience, as many records became fierce sounding.



This began to pose a philosophical problem: was the amplifier too strong and sharp in the treble, or are most recordings that dreadful? I think that the former is the case, but I'm still not convinced. I feel, if anything, that the 509 valve used here could be at fault. I have heard it in other devices and it can fail in its presentation of higher frequencies.

This sharpness aside, the 549's did pretty much everything that a good amplifier should. While they seemed to sacrifice delicacy for detail, much like a Krell, they still had a great ambience and sense of an acoustic. This helped to balance the G88 preamplifier's slight weakness in this area. As with the G88, all the usual parameters that one uses to subjectively test a product (imagery, detail, articulation and so on) were in the top league, although the treble performance seemed to detract from the overall coherence of the amplifier.

At these esoteric levels, what is required from a hi-fi system becomes a matter of personal choice. I found the combination of these two amplifiers a deeply impressive experience. It was so studio-like I found it a little too disturbing. I can more than understand those who do enjoy this kind of sound being unable to find anything on the market to better the combination.

As stand-alone products, I feel that the 549's are more successful than the G88. The 549's provide the listener with an intensity that is almost impossible to attain elsewhere. By virtue of their hybrid sound, they do not fall into a 'best-of-both-worlds' category, but instead define their own niche within the high-end market. If you can, have a listen to them. They are both impressive and unique ●

**Basic configuration of EAR549 output stage, showing balanced bridge working using equal anode and cathode windings, plus capacitor cross coupling. Additional screen and feedback windings are included in a complex quadrafilar wound output transformer.**

### Measured Performance

The 549's are rated at 200watts each, a massive output for a valve power amplifier. They produce very little distortion too. Measurement showed 250watts is produced at 1kHz, with little less at 40Hz and 10kHz.

The circuit configuration is basically balanced bridge working where both the anodes and the cathodes are fed from equal sections of the primary winding. The technique has been used by both Quad and McIntosh in the past. A novel development is the use of cross coupling capacitors. They force the PL509s to follow each other closely, reducing high frequency distortion.

Feedback is not applied from the transformer secondary, as in most valve amplifiers. Tim insists that his own transformers - which he both designs and winds - don't need 'linearising' by inclusion in a feedback loop. Instead, special windings provide feedback.

The first two stages use ECC-83 (twin triodes) operating as differential pairs, which in turn drive two ECC-85 (twin triodes) operating in differential mode as final drivers. These feed parallel pairs of PL509 output valves acting in push-pull.

### Test Results

Power	250watts		
Frequency response	5Hz-37kHz		
Sensitivity	1.75V		
Output impedance	0.25 ohms		
Damping factor	32		
Weight	28kgs		
Distortion	40Hz	1kHz	10kHz
1W	0.008	0.007	0.017
200W	0.18	0.04	0.075

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Over past issues one of the areas that has fired readers and ourselves with interest has been that of the valve amplifier. New models, like the Michaelson Odysseus and the Copland, seem to appear almost daily, while currently available or older ones become more popular than ever.

Obviously, there must be a large number of valve amplifiers around at the moment. Some of the owners of these machines will be keen to improve upon what they already have. But how? One of the problems with a valve amplifier is that there are great big, scary voltages running around inside them, just waiting to jump out and bite the first hand that sets foot inside - as it were.

It is possible to alter the sound quality of a valve amplifier without having to wield a soldering iron. Because valves have a finite life, they have to be replaceable, otherwise your expensive amplifier would soon become redundant the moment one died. This is an obvious place to start improvements, especially as they play such an important part in the overall sound quality.

Both construction and the care with which they are selected play an essential role in a valve's sonic ability. Alternatives are available for the most popular valves, such as the EL34 output pentode, but each variant will sound different. Choice is more limited today than in the past, due to the relative lack of demand compared to the days when practically everything electronic used a valve of some kind, but some companies still offer a few options.

For example, PM Components offer two versions of the ECC88 triode valve; the E88CC and E88CC-01. Both have very different sounds. I carried out listening tests and, in my opinion, the E88CC-01 gives the preamplifier stage a greater sense of life and body than the standard ECC88s, and is superior in every way. This is reflected in the price, as the 01 costs a little more than the standard one.

Secondly, the selection process a valve undergoes is of equal or even greater importance than the type used. All undergo a testing process, to determine the overall quality. Valves that are usually supplied in multiples are then matched into pairs, to reduce the performance differences between. Some companies take this a stage further.

Enter Groove Tubes. Better known in the guitar world than in the hi-fi business, they take the selection procedure further than anybody else. Their unique process, resulting in a far higher reject rate than the norm, involves testing the valves for distortion, via the heater element. They are then rated on a one to ten scale. This routine, along with rigorous quality testing and pair matching, ensures that they are about the most consistent currently available. Once again, this level of testing is reflected in the price.

PM Components have taken the unprecedented step of specifying their own range of valves. They get them manufactured by the Shuguang factory in China. Known as Golden Dragons, they



offer reliability, low microphonics and less noise than regular models.

As an example of just how much these valves can cost, the ECC82 preamplifier valve costs £1.75 in a standard version and £5.82 in Golden Dragon. The Groove Tube versions cost £14.55. The EL34 pentode mentioned earlier costs £17.63 for a matched pair in standard form (the same as Golden Dragons) as opposed to £10.58 for an unmatched normal pair. This time, the Groove Tubes cost a serious £52.75 for a matched pair.

To establish the worth of the various brands, we performed a listening test on them, both privately and under the auspices of London's Vinyl Tube Audio. A variety of sources and loudspeakers were used at both locations, but it was decided that the amplifier should remain a constant throughout. We decided that the popular, well-known and not too esoteric Audio Innovations Series 500 integrated amplifier should be used. The valves used in the test were the standard ones as supplied with the amplifier, plus Richardson Red valves (from the last surviving UK manufacturer) Shuguang Golden Dragons and Groove Tubes.

First, the standard valves were replaced with the slightly more expensive Richardson Reds. This appeared to give the amplifier a better dynamic range, with appreciably less distortion on transients. Next, the Richardsons were replaced by Golden Dragons. This gave a far wider soundstage, but without as great a depth. The mid-band appeared cleaner and less confused, although the high treble was more raucous. I found the Dragons slightly easier on the ears, although some found them too hi-fi. Finally, these were supplanted by Groove Tubes, stage by stage. Even by just changing valves in the drive stages, instrument definition, detail and separation all improved. Substituting the ECC83s for 12AX7 valves improved the sense of presence and fine detail, while changing over to the 7025 valves in their place gave a more dynamic, lively sound.

At the end, we changed the output EL34s for a range of Groove Tubes, trying to determine the distortion rating that fitted best. Eventually, the middle ground (4, 5 or 6) suited, having the best

## tweaky corner

**Alan Sircom bends his ear to the sound of valves.**

### RICHARDSON REDS GOLDEN DRAGONS GROOVE TUBES

balance between distortion and clarity. The valves with the lowest distortion seemed to have the life cut from them, while the highest were just too warm for audio use.

Having determined that, the Groove Tubes were put up against the Golden Dragons. Again the Groove Tubes improved upon the other valves in the test, in almost every way. Testing at home confirmed this, although the improvements were slightly less marked. The change between the standard valves and the Golden Dragons was profound, but the difference between the Dragons and the Groove Tubes, while still obvious, was not as clear as before.

The conclusion is clear. You pay yer money and you take yer choice. The standard valves supplied with most equipment sound . . . well, standard. Direct improvements can be made from upgrading them and it appears that their performance is in direct relation to the cost. The Groove Tube valves are very expensive, but they offer the leading edge in terms of sound quality. Both the Richardson and the Golden Dragons are not that far behind, especially when one considers the price differential. They offer fine quality, which comes close, but does not quite reach the dizzy heights that can be achieved with the Groove Tubes ●



# LEVEL HEADED BARGAIN

A new approach to cassette deck manufacture has given Technics a fine product.

**Report by Eric Braithwaite.  
Tests by Noel Keywood.**

"Squeezing such a performance from a deck costing just £130 is something Technics ought to be given a prize for" I said of Technics RS-BX404 cassette deck in our September 1991 issue. It was a little marvel of a two-head machine for £130. Doubtless feeling a bit confident, Technics rang up and offered me a brand new *three-head* machine, the RS-BX606. 'How much?' I asked. '£169.95,' they said. What? At

that price, if it's any good at all as three head-decks go, a lot of Japanese faces belonging to other companies are going to stop looking inscrutable and assume a worried frown. I wonder what the Japanese for 'angst' is?

Normally, I prefer to tantalise, and leave the conclusion to the end, but a friend's comments say it all. He dropped in while I was testing the '606 at home (the editorial listening rooms fell victim to a power-cut), listened for a few minutes, and said: "That's very good. Not quite as good as my Nakamichi, though".

"It's a quarter of the price," says I. "Oh... It's *incredibly* good!"

Now I don't know whether the bullet hole in my foot was self inflicted, or whether Technics were holding the pistol, but this cassette deck could make practically every two-head deck under

cassette decks around which seem to have been built on a "screw it in and hope for the best" basis. The sins of the head are then compensated for in the electronics - or that's the general idea. There's no substitute for proper, well thought out engineering at both ends; when it's wrong, an owner takes along a cassette recorded on one machine to try on another and it comes out like nothing on earth.

It looks as though this is about to change. A glance at Noel's Measured Performance section will tell you that Technics have made their own heads - no bodge-ups using someone else's and hoping the innards can be tweaked to suit. There's some thought gone into this machine.

Not that it is very obvious from the outside. In looks, the RS-BX606 is very similar to the budget two-head machine reviewed in September, but without microphone sockets this time. The only real give-away, apart from the words "Three Head" on the window of the cassette compartment, is a round button with gold surround (?) up near the rotary record-level control. It is marked Monitor. Otherwise, the '606 is much the same colour and shape as the '404, with the row of gently curved control buttons under the display and slight hump at the lower edge of the cassette door. So subtle this, it seems like a trick of the light until it's looked at sideways on.

The facilities are useful, avoiding trivial extremes. Starting from the left, there's the On/Off/Standby button, with Eject and a headphone socket below along with its small associated volume control. Right of the cassette compartment, which is lacking any fancy motor drive or cassette stabilizer gubbins, is a basic display panel without a crazy frills. A red legend shows recording mode, and a white triangle confirms the transport is operating. A sensibly sized electronic tape counter sits below. This can be switched from a straight numerical three-digit counter to indicate elapsed time as well.

### Segments

Record or playback level is a row of white segments from -30 to +12, with Dolby level indicated. Peaks are held for a second or two, sensibly at zero or above. Cleverly, the range of the meter can be switched to read from -7 to +7. The need might not be immediately apparent, but it proved very useful fine-tuning recordings of pop music which seldom have much in the way of low-level sound, but can overload and distort quite easily if over-recorded.

A useful little trick is a Memory Repeat button; using the tape counter reset and this, a track or section of tape can be set to play sixteen times or until it's stopped manually. I listened seven times round, but boredom and neighbours intervened before I made it to the end. Tracks (called 'tunes' in the manual, which is a different thing, or so I always thought) can be searched for using the

Forward and Rewind buttons during playback.

Initial tape/source monitor switching is automatic - insert a tape, and it will default to the Tape position. There is a manual over-ride. Tape type switching is automatic. There is an MPX filter for cutting out pilot tone from a tuner, and variable bias is provided for tape tuning. Unusually, it works with metal tape, as well as ferrics and chromes.

Otherwise, all else is as usual; the normal controls for Pause, Play and so on, Memory Repeat and Memory Stop. The muting department has an interesting sideline: it will either mute a recording for four seconds or as long as you hold it down.

I've gone on at some length, because this is a deck whose price is going to attract buyers who would never have thought of a three-head deck before. My apologies to those who've seen it all before. Now down to the listening.

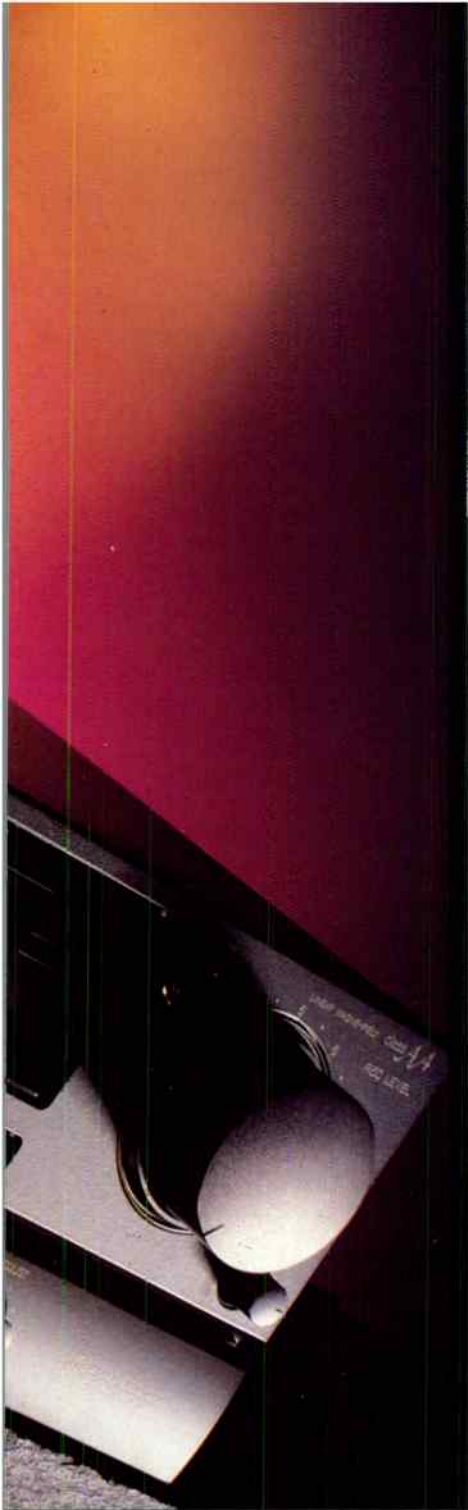
### Sound Quality

Glorious - there's no other word for the sound of this deck with prerecorded tapes. Accurate, detailed, sweet without being sugary, quick without anything being left behind; everything on a good prerecorded cassette tape came out of the speakers. The singers on the Hyperion 'A Feather on the Breath of God', who so often marry together, all came over clear as a bell and soaring like swallows. Brass in Mussorgsky's Pictures at an Exhibition had the right amount of bite and rasp, with the pianissimo flutterings of single instruments way back in the orchestra where they're supposed to be. Even the tinkling of music stands was practically visible.

Copland's Fanfare for the Common Man showed off the full timbral and tonal differences between trumpets and trombones, which has come to seem a rare event, and simpler chamber pieces had everyone in their place and every note distinct, every pluck of the string, every breath of the flautist. The hardest pre-recorded tape I have for a deck to reproduce, the Chandos 'Norfolk Rhapsody' by Vaughan Williams, came over with full depth and dynamics from whispering pianissimo strings and almost inaudible harp through solo violin to awesomely swelling orchestral tutti that showed you the whole orchestra was there on that cassette.

It's good for rock music, too. A bit of a mixture, again, but Tina Turner's Break Every Rule was danceable to, clean, sharp and fast. Every nuance of her vocal athletics could be heard jumping the fences, with the backing tracks neatly laid out behind and around her. Not a drumbeat or a guitar string was missed.

With this machine, many people are going to experience a revelation akin to hearing a tape on a top-rank personal stereo for the first time. Remember how everything seemed that much clearer, that much more detailed? Part of it is a little very subtle tweaking. The Technics is kind to tapes without taking



£200 - including their own RS-BX404 I was so pleased with - redundant. If you can hear what you're taping while you're taping it, and the quality is this good, there's hardly any point in sticking to a two-head machine.

That, as we've said before, is the real advantage of a three-head-deck. No putting a tape in later only to discover that it was over-recorded and sounds fuzzy and distorted, or under-recorded and sounds as though the tape's been through a washing machine and all the music has shrunk into a dull porridge.

The ideal specifications for a record head are slightly different from those of a replay head and using one head for both purposes, as they do on two-head decks, means compromise. It takes quite a lot of thought on the part of the designers to engineer such an arrangement well. There are any number of

anything away. Compared to the reference Nakamichis, which can be revealing to the point of cruelty with a merely average tape, vocals were a little more forward, some dynamics fractionally more subdued, the mid-range just a fraction warmer and therefore fuller, and the bass a little bit softer and looser. Against references more than twice and three times its price, the Technics gave away little in terms of imagery other than a little widening of a solo flute and a fractional blurring at the edges of notes.

Flute, by the way, showed up the inescapable fact that although this is an extremely good transport, it's not as good as ones which costs the same as this entire deck. How could it be? But

there was a trifling instability in sustained notes, which softened the tone and made a little wobble evident for the space of a quaver before it recovered. I suspect a listener would have to be listening for it - which I was - or to be a pitch sensitive musician before such a small blemish was even noticed.

When recording, high quality programme material sounded excellent - average material sounded a little better than might be expected, but with hardly any tonal or timbral shifts. If you imagine a piece of music as a yard rule, what came out of the Technics was everything but the last three inches or thereabouts. Few but the very best manage more than two thirds of the length.

Recording on metal tape (TDK MA) confirmed the virtues and strengths of the Technics deck. With Dolby B, music was near enough to the digital source that most people would barely notice the difference. I never thought I would be able to hear this on a budget deck, but I could practically hear the edges of each track when the multitrack master was laid down. The Technics sounded a bit fuzzy, maybe, compared to the Nakamichi, but that really is an achievement.

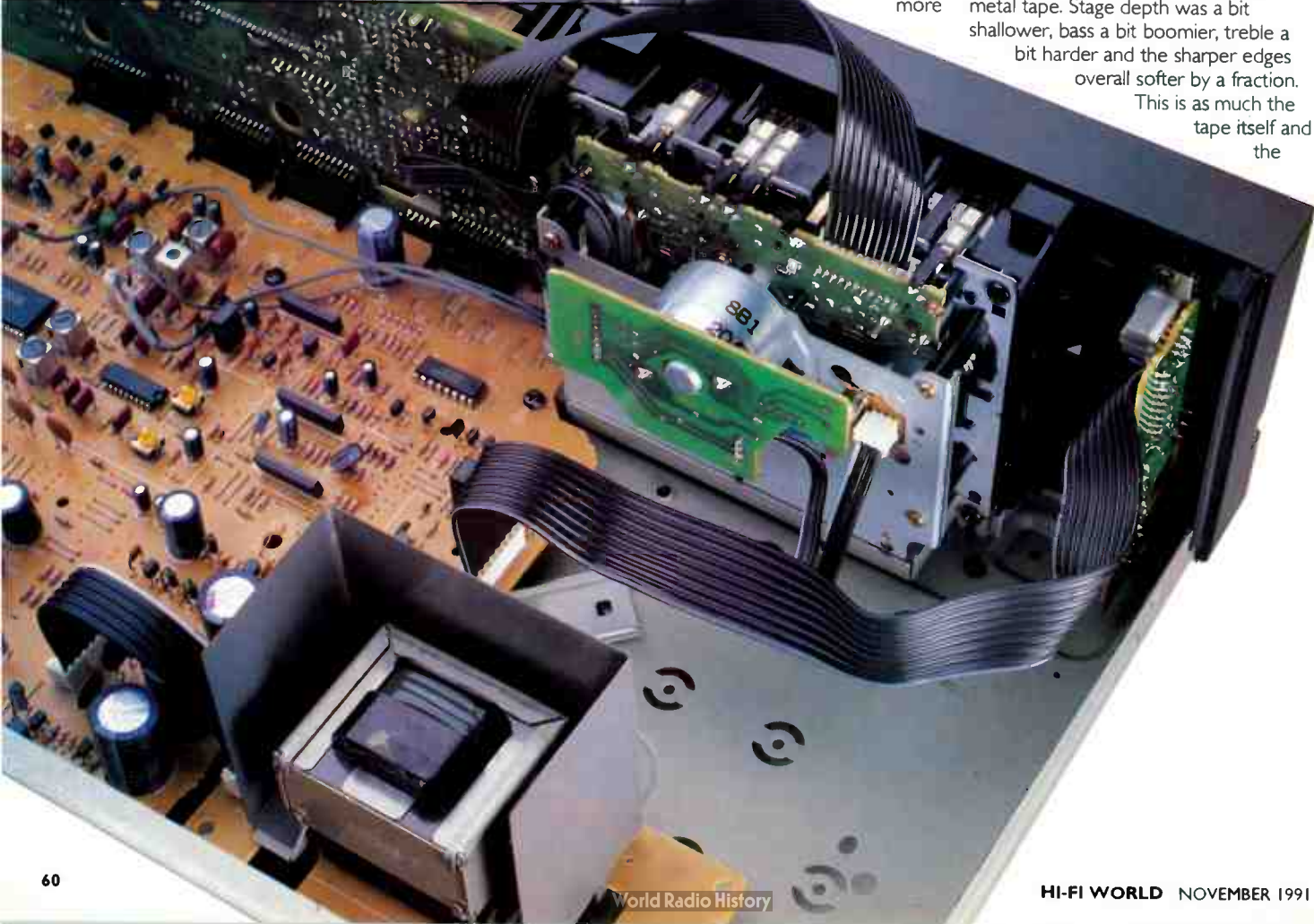
Rock material came across with no diminution of style or energy, and what is more

important, no slackness to the beat or coloration of voices or instruments. The only way of differentiating was to turn up the volume and listen very closely; I began to feel a bit like someone looking for a hair (rather than anything as obvious as a needle) in a haystack, just trying to find fault. Perhaps the edges of the elements of the mix were a little fuzzier; perhaps the notes decayed just a fraction more slowly; perhaps some bass lines were softer and a little looser. Dolby C added a slight graininess on voice, and softened bass a little, but hiss was negligible, thanks both to Dolby HX-Pro and what is obviously a very well made head assembly.

A word of warning. I thought I would really test this machine and fed some heavy treble energy into it - Classical and Rock - and turned the knob until the indicators fell off the edge. The heads are good, but they won't put up with that! Using TDK MA, +8 is as far as you go, then everything breaks up. Treble becomes grainier and control goes out of the window quite a way down into the mid-range. But this is the benefit of monitoring with a three-head deck: it can be heard while it's happening and record level wound down. The performance was extraordinary; though under-recording tended to give a dullish sound compared to the reference's softened one, there is leeway in between, and combining off-tape monitoring with the switchable meter range should make perfect recording an everyday event.

Chrome tape (TDK SA) had the Technics player sticking to its guns, with most of the strengths of recording on metal tape. Stage depth was a bit shallower, bass a bit boomier, treble a bit harder and the sharper edges overall softer by a fraction.

This is as much the tape itself and the



poorer treble overload margin, but we're talking fractions here. A word of commendation hereabouts too for Technics' variable bias. It is very accurately set up and there's no need to turn it more than a little either way for matching most tape brands available in the U.K. The manual gives a useful list of tapes and map of settings too. It's not as incredibly (over?) detailed as Aiwa's which seems to list every tape known to man practically back to prehistory, but it's broad enough.

I got good results with ferric tape too, this time with TDK AR, the wonder Type I tape which can sound as good as a chrome. Results were almost exactly the same as before with chrome and metal, with no more than a slight curtailment of upper and lower reaches and a slight increase in forwardness in the presentation. Tonality and musical truthfulness remained exact, in fact, over all three tape types, with nothing more than a very mild softening of focus on the way down the grades.

### Tricky Piano

Any reservations relate only to three areas. A tricky piano test with a wild dynamic range swooping from pianissimo to mezzoforte in a few bars was about the only thing that showed the electronics package as a whole is not fashioned out of gold bricks. The piano remained quite steady on sustained notes with just a trace of uncertainty, and it retained a high proportion of its weight, but the Technics was valiant though unhappy at tracing the extremes of the dynamic range. This recording has, however, tripped up far more expensively engineered decks than this, and with far less pleasant and less listenable results.

A second reservation relates to the effective, but nonetheless plasticky controls. The money has been put where it really matters, in the heads and the electronics, so it's churlish to ask for a more heavyweight build and rugged casing and controls. Treated with care and the respect its performance deserves, and it the deck should last well. And the last reservation? Only that Technics are going to shoot me in the other foot by sending me a Nakamichi Dragon-eater for two hundred pounds next month.

The Technics RS-BX606 is without doubt the top of the heap for affordable money, and it won't take prisoners in many systems outside the second-mortgage set-ups. Please, Technics, don't make it obsolete inside six months. If you must change it, put it in a stronger case, change some of the plastic for metal, transform the operating mechanics into something silkier. Leave the innards alone.

Judging by the technical strides they've made in making a three-head machine of real worth available at what amounts to a bankruptcy sale price, if Technics enter a long jumper in the next Olympics, I think I'll put money on him ●

### Measured Performance

With the RS-BX606 Technics have mustered their enormous industrial strength to come up with a product that is technically ahead by a clear margin. The independent, siamesed record and replay heads demonstrate this most clearly. They have an overload ceiling almost as high as Nakamichi heads, possessing around +3dB improvement over previous models and rivals. This means that higher recording levels can be used, making hiss less obvious. With TDK MA-XG for example, a recording level of +8dB (ref. IEC 0dB) can be used, which translates to no less than +12 - the top segment - on the record level display.

Less expensive metal tapes also manage well, That's MRX-PRO hitting +6.5dB, which lit the +10 segment on the display. This is right around its upper limit. At such levels there is some slight muddle; a perfectly clean sound is obtained just a few dB lower. Which level you prefer depends upon your sensitivity and tolerance to degradation. Chrome tapes can take +3dB (IEC) and ferrics +4dB.

Technics achieve these levels both by the use of a good head and by the application of a higher bias than is usual. Treble overload suffers a little as a result, but the performance balance is still appropriate for most types of music. In this approach they follow Nakamichi - albeit trailing many years behind. It always surprises me that Nakamichi's initiatives remain unappreciated by all other Japanese cassette deck manufacturers.

So, in a nutshell, the RS-BX606 offers at least +3dB more dynamic range than all rivals which, with cassette, is a significant advantage. Technics confirmed that the head is both designed and manufactured in-house, and that it was necessary to abandon OEM types to gain such an advantage.

### Frequency Response

A record head must have flat frequency response and low bass distortion too. Technic's possesses both. It has a remarkably flat response, as our analysis shows. This is flatter than all rivals, including Nakamichi. The high frequency limit is 17kHz (-2dB) and the low frequency limit 10Hz. There is one low frequency ripple, but it isn't great. Both with recordings and with prerecorded tapes this deck delivers smooth bass output with little distortion (around 1% third harmonic). In all areas, Technics new head is an exceptional performer.

Variable bias works with all tape types, including metal. This is new for Technics. Replay equalisation was so carefully tailored that ferrics, chromes and metals all gave a perfectly flat response. Just a quick twiddle of the bias knob is enough to get any tape tuned in perfectly, tests showed. This ensures recordings will sound tonally accurate.

The other item of great importance to every cassette deck is the transport. Technics have again produced their own, confirming their determination to get ahead by producing their own parts. It's another action that allows them to distance themselves from competitors. This one uses a direct drive motor to the capstan. The benefit is - or should be - very stable basic speed, free from drift and wow. Our review sample worked well in this area, giving much the same performance as the RS-BX404 tested in our September 1991 issue. Wow was low-ish at 0.08% and flutter well suppressed at 0.15%. The latter figure was very good for a single capstan type. I noticed only that drive torque looked a bit weak; a cassette with stiff hubs caused the transport

to stall. I had to rewind the cassette on our Nakamichi ZX-9 to get it running freely, then the Technics was happy. Fast reeling was on the slow side too, probably because of limited motor torque. This should not be a problem with good tapes, but watch out for uneven winding that results from continual stop/start usage. Cassettes may need to be rewound end-to-end on occasion to keep them running freely.

Replay frequency response was flat from 30Hz up to 20kHz. This ensures that pre-recorded tapes will sound tonally balanced, in particular avoiding the muffled sound that comes from incorrect head azimuth and replay equalisation. Hum and noise in the replay amps was low also.

In every area, the RS-BX606 performs very well. At the price it offers a level of performance - especially from the head - well above that of rivals. With this deck, Technics have a cracker on their hands.

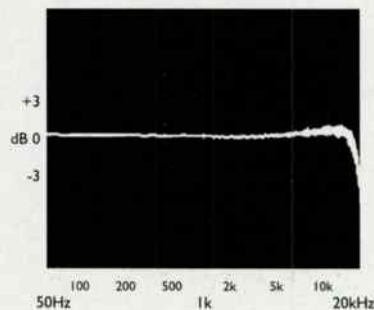
### REPLAY (prerecorded tapes)

Frequency response (-2dB)	30Hz-20kHz
Speed accuracy	+0.5%
Hiss (70uS, Dolby out)	-61dB

### RECORDING (blank tapes)

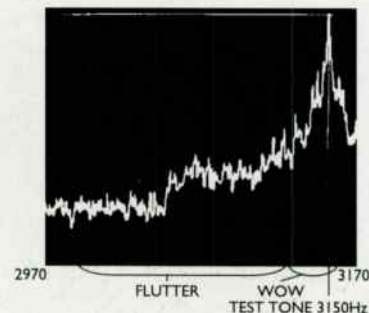
Frequency response (IEC Primary Refs.)	
ferric (IECI)	10Hz-17kHz
chrome (IECII)	10Hz-15kHz
metal (IECIV)	10Hz-17kHz
Separation (1kHz)	-49dB
Distortion (315Hz)	0.5%
Hiss (70uS, Dolby out)	-55dB
Speed variations (DIN total)	0.08%
Flutter energy (3-3.13kHz)	-26dB
MOL/SAT (IEC Refs)	315/10k
IEC I (ferric)	+4dB/-11dB
IECII (chrome)	+3dB/-6dB
IECIV (metal)	+5.5dB/-3dB

### Frequency Response



Flat response to 17kHz

### Speed Stability



Little drift, wow or flutter



# a goddess of cartridges

**The Audio Note lo is named after the goddess Zeus loved.**

**Alan Sircom came to the same appreciation.**

Silver is no longer classed as a precious metal, except in the hi-fi industry. Here, its superior conductivity makes silver an obvious choice of the audiophile designer. Nowhere is silver used with such abandon as by the Audio Note Company of Japan, whose aim is to use the maximum amount of the metal in the audio path. This is even taken as far as the cartridge itself. However, the amount of silver contained within the £1,295 Audio Note lolliv is not its only innovation.

First designed in 1978 and refined ever since, the Audio Note lo features novel aspects of cartridge design rarely seen elsewhere. Until recently, since the cartridge had to be hand-built, only about fifty los were made in a year. In July 1990, Audio Note's UK distributors were given

permission and the training required to manufacture this complex cartridge; the first UK-built lo was available in April 1991. Production is expected to be increased to around 200 los per year.

To produce the lo in this country needed substantial investment in tooling and measuring equipment. Some of the rigorous test procedures, equipment and records used are said to be unique to Audio Note. One such test uses a fast frequency sweep at high amplitude to seek out any problems within the cartridge.

The Japanese designer behind this cartridge, Hiroyasu Kondo, has attempted to address many of the problems that he considers paramount in preventing the best response from a fine cartridge. After painstaking research, he found that

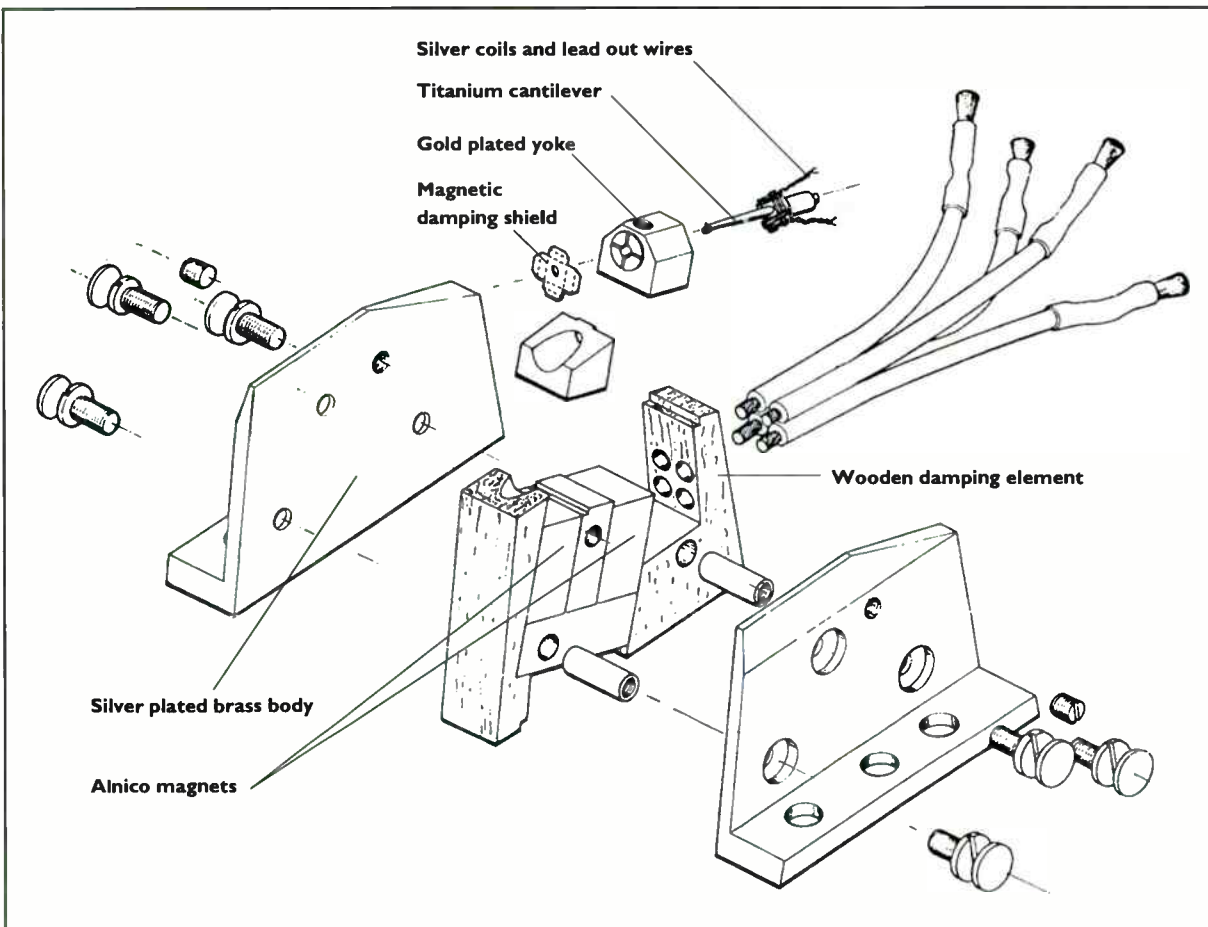
the very low output moving coil design is closest to perfection. The lo, therefore, is not recommended for use with the moving coil stage of an amplifier, but with a special transformer instead. Two expensive - and silver wound - transformers are available from Audio Note, while Audio Innovations produce two less stratospherically expensive models which will suffice.

This low output design has been developed with an eye to the relative effects of the magnetic materials used within the cartridge itself. It was found that the magnetic material used exerts an influence on sound quality. The optimum was initially discovered to be an electromagnet. This has a number of practical limitations and can only be used in the most expensive of applications. The electromagnetic circuit is in production today, under the guise of the lo Ltd., but this needs six lead wires instead of the usual four - two for the DC power supply. Arm rewiring in this circumstance is mandatory.

Hiroyasu Kondo then found that very high grade ALNICO magnets came close, in sound quality terms, to the otherwise impractical electromagnet. Two ALNICO magnets, set within a pure iron yoke and gold plated to prevent corrosion, are fitted to the lo. This arrangement creates a very strong and accurately focussed magnetic field, allowing the minimum number of coil windings.

With such a sensitive design, it was thought that the least number of electrical connections should occur in the signal path, so the coil wire, made of 99.99% pure silver, was taken right up to the output terminals. At this point, research progressed into the cantilever, its damping and the stylus itself. The best combination was thought to be a Titanium cantilever, with a factory-adjustable Butyl rubber damper and a Van den Hul I stylus for better tracking and lower record wear.

The cartridge housing was given close attention too. Audio Note felt that for maximum information retrieval, mechanical movement of the stylus should be unaffected by extraneous vibrations within the cartridge housing. The mechanical integrity of the cartridge was given top priority. To this end, the cartridge body was designed to minimise standing waves and eliminate resonating air pockets. At the same time, the rigidity of the body is maximised. The likelihood of coloration from energy stored within the housing should therefore be reduced. This emphasis on rigidity is taken beyond the body of the cartridge by providing six mounting holes for bolting it to the headshell. If possible, four or preferably all six holes should be used, to



Exploded diagram of the Audio Note lolly cartridge

allow rigid coupling between cartridge and arm.

Only a small number of pick-up arms have sufficient rigidity to do this cartridge justice. An additional problem is that it weighs a massive 18 grammes. Most cartridges weigh 8gms or thereabouts and most arms can accept 12gms maximum. The SME Series V fitted to my Pink Triangle Anniversary turntable is compatible, and pick-up arms such as the more expensive Helius models would serve. While the Linn Ekos should work, I have not heard this combination, so cannot pass comment on its virtues.

Peter Qvortrop of Audio Note strongly suggests that the pick-up arm be rewired with Audio Note cable; I have not had a chance to try this yet, but it seems a logical progression. I spoke to SME on the subject: rewiring would cost £74.61 for the modification, £35 for the internal wiring, £15 for the leadout wires and about £150 for the lead connecting the arm to the amplifier. This last is unnecessary on the Anniversary, because of its FlexiLink design.

In appearance, the cartridge bears some resemblance to the expensive Goldring designs, but on a much larger scale. The two silver-plated side panels and the solid rosewood end cheeks give the cartridge an expensive and purposeful look.

It needs a great deal of running in and is very critical of set-up; VTA especially must be correctly aligned. Once in action though, the lo shows

just how poor most cartridges are at their job. Used with an Audio Innovations/Audio Note system, the lo offers some remarkable insights into what is going on in the grooves.

On first listening, the cartridge sounds almost too lean compared with most others. It soon becomes apparent that this is not the case; other cartridges seem to have a terrific resonant overhang that we have all come to terms with. This is most noticeable in the lower regions, where they sound bloated compared to the lo.

Overall, sound quality seems very natural on acquaintance. Piano notes and female vocals, traditionally the most difficult for a system to reproduce, are unusually realistic. Detailing is excellent; I noticed notes in complicated mixes that normally get lost in the melee of sound.

The lo's imagery, solidity and articulation are all superb. This made the sound stage appear quite natural. It was perhaps less solid than is sometimes the case, but this seemed to better represent live music. In other words, the lo's soundstaging is well executed, without drawing attention to itself. I found that in every system I have used it in, it has never strayed into 'hi-fi', always staying on the side of the music.

The lo also has speed and pace. In this sense it reminded me of the Decca models, but without their idiosyncrasies. Hi-hats have ring and a sense of rhythm that suggests

there is something fundamentally correct about its performance, while other cymbals are well accounted for by the clean decay of the cymbal ring. These qualities were finely portrayed.

One area that I found especially beguiling was the lo's understating of surface noise. The few cartridges that come close to its performance often do so by delivering every possible piece of information from the groove, including track damage. The lo is less unrelenting in this manner. It still provides a remarkable amount of information, but not to the constant accompaniment of the sound of frying bacon!

In fact, the lo's biggest drawback is the systems it might be partnered with. In a complementary system, such as the Audio Innovations/Audio Note sound, the cartridge will blend in with a quality that proves difficult to live without. But I can also see its lack of character and accent on the music making some systems sound flat and lifeless when compared to a cartridge that has a little more of a plummy, flabby presentation.

That aside, I have little else to say that is critical of the Audio Note lo. It is very expensive, a little system dependent and demands the finest arm to live in. But, for those whose systems fulfill these criteria, the lo is one of the finest cartridges available. When we are up in the market that includes needles like the £4000 Kiseki Lapis Lazuli, the Audio Note lo looks like a bargain ●

The original Creek T40 tuner had a fine reputation. It was known for sounding smooth, a trifle warm, but relaxing to listen to. Perhaps it was the general sense of atmosphere and closeness it could create that made it most attractive to listen to though. Whilst so many tuners these days sound flat and lifeless - or 'boring' to use one of hi-fi journalism's most contentious phrases - the T40 did not. It was technically unpretentious but this did not matter; it was widely appreciated for its sound alone.

Somehow, 'improvement' to S3 status managed to destroy most of these qualities. In our April 1991 issue I wrote "Only on Radio 2 did it work properly" and "our sample was poor to the point of unacceptability". The TGI Group who now own Creek admitted they had had production problems. With manufacture now transferred up to the Tannoy factory in Glasgow, these have been eliminated, we have been told. The T40 tested here is a product of the new arrangement, so this test is a re-run as it were.

That the T40 should ever have been popular is an indictment of its more sophisticated rivals. It doesn't have push button station selection, only manual tuning using a good, old fashioned knob. This operates an electronic tuning system, but even though the display indicates in 0.05MHz steps, tuning is continuous and analogue, hence the need for automatic frequency control to stay on a station. There is no signal strength indicator and although both Narrow (IF bandwidth) and DX (Long Distance) buttons are fitted, they seem ineffective in use. The T40 gained popularity solely because of its sound, which goes to show how little respected other gadget laden tuners are in this area.

What I like in particular about the T40 is its compact dimensions, which are ideal for shelf mounting - and its neat appearance. The attractive green digital readout of frequency is complemented by fine green legends applied to a satin finish black fascia. The whole is neat and unassuming to look at, yet tasteful and even elegant in a quiet sort of way.

The rear panel carries audio outputs, together with a level control for amplifier matching. There are

# another look at the creek T40 tuner

**In our April 1991 issue we tested the newly revised Creek T40 tuner. Problems discovered then have been eradicated, Creek told us, bravely submitting another sample.**

Report by Noel Keywood.  
Listening tests by Eric Braithwaite.

screw terminals for 75ohm and 300ohm feeder cables, plus a normal 75ohm socket for coaxial cables.

## Sound Quality

It was clear that the T40s3 tuner had a very creekly (puns definitely not even implied) sound. The word that keeps recurring in the listening notes is 'pleasant.' Now, how to define the meaning of the word in sonic terms?

On music broadcasts, the revised T40 at its best demonstrated a clean bright treble without that glaring 'Mr Sheen' overlay that might be expected to afflict it, with a gentle and sweet mid-range. Listening to Billie Holiday on Jazz FM showed a respect

for the balance of the recording, with voice and instruments well-placed in an acoustic, though a little lightened in tone, and plucked bass a little smudged. This was a 'musical' balance, free of obtrusive colorations and smoothed over, if a little too loose in focus in the lower reaches.

Announcers' voices were chesty and husky according to microphone - if they were baritones - but slightly lifted in tone if they were tenors. Female voices had just a trace of lispiness. While orchestral music on Radio 3 came out of a background somewhat - but not disturbingly - hissy, there was a trace of constriction in the lower mid-range of instruments, which were slightly grainy. Some concentrated analytical listening pinned down some lack of control: in a song recital, the soprano developed momentary glassiness and slitheriness on top notes, and while there was a good sense of the studio acoustic, the accompanying piano shifted in tonal colour across its range a little.

Rock music came out of the tuner well, though not with such dynamism that the listener would fall off the edge of the seat. It was here that some doubts crept in about the overall performance; some types of compression this tuner didn't appear to like at all, and some music on Melody and Radio 1 sounded coloured rather than compressed, with the bass becoming distinctly flabby. String tone on Radio 2 could seem, massed and mutli-miked, a little on the sour side. Yet an obviously heavily EQ'd studio mix broadcast on R1 came over with gutsiness, if not full disco power.

There are eccentricities to the Creek T40s3 which are obviously inherent in the design, if they are tamed from the last one we reviewed. Switching in AFC still produces an odd bass hump - bass is discernibly cleaner and less muddled otherwise, even though the degree is slight. Still, I for one find it difficult to comprehend why it should happen in the first place. Tuning, too, needs a featherlight touch for accuracy, or the AFC will jump. While the T40 prefers the stronger stations, it's a fiddly business tuning in on the dot. Switching to mono, however, does





easily tame stations whose stereo performance is not up to scratch.

Listeners in search of more distant stations, however, should not be misled by the 'DX' switch; as Noel found previously, it appeared to make no difference. Distant stations remained unwilling to put in an appearance.

Creek's T40, in its series 3 guise does have the benefit of a distinctly 'musical' and attractive sound, and one that will almost certainly suit Creek owners. Father Time, however, has upped his pace of late, and there are tuners which are both less fiddly to use, offer presets and more convenience, and are both more

neutral and lacking whatever quirk in the circuitry that lies between the switches and the bass performance. Whether they offer such a universally relaxing sound is something best left to the listener. I have to say that I was not entirely happy about the whole concoction ●

## Measured Performance

Having become alerted to the problems of the Creek T40 tuner by an earlier sample, I was especially searching in my tests this time around. The original Creek T40 was euphonically enhanced, possibly by accident. Upper treble rolled down and a bass hump was introduced by AFC, which is usually switched in of course. The net result was a smooth, warm sound with plenty of bass wellie; people loved it.

I have no great objection to this sort of thing. All that matters at the end of the day is that a product gives enjoyment. This the Creek did; our advertising manager still swears by his. There is an argument against artificial enhancement though. It turns something that should be a neutral medium into a interpretive one. There are innumerable interpretations and they stray away from accurate reproduction of the original performance. Hi-fi is meant to be about travelling in the opposite direction as it were, no matter how imperfect any position of claimed accuracy might be.

Our review sample had a residue of the bass hump problem. Perfectly tuned with AFC switched out - a delicate process we found - frequency response was essentially flat from 11Hz up to 15kHz, some slight treble lift (+0.5dB or so) being evident in the analysis. When AFC was switched in a bass hump at 20Hz would appear. Its magnitude depended upon tune accuracy it seemed; I was never certain about this though. At worst a +4dB hump existed and this would be quite audible in practice as strengthened deep bass, or even boominess. It was a curious and uncommon phenomenon.

Channel separation on stereo was adequate at -25dB, if not especially good. Very little distortion was produced and what little there was (around 0.15%) proved to be second harmonic in nature. The distortion analysis shows this. Second harmonic is

subjectively benign, only altering timbre when present in large quantities (i.e. more than 1%). The T40 now performs very well in this respect, being up amongst the best

Unwanted pilot tone and sub-carrier signals at and above 19kHz were very well suppressed by effective filtering. This is important for recording purposes, since these high frequency signals can jam Dolby action and produce whistles as well if they get through.

The T40 also proved to be pretty quiet. Any tuner that produces less than -70dB hiss at full quieting gets my approval in this respect. The T40 produced -72dB hiss, providing it received more than 1mV or more of aerial signal. Most tuners need around this amount, some managing to be a bit more sensitive these days. However, even critical Radio 3 listeners should not be disappointed by the Creek. Give it enough signal and it won't be heard to produce hiss - even during the longest and most excruciating of BBC silences where it seems that Radio 3 might have gone off-air.

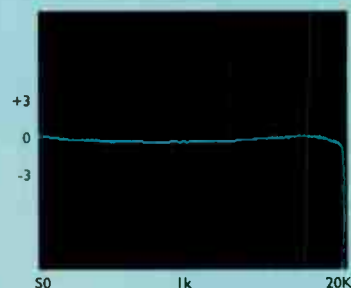
I would not recommend the T40 is pitched into difficult signal conditions, because at 64dB its selectivity (alternate channel) is distinctly mediocre by modern standards. The only saving grace it has is that a strong nearby station will gradually overwhelm and mute a weaker station, without any nasty spitting, crackling sounds. The Narrow button only seemed to make matters worse - not better. Sensitivity was satisfactory, if not exceptional. I was disappointed by the lack of a signal strength indicator. Even one LED that lights at 0.5mV to show that enough signal from the aerial was available for optimum performance would have been useful.

The T40 is a pretty mixed bag, performance wise. It is good in many areas, but it has some blemishes. With this one, the proof of the pudding must be in the eating. **NK**

## Test Results

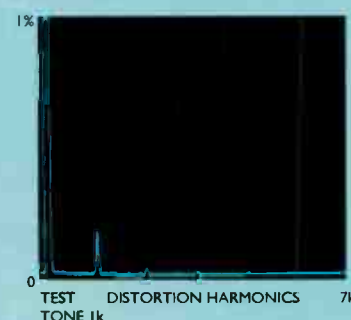
Frequency response (-1dB)	11Hz-15kHz
Stereo separation	-25dB
Distortion (50% mod.)	0.15%
Hiss (CCIR)	-72dB
Signal for minimum hiss	1mV
Sensitivity	
mono	2uV
stereo	30uV
Selectivity (alternate channel)	64dB
Signal strength meter	none

### Frequency Response



Slight treble plaeau lift

### Distortion



A small amount of second harmonic distortion at 0.15%

# READING WHAT THE CRITICS SAY, YOU'D THINK THAT REVIEWING MUSICAL FIDELITY IS A LABOUR OF LOVE.

Our hi-fi is well known for its ability to arouse passionate emotions.

"By the time the cadenza had been reached, I was a mass of goose bumps," sighed one reviewer, describing how hearing Mozart's Sinfonia Concertante on the new A120 from Musical Fidelity integrated amplifier enhanced his perception of this favourite work.

His emotional experience took place during the Andante movement, which is the spiritual core of the music.

"It's a 27 year old recording and whilst it makes no great sonic demands on the system, it's easily destroyed by ham-fisted processing. In the case of the A120, the concentration and the magic were all there..." he reports with pleasure in High Fidelity magazine.

He's not the only one who finds Musical Fidelity highly involving.

"Personally, I've always been a fan of the A1", confesses another critic in High Fidelity. "Now Musical Fidelity has seen fit to introduce a MkII version... First impressions were of a slightly leaner, tidier bass, no loss of midrange warmth or clarity and that distinctively crisp yet slightly understated top."

Getting to know the new A200 integrated amp, High Fidelity's reviewer was delighted to find that "it allows intimate

contact with all the emotional power of the music... Its overall control, fine pitch definition, dynamics, delicate handling of other low level information all placed it highly in my estimation."

And there is a writer for HI-FI News & Record Review who waxes positively lyrical about the new B1 integrated amp, saying "The comparison between the old and the new B1 is easily told by reference to the chalk and cheese simile, with the old B1 taking on the role of chalk..."

In his view, however, "The more important comparison is to the Pioneer A-400, an amplifier which in the last year or so has helped in a thirty-somethingish reevaluation of what it is to be a budget amplifier in the early '90s... Now the list includes the Musical Fidelity B1.

"Right from the beginning I felt that the new whiter-washing B1 was doing things that the Pioneer was only hinting at... It was the B1 that at certain moments... Induced an effect akin to drawing a finger slowly down the spine", he concludes with unblushing frankness.

In the same issue he was moved to describe the character of our new compact disc player thusly: "I found the CD1 silver-tongued and expressive: it offered good treble resolution and was fundamentally musical and involving."

While in CD Review, another critic was smitten by the charms of our P180 power amplifier, confiding "My impressions are of an amp that definitely has personality... a sort of transparent musical signature: namely a combination of strength, control and easy flowing momentum. The P180 has power and current aplenty and will capably handle any speakers thought 'difficult.'"

Then there is the writer for HI-FI World who had a brief encounter with the P180 married to its outboard Choke Regulated Power Supply (CRPS) and was excited to discover that the upgrade makes the amp "sound more controlled and refined... improved the imagery and added a spaciousness to the sound, while improving upon the sense of tightness in performance."

He was frankly poetic about the remarkable sound quality of the P180 with CRPS, going into rhapsodies over its "Passion, Grace and Fire."

Perhaps reading these comments has aroused within you a strong desire to experience these pleasures for yourself.

Don't let unsatisfied longing torment you, instead pay a visit to your hi-fi dealer and listen to the latest products from Musical Fidelity. You'll soon begin to understand why hearing is believing.

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MUSICAL FIDELITY

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We've all become used to a pair of leads dangling down the neck of the chap in the bus queue, and assuming they connect up to a personal stereo. It might, of course, be a Discman - like, Sony's term for a portable Compact Disc Player. They're less common, because they are much more expensive. While the price of full-size budget players comes down, it's the size of the CD portables that shrinks less so the price. Startlingly so, in the case of the Technics SL-XP700 player in this review.

The other two portable Compact Disc players tested here also come from renowned Japanese manufacturers, but are not quite as diminutive as the Technics. Sony's D-303 Discman and JVC's XL-P70 player are both tiny, when compared to the early CD personals, but loom large against their svelte rival.

Increasingly, from the early days of simple controls and functions, portable CDs are developing into players that ape their full-size cousins in practically every facility the Japanese can think of. This is all to the good, but few people are going to attempt to cope with tricky programming while they're out walking the dog.

Walking, note, not 'running alongside.' None of these players demonstrated any pronounced ability to survive sharp jolts or jerkiness. (Nothing will have me joining the joggers' rat-race at six in the morning,

so this aspect of performance was tested by a staircase and a variety of climbing speeds.) We are spared for a while longer the sight of someone like Kris Akibusi breasting the tape with headphones in his ears.

What we may not be spared is the odd notion that while we may be willing to pay two-hundred pounds and upwards for a portable CD player, we'll happily put up with a pair of cheapo phones that we might sneer at if they came with a thirty-quid personal stereo. Soundwise, this batch were all acceptable, but I wouldn't put it higher than that. Be prepared to throw them out - or in one case, at least, probably wear them out within a week - and buy a better pair. All these three players were deserving of better headphones than they were supplied with.

## JVC XL-P70 PORTABLE CD PLAYER

Chunkier than the Sony, but also black, the £249.99 JVC XL-P70 portable Compact Disc player is dissimilar in that it is a sixteen-bit, eight times oversampling device. Like most others these days, however, it has a slightly raised section in the lid.

# moving music

**Three portable Compact Disc players sounded out by an upwardly mobile Eric Braithwaite.**

This is very like the curved bonnet of an old Routemaster doubledecker bus, but instead of the London Transport logo, it carries the main track and time display, as well as one for the inbuilt graphic equaliser system and its associated controls. The front (or top, if you were carrying it) has the main display and tiny round programming buttons alongside a 'remote sensor' window, for the hand-held remote supplied in the package. The main track search, Stop, Play and Open controls are on the rounded edge. Volume control and headphone socket are at the side. It's right-handed, by the way -

# Wacky, controversial, radical valve amps. Just what you'd expect from Michaelson Audio.

We've been called a lot of things but boring is not one of them.

One critic says in Audiophile that our four-box 112 Watts per channel Chronos pre- and power valve amps look like Battersea Power Station.

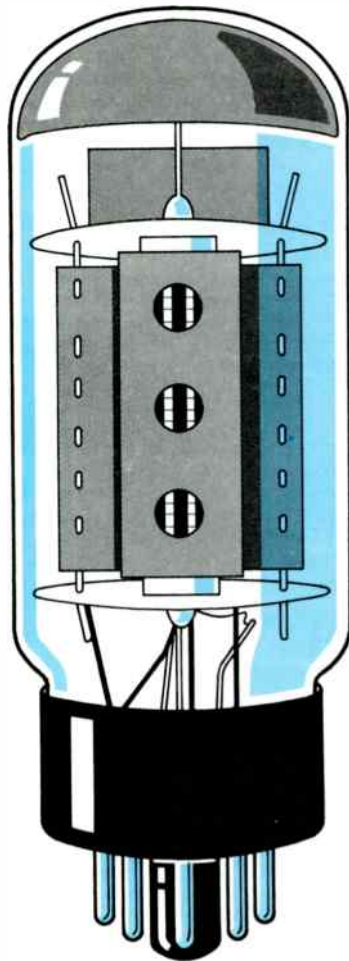
But after listening to them (perhaps with eyes closed), he called them awesome and says he was gobsmacked. "I had little idea quite how much sheer gut-thumping power such a beast can deliver. Believe me, it's frightening..."

Another reviewer bravely says Chronos are "quite gorgeous" adding that they look "a damn sight better than your standard parallel sided breadbox."

To judge from his review in Hi-Fi News & Record Review, he likes the sound, too. "Across the bandwidth it sounded forceful and in control..."

"But it's the mid-band (isn't it always?) that makes tubes the choice of the connoisseur, and here the Chronos positively sings."

Then critics from Hi-Fi Choice had their say. "From the opening bars of the music you can hear that Chronos is in the top league. There's that sense of ease and spaciousness which is so characteristic of high quality valve amplifiers... Chronos power amps can swing dynamics which will take your breath away."



In their view, the Chronos soundstage is "as close to 'being there' as the limitations of the listening room and the recordings are ever likely to allow."

At Michaelson Audio we recognise that not everyone has room for our massive monuments to valve supremacy.

So we also make Odysseus, an integrated valve amp. It looks "slightly less outrageous but the aesthetics are still a matter of taste", according to Hi-Fi News & Record Review. It's "a high-end monster in (almost) budget clothing..."

"But the real reason for buying an amp like Odysseus (unless you're merely wild about the styling) is its midband. Choose whatever tubey adjectives you like – clarity, authority, detail, warmth – the Michaelson has 'em in spades, with an added plus . . . the Odysseus offers wall-to-wall coverage, exploiting the precision focusing of small speakers... it performs like a true champion."

Perhaps by now you are asking yourself, just how weird do Chronos and Odysseus look? And why is there no picture of them in this advert?

The reason is this: we want you to visit your hi-fi dealer to hear and see them in person.

Call them stunning or bizarre, they'll probably leave you speechless.

M I C H A E L S O N A U D I O

MICHAELSON AUDIO IS DISTRIBUTED BY MUSICAL FIDELITY, 15/16 OLYMPIC TRADING ESTATE, FULTON ROAD, WEMBLEY, MIDDLESEX HA9 0TF OR TELEPHONE (081) 900 2866.

designed to be slung over the left shoulder. Are there left-handed portables?

A large box opens up to reveal quite an array of goodies. Like the Sony D-303 there's an optional car-mounting plate. JVC also offer a carry-case and strap, a pair of headphones with larger than usual earpads (though with a thin metal headband), mains transformer/battery charger, a set of four rechargeable AA batteries, two leads and a pair of batteries for the remote. This portable slots into JVC's Compulink system which allows synchronised recording if other JVC separates are used, so there's a 'Home Audio Station Unit' provided too - it's a plate with built in jacks to plug into the output and Compulink sockets at the back of the player. Finally, this sports a pair of phono sockets to take a phono-phono lead (supplied) to an amplifier. This is a little handier than the somewhat unreliable minijack-to-phono leads that are usually required.

JVC claim that alkaline batteries should last about six hours - a healthy contribution to pocket money, although four are needed - while the rechargeables flake out after two. Spare rechargeables are essential for this player, for they take nine hours to recharge, a positively tortoise performance compared to Sony's and Technics' hare.

The most noticeable feature complements the Hyper Bass control which boosts bass at around 60Hz. This is the SEA electronic equaliser which operates over five frequency bands. The instructions for using it are spread over three pages of the manual, but there's a helpful list of four preset positions - one 'for music with a heavy beat, such as disco music', one for 'crisp clear sound with transparent highs' (I sense a value judgement here!), one for 'background listening' and one for 'singing'.

I had thought the manual remarkably literate, until I realised that someone had either been listening to a certain Scottish manufacturer or had been suffering blocked sinuses. 'Tracks' are constantly referred to as 'Tunes' which is mildly puzzling at first. The manual does clearly state, however, that 'Tune' skip, fast forward, reverse and random play can be selected through the controls on the machine. Programming of up to twenty two tracks (O.K. tunes, if you insist) has to be done via the hand-held remote, which I can't see people carrying about with them. This is presumably for domestic use, but it provides all the necessary functions including remote control of the graphic settings. 'Intro Scan' also offers a fifteen-second taste of each track.

The main display offers a battery-

strength indicator (shaped like a battery!), a reminder of what functions have been selected and elapsed time.

The JVC's headphones looked (and felt) the cheapest of the lot, with their thin metal headband and large earpieces. Paradoxically, the combination of player and cans didn't disgrace itself entirely; through them, the sound was fairly clear and decently behaved. 'Joggability' was very poor, however, as this player took longest to recover of all the group. In addition, track access was also the slowest.

Overall, bass was rather flabby, the mid-range was on the duller edge of uninteresting, treble sounded a bit 'slap-happy' - not spitty, but unfocussed - and imagery was rather vague and watery, with centre stage not too clearly defined. There was some cuppiness evident on male vocals. Tonality was decent instead of accurate. Hyper Bass turned everything woolly and sludgy, and as for SEAS... the frequencies sounded as lumpy and peaky as the graphic representation on the display. Stick to flat, or adjust manually and try for subtlety, but with merely five frequency bands to play with, subtlety wasn't easy to achieve.

This portable has a distinctly old-fashioned sound and is, in terms of absolute quality, the least capable as a transport - yet its offences were (SEAS and Hyper Bass apart) muted and it proved relaxingly easy to listen to.

## SONY DISCMAN D-303

It's astonishing how most of the essential functions appropriate to a full-size Compact Disc player are packed into this £279.99 five-inch square package that is only an inch high. Play/Pause, Track Skip and Track Programming are all on offer, with the most popular available from the remote in the headphone lead. A number of lesser facilities are divided up between three smaller buttons; Track Selection (and unusually, Index Selection), Shuffle or Repeat Play, A-B Repeat (which will allow a selected portion of the CD to be repeated) and twenty-two track memory.

One trick you won't find on a full-size player is a handy switch labelled 'Resume'. While this is on the CD will restart at the point it left off when Play is pressed again. It's better than using the Pause button if you end up having a long conversation with your stockbroker on your portable phone. All the controls emit a variety of

'beeps' when pressed, but they can be switched off.

Information is provided by a small but nonetheless legible liquid crystal display. It shows all the selected modes, remaining or elapsed time and selected tracks. There's a useful bar-graph indicator for battery strength, and a message 'lo batt' when power runs low. It's backlit in a gentle amber colour when the mains adaptor/charger is used. Normally, the player runs off two AA batteries or the rechargeable supplied. Two to three and a half hours playing time can be expected, which is the maximum from alkaline batteries, but the minimum from a quick thirty-minute charge. Accessories include a mounting plate so the D-303 can be used in the car.

An unusual feature for a portable is an optical digital output, so at home (or on the move, for in-car D/A converters are looming on the horizon) this player can be plugged into either a DAC or one of the amplifiers with a digital input.

The Sony portable opens up, as usual, like a picnic basket or an old fashioned portable gramophone. One day, someone will take a leaf out of either book, relieve the pressure on making these things cigarette case thickness and solve the problem of carting CD's around by providing storage space in the lid, just like the old times.

Some brisk walking and stair-climbing - the usual test for 'joggability' - demonstrated that this is not a machine for the Olympic 3,000 metre runner, but for the stroller. Sudden jolts had it skipping noticeably, though it recovered quickly and wasn't susceptible to normal vibrations like those from the dreaded Northern Line Underground. Obviously, the memory chip Sony were demonstrating at Chicago, which allowed them to chuck a Minidisc player up in the air and listen to it still playing as it came down hasn't yet percolated down, into the CD portable where it would be useful.

The headphones supplied, which unfolded in a spidery fashion, with what seemed to be joints all over the place, are best thrown away. Even with the 'Bass Boost' switched in, the sound in the lower reaches was thin, and overall, little better tonally than a good personal cassette. Better headphones are a worthwhile investment.

Overall, the sound, while tonally moderate without too much shrillness, was bright and clean. Timbres were a little lighter than ideal and bass could be on the woolly side. Although transients came across sharply, brass could sound a little glazed over. There was a tinge of glare and harshness in the mid-band, ►

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but the player demonstrated good dynamic control. This is not untypical of one-bit chipsets. The player was well controlled, however, and while somewhat two-dimensional in terms of staging, was well up with budget full-size machines in overall sound quality.

Listening via the digital output rather emphasised the Sony's limitations, particularly in regard to stage depth and width. Using the minijack-to-phono lead supplied, by the way, dulled the sound somewhat, taming some of the slightly harsh edges which the digital output laid bare.

Digital output or not, the transport is still too limited for it to be a true dual-use mobile and domestic CD player. It would be an excellent partner to, say, Active Diamonds, Goodmans Maxims or a half-way decent mid-price system - if you must have sound while you stroll and can't afford a second machine for home.

## TECHNICS SL-XP700

The designers at Technics have been to Weight-Watchers' classes. The 18-bit, eight times oversampling SL-XP700 is not only the slimmest of this bunch of portable Compact Disc players, it's also the cheapest at £199.95. Technics make a point of it being thinner than two CD jewel boxes together, but it's not light-weight; it feels positively solid and metallic.

Standard Technics bronze-tinged black in colour, it is also perfectly flat with a rounded top edge following the shape of the lid. Its control buttons are placed on this sloped edge at either side of a display panel, with the volume control easily accessible on the top lip. The display panel is slightly smaller than the JVC and Sony models also reviewed here.

The SL-XP700 runs on either the two rechargeable batteries supplied, a mains adaptor/charger or two AA batteries fitted into a clip-on battery holder. Playing time is said to be up to two hours using the rechargeables, and four with alkaline batteries, very good for those with tightly zipped wallets. Like Sony's, a 'fast-charge' of an hour will provide listening for an hour and a half; three hours' charge will give the maximum two hours playing time. In addition, the machine will switch off if it's left on Stop or Pause for more than four minutes to conserve the batteries.

Apart from a dead battery indicator, the display shows Play

Mode selected, Track number, playing time and elapsed time. Programming of up to twenty four tracks is provided on-board, and is fairly simple, as is the 'hold' function which allows play to resume when you stop the CD for a moment. The usual control functions appropriate to a full-size player, including Random Play and Repeat Play, are all available.

A traveller-friendly facility is provided; anyone who travels regularly will have been irritated sometimes to frenzy by that constant 'tiss-shuck-tiss' from a passing personal. Technics provide an 'ASC' switch to reduce HF leakage. There is also a bass-boost, this time called S-XBS to boost the lower frequency range. Initially, this effect seems quite enlivening, but it becomes a relief to go back to a more natural, if bass-light balance after a while.

The Technics SL-XP700 appeared to be the strongest in build of the group; it's clear, not only from handling it, but also, it turned out, from the sound of the transport, that they have put metal where it matters.

The Technics headphones include a remote control in the cable, from which it's possible to control the more simple functions - play, stop, track skip, or returning to the beginning of the track that's being played, as well as some adjustment to the volume. Each operation is accompanied by an audible beep. The 'phones are plug-into-the-ear types. Perhaps I have non-standard pinnaea, but the left-hand one wouldn't stay in. A bit of juggling and contortion, and I found they produced excellent, smooth, even sound and imagery - then they'd fall out. I didn't dare move. When I did, it was to discover its reaction to jerks was no better than average; again this is a travelling player, not a sprinting one.

The sound, however, was a delight; smooth, delicate and sweet over the entire frequency range. There was a detailed soundstage with finer inner resolution, clarity and depth than the other two players in this report. There was a slight element of muddle in the centre - but only compared to a good domestic player. Tonality was realistically accurate, with a sweet, though a little soft-edged, treble. Bass was delicately soft, yet not deep or flabby. The player was very listenable to, both on the move and as a home player. It produced a quality of sound that was clearly CD and beyond what you would expect from a top-rank personal cassette player even on headphones, when so many CD portables fail to be distinctly superior.

The Technics might, viewed as a domestic player, be a little over-restrained or laid-back compared to similarly priced full-size decks, but its

ability to present detail and make sense of really difficult CDs were well beyond a budget machine. I'd have liked a presentation a little more taut, and a trifle speedier, but I found myself comparing its performance with full-size models costing a hundred pounds more.

## CONCLUSION

All three players are in the 'Strollman' league - any more than a gentle pace jolts a Compact Disc out of smooth reproduction and into a series of fits and starts. Of the three, the Sony recovered - not the most effortlessly - but at least the less effortfully. Two - the Sony and the JVC - were clearly designed and packaged with at least half an eye on their use in the home as add-ons to a hi-fi system. The Sony's optical digital output is definitely overkill here; it's good, but not, I feel, worth the cost of an additional Digital/Analogue converter. It is ready, however for the 'Digital' amplifiers coming on to the market with a built in converter. As a stop-gap, it might well suit, if an owner of one of these wants a CD player he can cart around, but doesn't want to buy a domestic machine as well. Paradoxically, the most likely to please in this respect was the Technics, which came with no more aid than a simple lead.

It was ahead of the other two in portability, too. The JVC was clearly lagging behind here - it was the least pocketable in size, with the Sony following. Not only was the Technics so slim it was hardly bigger than a cigarette case, its curves were definitely sexy and it was viewed as by far the most elegant in looks. It has two other advantages: longer battery life expectancy than the other two (the JVC was particularly consumptive, if that's the word) and a smoother, more detailed sound.

Against this, there are those horrid earplug things, but other people might have tighter lug-holes than me. There really can't be any doubt; on every ground except perhaps sheer number of facilities, the Technics is the one to choose out of this batch, unless for some odd reason you have a D/A converter lying around but nothing to plug into it. The last reason is price, and honest! I didn't know it was the cheapest until I'd listened to all three. It's simply unbeatable, multi-bit or no ●

At just a penny under a hundred pounds, the Aiwa AD-F410 is bound to bring a glint to the eye of the impecunious, though how Aiwa manage to provide Dolby HX-Pro, B and C noise reduction, user-variable bias adjustment and still make a profit is a mystery. Still, their accountants can worry about that.

Aiwa have not been wasting money on frills; the AD-F410 looks pretty basic. The casing, folded over to form the sides and top, is metal, as is the base and back. It might be thin, but the fold gives it rigidity. The front is moulded plastic, as are the control knobs and buttons, and the control mechanics are functional, with some fairly unsubtle clanking and banging

from commonsense; what looks like a switch to the right under the display panel, and is labelled 'Dolby B-C NR HX-Pro' is simply there to fill up what would otherwise be a gap and isn't functional. The real Dolby B/C switch is a tiny slider below the bar-graph display. A second identical slider to the left selects timer operation. The other example of aesthetics taking over from practicality is two identical small knobs below the Record volume control. The left one is for varying bias, the right hand one is for channel balance. Symmetry is all very well, but I can imagine it might be very easy in a flustered moment to start wagging the wrong one.

There are two small but thoughtful additions which show that Aiwa take

less is it going to be taxed by cheaper amplifiers.

It was clear at the beginning of the listening session that, as far as replay of pre-recorded tape went, this bargain price cassette deck was not going to disgrace a budget system. Some of the finer subtleties evaded it, but it turned out a pretty attractive sound.

There was a trace of mid-band coloration evident. The effect was to round out the frequencies so that solo flute, for instance was fruitier than the reality, and not absolutely clean and pure. The trombones in Copland's Fanfare for the Common Man had a slightly tubby sound, though brass was generally free from glare or sheen, and sounded satisfactorily brassy. Piano, however had a tendency to become clangy.

It is clear that the response is slightly tailored for pre-recorded tapes, bringing the mid-band forward. While a surprising degree of detail could be discerned within a recording, it was sometimes difficult to pin down the precise locations of vocalists or instruments.

Overall, the effect was acceptable, but not wildly enthusing. Recording, however, showed up a series of limitations. While the overall tonality wasn't seriously adrift, and the mid-band was pleasantly smooth, both treble and the amount of dynamism seemed seriously restricted. At low recording levels music seemed to have been recorded through a grimy window.

Vocals came across - but that was really all; there was little in the way of nuance of tone or subtlety, and practically all instruments except in the mid-range were thin in tone lacking real physical presence and the sense of there being a real live body behind them.

The bias adjustment chart may include every tape since monkey became man, but the fundamental cheapness of (I suspect) both head and electronics made recording on anything other than good ferric or chrome a waste of money. There wasn't enough of an increase in overall control or range to make recording on metal worth the cost. Bias adjustment would cope, but the response was too restricted.

Meter range was barely adequate, especially as recording into the red beyond the Dolby mark rapidly increases distortion and graininess on the tape. If money is really tight, this is not a bad deck; it avoids any real horrors in terms of sound quality, but it would be wrong to recommend it for any purpose other than the most basic recording for replay in the car or personal stereo. It would be viable in a budget system, but not necessarily as more than a stop gap.

# pushing down the limit

**Struggling to produce a cassette deck below £100,**

**Aiwa have hit a performance limit, finds Eric Braithwaite**

going on. The cassette door, however, is commendably smooth. Behind it is the 'Anti-Modulation Tape Stabiliser', a kind of sprung plastic pad which holds the cassette firmly in the compartment.

Overall design is quite tidy, the deck looking fairly chunky on four shallow drum feet, with display, cassette door and function switches in round-edged recesses, something that's becoming a Japanese speciality this year. The tape counter is a basic, three-digit mechanical one, and the display itself is minimalist. The bar-graph runs from 'infinity' (quite irrelevant, and always lit) to a -20dB LED, then up to +10dB in seven steps, with Dolby flux level marked at +3dB. Usefully, the LEDs change from green to red at +3dB, and are held on peaks for a second or so. There are no other fancy indicators - not even one to tell you the deck has automatically selected EQ or bias for any of the three standard tapes. There is just a small green light for Dolby B and a red one for Dolby C. There is a small indicator light on both the Record and Play buttons, though.

This array of switches is one aspect where design has taken over

some care over the novice or first-time buyer. Each pair of sockets at the back is clearly labelled not just 'Line In' and 'Line Out' which has been known to confuse, but 'Play' and 'Record' as well. The other sensible addition is a strip across the top of the fascia which gives a colour-coded key for setting bias for more than sixty tapes. Comprehensive isn't the word for it - I think that's more brands and types than I've used in my life, and I'm not in the first flush of youth, either (for confirmatory mug shot of this statement, see our Audiofile Show report). The list is repeated in the well laid-out and comprehensible manual, too - no nonsense here about three suggested tape brands no-one outside Tokyo has ever heard of.

As is usual in this establishment, the Aiwa was slotted into one of our reference systems which are intended to be as revealing as possible, so it should be borne in mind that we are making comparisons with an absolute. Any failings are not going to be anything like so obvious when this cassette deck is partnered with amplifiers and speakers in its own range. Conversely, the better it sounds in the reference system, the





### Measured performance

The AD-F410 is billed as a budget beater. It should outperform all other budget decks if this is to be justified. It is cheap, that's for sure, but whether it is value is more open to question I found.

With cassette decks the transport mechanism and the head consume much of the build cost, so it is here that manufacturers usually seek to make gains. Unfortunately, unless these components are built in-house to attain appropriate quality a good price, the economics are immutable. Aiwa, for all their expertise, seem as much a victim to these matters as everyone else - Technics excluded.

The AD-F410 has a laughably poor combination record/replay head. I would have criticised its performance ten years ago; I could barely believe it has been used in a modern product. Repeated checks confirmed that it was incapable of achieving record levels higher than IEC 0dB flux, although some of the reason appeared to be a certain amount of under-biasing. TDK AR ferric tape gave the best results: it hit +1.5dB MOL - a pathetically low figure. With the AD-F410 the rule must be never go into the red when recording, then distortion should not be a problem. At Dolby flux, bass distortion hit 7%, another sign of a poor head. This gives soft, flabby bass.

Low head overload threshold apart, the Aiwa otherwise worked well enough. It has low hiss figures, with or without Dolby operating. Frequency response with recordings was very flat with all three tape types, which ensures a good sense of tonal evenness will be achieved. A help in this respect is variable bias, which even had some small but useful effect with metal tape. The frequency response analysis clearly shows how well the deck performed in this area. What a pity that the head couldn't cope with strong signals.

Treble output with prerecorded tapes fell away fast above 12kHz, which gives a dull-ish sound in practice. Dolby emphasises this common problem, which is why Dolby is so often left switched out. All the same, I would rate the Aiwa par for the course in this matter, considering its price.

The transport held speed well over a long period and it didn't commit any grave sins. There's plenty of flutter and some capstan wow of a sort to make notes sound impure - a classic cassette problem. Quantities weren't great, considering cost - or

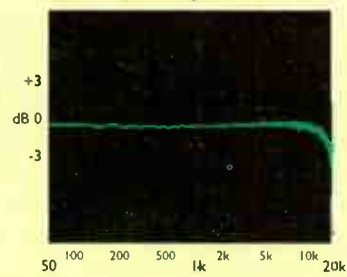
lack of it. But at the same time that is not to say that the transport was distinguished in its performance.

I'm afraid to say that any deck incapable of recording above IEC 0dB doesn't fulfil my criteria for high fidelity. Even budget decks usually manage better than the AD-F410. It's no bargain - even at the low price. You get what you pay for. **NK**

**REPLAY** (prerecorded tapes)  
 Frequency response (-2dB) 30Hz-12kHz  
 Speed accuracy +0.4%  
 Hiss (70uS, Dolby out) -61dB

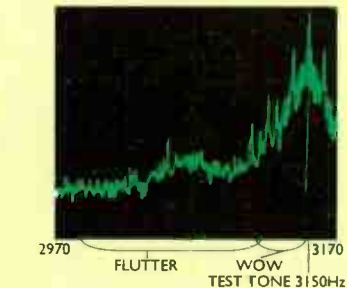
**RECORDING** (blank tapes)  
 Frequency response (IEC Primary Refs.)  
 ferric (IECI) 12Hz-14kHz  
 chrome (IECII) 12Hz-17kHz  
 metal (IECIV) 12Hz-17kHz  
 Separation (1kHz) -38dB  
 Distortion (315Hz) 1.4%  
 Hiss (70uS, Dolby out) -57dB  
 Speed variations (DIN total) 0.15%  
 Flutter energy (3-3.13kHz) -23dB  
 MOL/SAT (IEC Refs) 315/10k  
 IEC I (ferric) -1dB/-4dB  
 IECII (chrome) -2dB/-4dB  
 IECIV (metal) 0dB/+1dB

### Frequency Response



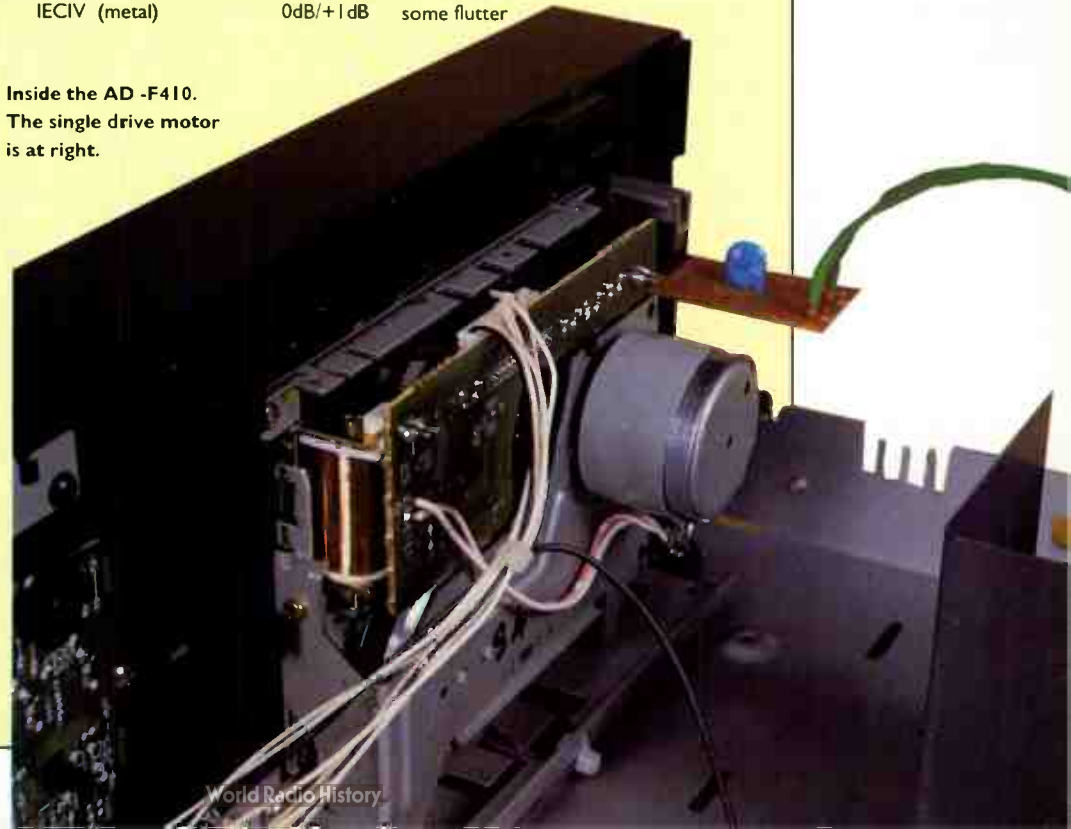
Flat frequency response with all tape types

### Speed Stability



Capstan wow 'shoulders' and some flutter

**Inside the AD -F410.**  
 The single drive motor is at right.



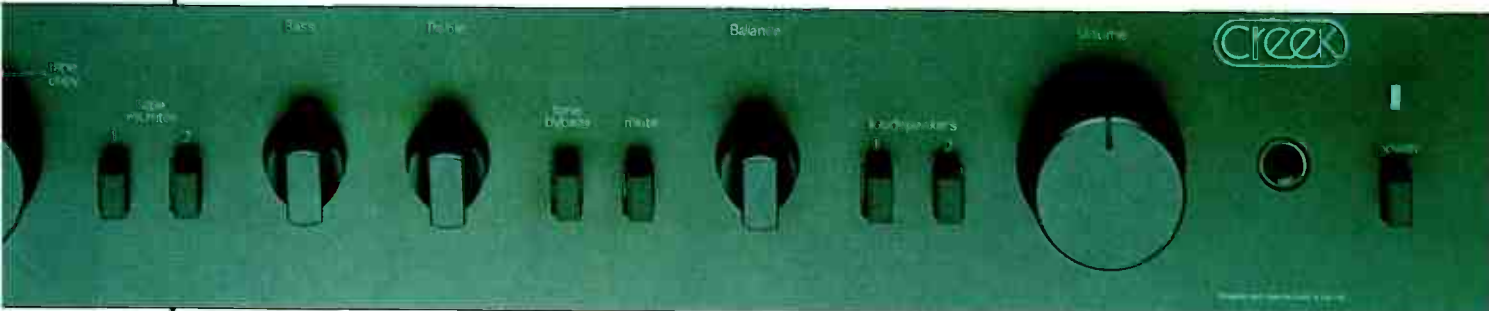
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# deeper bass from dipoles

Dipole loudspeakers offer deeper bass of better quality than conventional loudspeakers. But they are also difficult to use.

● Noel Keyword explains their benefits and drawbacks.

● Graham Bank, Technical Director of Celestion, shows why a bass dipole must be room aligned.

The word Dipole is beginning to become popular in the loudspeaker world. It has a certain mystery to it that arises from an association with panel loudspeakers, most of which are dipoles. Now though, dipole loudspeakers of many sorts are beginning to pop up all round us, as if the principle can be easily and universally applied to any loudspeaker. It cannot. At low frequencies in particular, dipole loudspeakers are problematical and only display their advantages of smooth and extended bass when properly aligned in a room. Graham Bank of Celestion explains why and how a bass dipole is room-aligned in an accompanying article.

Any dipole that covers low frequencies is subject to this requirement. It applies to full range dipoles like the Quad ESL-63, the Dali Dipole, and the Musical Fidelity dipole, all of which cover the entire audio band. Naturally, it also applies to an even rarer device: the dipole sub-woofer, or bass dipole. To my knowledge, such an animal is made only by Celestion and by Gradient of Finland. The latter have produced a dipole sub-woofer for the Quad ESL-63 (imported by K.J. Leisure Sound). It is at low frequencies that both the strengths and weaknesses of a dipole become more apparent and intractable.

Bass dipoles in particular are such specialised and rare devices that few people, I suspect, really know the full extent and complexity of their problems. I doubt very much whether

they appreciate their real strengths either. I've seen most of the learned research on loudspeakers, from Olson (1937) onward, but never encountered dipole room alignment theory until 1985, when Celestion introduced the SL-6000 dipole sub-woofer. It might exist, but if so, it is not widely known about or appreciated. I was intrigued by the Celestion and the theory behind it - and I remain so. By virtue of the fact that it has no box, it can produce enormously deep bass - much deeper than that of current box loudspeakers. When it is matched into a room the quality of the bass is more even too. The drawback is that room alignment is so difficult a computer has to be used to work it out. And the Celestion dipole needs electrical equalisation too, to compensate for its limited baffle size.

What concerns me is that if bass dipoles are to be exploited for their considerable strengths, their problems must first be understood and overcome. Otherwise, these loudspeakers will become just another short term fad in the hi-fi business, discredited by their apparently poor performance. You cannot stick a dipole that handles bass in a room, point it at a listener in



**The Celestion SL-6000 double-dipole sub-woofer, supporting a Celestion SL600 box loudspeaker. Beneath the fabric dome lies a 12in paper cone bass unit. Each SL-6000 has two of them, one on the front baffle and one on the rear baffle. Because there is no box, there is no lower limit to the depth of bass it can produce; even 5Hz is possible.**

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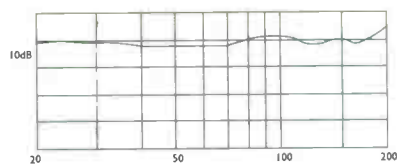
And to complicate matters further the angle which the dipole makes with these boundaries will dramatically affect what happens. When you add up all these sound sources, not only does the pressure change on one particular axis as you rotate the dipole, but all the images rotate as well, changing their relative contributions. In order to illustrate this effect Figure 5 shows the same room/listener layout, but with the dipole rotated. The angle of rotation has been chosen so that the reflection from the front wall coincides with the zero-axis of the dipole where no sound is radiated at all. Rotating the dipole has eliminated the contribution of the reflection from the front wall completely.

To try to analyse what happens when a dipole is placed in a room you need to compute all the images in all the surfaces and sum the pressures with their respective phases to find the combined effect. This is an enormously complex task; Celestion has written a computer program to do this for its SL-6000 dipole. From this we have found you can get a good correlation between predicted pressure and the actual result in a room. Without a computer it is difficult to decide which is the best angle to point a dipole. To illustrate what a difference correct orientation makes, Figures 6 and 7 show correctly

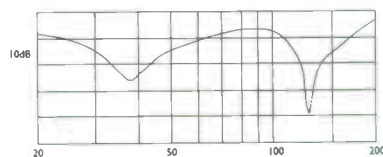
and incorrectly aligned dipole responses.

If a dipole is a low-frequency only device then aligning it with the room is perfectly feasible, since you are only dealing with the output from the dipole itself. If a dipole also radiates into the mid-band then the angle required for mid-band reproduction will not be the ideal angle for very low frequencies.

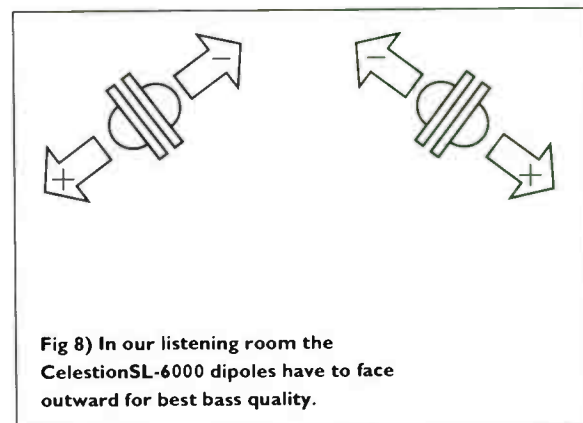
This poses a fundamental design problem for wide band dipole systems. What is needed is a system whereby the sections that handle different frequency bands could be pointed in different directions, rather than having to compromise the bass in favour of the mid-range or vice versa. Celestion choose to put only very low frequencies (below 100Hz) that do not suffer beaming effects through the SL-6000 dipole sub-woofer and angle it to suit the room, using a computer. Sitting on a pedestal above is a normal box-type monopole loudspeaker that has to face the listener, because it beams high frequencies. Whatever arrangement is used, it is crucial to realise that with dipoles you do have to point them with regard to the room and listener, not just the listener alone, in order to obtain the excellent in-room bass response they are capable of providing ●



**Fig 6) When correctly aligned in a room, a bass dipole gives an unusually smooth and extended bass output.**



**Fig 7) When incorrectly aligned in a room, a bass dipole suffers peaks and suck-outs that make it sound boomy and one-note. Room alignment is essential to avoid this.**



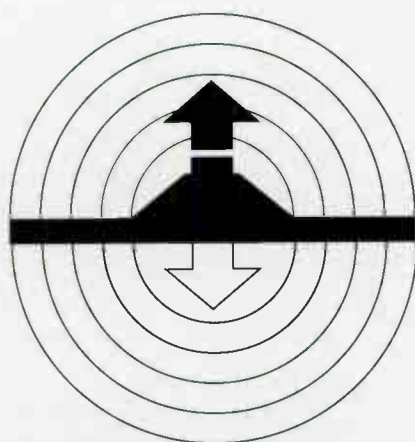
**Fig 8) In our listening room the Celestion SL-6000 dipoles have to face outward for best bass quality.**

## WHAT IS A DIPOLE?

In basic form there is nothing complex about a dipole, even if its name suggests otherwise. You can think of it simply as a loudspeaker without a box, for this represents a dipole in its simplest form. Most commercial dipoles have a baffle, which is nothing more than a flat panel to which the loudspeaker drive unit is attached.

So a dipole can be either a bare drive unit, or a drive unit mounted on a baffle, which could be a sheet of chipboard. Commercial dipoles are usually a bit more complex in their structure, but at heart they still retain these basic features.

The basic problem with any dipole is simply that the sound from the back cancels the sound from the front below a certain frequency. When the cone goes forward it compresses the air in front, but rarifies it behind. The positive front pressure cancels the negative rear pressure around the edge of the cone or baffle. The frequency at which cancellation starts to occur depends upon cone diameter. Mounting the drive unit on a baffle effectively increases the cone diameter, pushing down this frequency



and giving deeper bass. Unfortunately, size becomes a limiting factor. To get down to 40Hz, a practical lower limit, the baffle must be 14ft across. This is a fairly serious drawback.

A solution is to put a box around the back to contain the rear radiation from the cone. Then the sound from the front doesn't get cancelled by the sound from the back and you get bass from the thing. Hence the box loudspeaker was born. It is a monopole, even though the term is rarely used in connection with it. There's no doubt that box loudspeakers are effective in providing bass down to 40Hz from a reasonably sized cabinet.

Heybrook's Sextet and Kef's 103/4 tested in our October issue both managed this from small cabinet dimensions.

So what has changed to make the dipole loudspeaker acceptable? Celestion have shown that a small dipole, which would normally have little bass because of its limited baffle size, can be electrically equalised. This extends its bass down to any chosen lower limit. It is easy to get lower than 40Hz. Our own hits 10Hz without difficulty.

Equalisation is an additional expense and complexity, but it can be made acceptable these days. The low cost of modern electronic components does help to make an equalised dipole a tenable proposition. Dipoles do not have to be 14ft across any more, as Celestion have shown. Residual difficulties of low efficiency and long cone travel can be dealt with satisfactorily. Celestion in fact use a patented 'double-dipole' which has smoother bass.

Having shrunk the dipole down to manageable proportions, it then has to be put into a room. This is where the last great, remaining problem crops up - the need for room alignment. If manufacturers can overcome this not-so-minor problem, which is soluble, then the dipole could finally become a reality. Dispensing with the box altogether has so many benefits, hi-fi would then take a useful step forward ●

Celestion's new venture into loudspeaker design looks innocuous enough from the outside. The £239 Celestion 9 is tall for a 'bookshelf' speaker at 50cms (19.5 in). Our sample was finished in traditional black ash vinyl. The front has chamfered edges and the black plastic, cloth-covered grille frame is bevelled to match.

Taking the grill off reveals the surprise. The top driver is familiar enough: it's Celestion's easily recognisable titanium dome tweeter with its three protective bars stretching across the face plate. But below it lies not one main drive unit, but two.

Yes, the three-way speaker is back. The idea of spreading the audio frequencies over three units - tweeter, mid-range and bass - has attracted both advocates and detractors over the years. The benefits are that a sizeable bass unit for deep, solid bass will not be at its best in the mid-range, so using three drivers instead of two should produce more, or at least cleaner, bass without necessarily using a huge cabinet. The detractors point out that while there are obvious theoretical benefits, it can be very tricky designing a crossover that allows the frequencies a smooth uninterrupted passage through three separate drive units. The result in practice has all too often been a decidedly disconnected sound, where it's all too obvious where one drive unit takes over from another.

# multiple of three

**Eric Braithwaite listens to the  
3-way Celestion 9 loudspeaker.**

In theory, at least, it's easier to design a crossover for a smooth transition between one tweeter and one main drive unit. It doesn't always come off, of course - the road to Carey Street is paved with the remains of printed circuit boards that failed to make it.

Nothing in life is free of compromise. A seamless transition between low and high frequencies might be easier to manufacture, but two-way designs then become prone to 'beaming', a problem which Celestion say their three-way 9 and 11 speakers should avoid. One of the associated phenomena is the listener's perception that some sounds

appear to be more concentrated at the edge of the soundstage, where the speakers are, than evenly spread across it.

Whether the two new Celestion designs (there is a second model, the slightly larger 11, at £279) and the Heybrook Sextet we reviewed last month constitute a bandwagon beginning to roll it might be too early to say, but it does look as though something curious is stirring in the draughtsmen's offices.

Apart from the three drive units, very neatly held onto a sectioned baffle with Allen bolts, there's another curiosity round the back. The terminal plate (which possesses a single pair of fairly chunky binding posts accepting 4mm plugs - Celestion have eschewed biwiring) is placed towards the top and a short reflex tube exits downwards into a port shaped like a cup split down the middle. Celestion call it a 'mouth design' and say it is 'profiled to minimize turbulent flow.' In simple language, the intention is that the air shifted to reinforce bass frequencies should issue out of this hole in sharp puffs instead of sighs, and bass frequencies should be cleaner and tighter.

One of the problems with three-way designs is to stop sound from the mid-range and bass units from interfering with one another round the back and concentrate their energies to the front where the listener is. Celestion have addressed this with a new 4.5in mid unit with a moulded polypropylene chamber filled with acoustic wadding behind it. Again, this is supposed to result in a cleaner mid-range.

The final test is whether the three drive units are seamlessly integrated, with no lurches between them and no propensity to separate the music itself into three distinct and irritatingly obvious bands. There's no doubt that Celestion have taken the elements of three-way design seriously, and addressed the known sources of muddle and confusion which have given it a bad name in the past. Technically, all seems well, but the proof, as always, is in the listening.

## Sound Quality

Celestion provide an excellent five language handbook, full of good commonsense advice on everything from power handling to cables. The translations, incidentally, appear to be fluent and idiomatic, which will please our E.C. partners. Placement near a wall and on spiked stands is suggested. The stands provided had solid metal base and top plates with a slim columnar support which can be filled with sand for added mass. There's a very neat sliding slat at the back behind which the cables can be hidden, and the stands come with spikes which can be adjusted for level from above.

Immediate impressions were that power handling is all Celestion say it is; Celestion recommend 10 to 100 watts, and the 9's handled some heavy wattage well. Bass, while not deep, superficially appeared tight and clean. There are

always some fears aroused, in my breast at least, at the sight of a metal dome tweeter, but this titanium dome is clear and bright without spitting.

A little more time brought one or two reservations. Andrew Laurence-King's Renaissance harp recording, while splendidly detailed, every creak of foot on floorboards being obvious, appeared to suffer tape hiss. It shouldn't - the recording is digital - and what is there is a gentle whisper from the microphones and the processing through an analogue mixing desk. Extraneous noises began to prove somewhat distracting, and the higher notes while clean were rather sharp on the ear. The glorious glissandi which sweep down through the whole range of the instrument were startlingly perfunctory. This called for a spell of more analytical listening.

Barenboim's Chopin, therefore, went into the Compact Disc player drawer next. This has tremendous dynamic range and some real heavyweight pounding crescendi. While the piano was a realistic size, a rarer achievement than might be expected, I began to feel as though I was listening to two, if not three, quite disparate speakers. Treble was clear and sharp, though some notes in the upper mid-range showed a trace of ringing, but there were observable problems in the lower mid and upper bass. The crescendi crashed and banged, and the piano sounded disconcertingly like a concert grand on some notes and a somewhat neglected upright on others. Bright upper notes mixed with a wooden and rather dull lower mid.

A live Erato recording of a Paganini Caprice (the music that slightly adapted begins The South Bank Show) had to come off the player fairly rapidly; while the hollow hall ambience was clearly discernible, the violin took on a decidedly fierce thin tone reminiscent of a recently emasculated wasp. A favourite for testing timing and timbre of voices, Walton's Facade, failed to resolve the doubts that were beginning to develop. The 9's are certainly fast - to an extent. However, the subtlety of Peggy Ashcroft's variation in tone turned into a jerky switching between soprano and contralto with nothing in between, and she was frequently simply overpowered by the brightness of the brass instruments. It wouldn't be obvious by any means that the players were using mutes.

The Jam's Compact Snap superficially appeared snappy, taut and exciting, but relapsed into fierceness. Voice was neatly defined centre stage, but the drumkit was distinctly muddled across it.

It seems that Celestion, for all their design expertise, have not quite been able to marry the three different materials used in the drive units so the stitching doesn't show. If anything, they are inherently too tight and they throw the joins into sharp relief. It's a pity, because the titanium dome tweeter, while its sharpness is not entirely tamed, possesses a transparent clarity and supreme ability to pin-point detail.

Since the port is tuned to 50Hz, and



### Measured Performance

Eric walked into the office muttering "Oh deary me no. Oh no, not at all. I really do think you ought to listen to those Celestion's." He listened in one fairly well furnished room. I listened in another, sitting far back (10ft) to be sure they would integrate. On stands a few feet in front of the wall behind, they sounded over damped and bass light. As Celestion say in their handbook, the 9s must be positioned against a rear wall. Doing this improved the bass balance. There is no alternative to wall placement.

Properly positioned, and listening at a considerable distance of 12ft I found the 9s sound astringently bright. The sense of unbalance and artificiality was very pronounced, even with warm-ish recordings. Their bass is lean and tight, without being especially engaging. These observations might seem perfunctory, and they are. The reason is simple: the fierce upper mid-range of the 9 overwhelms any strengths.

Measurement suggests a problem in the mid-range unit, rather than the tweeter. The frequency response shown below has plateau lift in output from 1kHz up to 5kHz, which is almost certainly the working range of the midrange unit. As the microphone was moved upward onto the tweeter axis, the peaks became more pronounced. Light bass, suitable for wall placement, is also visible in the measured response characteristic.

Listening slightly above axis the speakers sounded peaky and incoherent; below axis (I lay on the floor!) they sound more integrated, but box thrum became much more noticeable for some reason. The best place for the 9s is on high bookshelves, well above ear height. As Eric notes, the bass/lower-mid unit has one sound and the mid-range unit another entirely; they don't integrate successfully.

The Celestions are very sensitive, producing 89dB for one watt of input. That's 2dB more volume than most loudspeakers. They have a true 'nominal' impedance of eight ohms, dipping down to 5ohms at 200Hz and 10kHz, as the analysis shows. High rates of change indicate significant reactance. Modern amplifiers should cope with this satisfactorily, but all the same the 9's are not the simplest load I have seen.

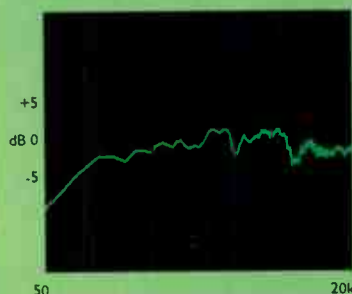
I found the new three-way Celestion 9 to be both astringently bright and incohesive in its sound. It suffers box thrum too. Sonically, it isn't a wild success, in my view.

NK

the lowest response is given as 48Hz, it is difficult to see that much has been gained over a two-way enclosure, of which Celestion have produced some startlingly good examples.

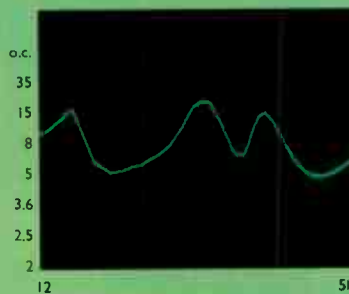
While the Celestion 9 may suit some ears and some systems, and bearing in mind I had it performing in a very revealing and ruthless system, its behaviour would require some considerable care with amplifier matching. Too neutral and the selvages show; too shaped, and the result could either be striking or appalling. This loudspeaker is to be approached with some caution and with careful listening ●

#### Frequency Response



Raised output from 1kHz up to 5kHz suggests the mid-range unit is responsible for the 9's bright sound

#### Impedance



Impedance hovered around 8ohms, but dipped to a minimum of 5ohms.

The Bigger Bit is an advanced Bitstream digital-to-analogue convertor for Compact Disc. Using Philips' latest and most sophisticated chip arrangements, it brings the very best obtainable performance down to a price level that enthusiasts and perfectionists might consider affordable - £599. This price is in contrast to the first Deltec convertor using Philips new DAC 7 technology, PDM-TWO, which is priced at a mere £2000.

As I said in our June issue where we tested PDM-TWO, Philips' new DAC 7 chip unequivocally gives the best measured performance from CD. In my view, it also gives the best sound quality. At present, a raft of manufacturers are wrestling with it,

quality from CD, Deltec speedily built the two-box PDM-TWO and released it earlier this year. Bigger Bit is a simpler and more affordable one-box successor.

Deltec retain their distinctive construction technique and housing style for this product. The chassis is made from heavy gauge aluminium sheet, to which is attached the sand-cast alloy front panel with its deep curves and rounded corners. An aluminium sleeve slides on from behind to act as a cover. The spray finish is a gloss dove grey. It looks attractive, a mottling or 'orange peel' effect, which some finishers may criticise, adding some extra visual character. The Bigger Bit feels solid and very strong as a result of its

panel will yield benefits in the future when Deltec bring out their own transport. There is an optical output and a small toggle switch. Both are identified as DEL TRAN. The output is a clock signal that will time Deltec's Transport into the convertor so they synchronise tightly without jitter or timing error. Experiments have shown that this technique results in a cleaner and temporally tighter sound. It offers a usefully unique future upgrade path for buyers.

A feature of all Deltec products that sets them apart from competitors is the use of Surface Mount Technology. Developed for aerospace to reduce weight and bulk, and also to improve reliability, Surface Mount Devices (SMD) are specially

## one bit bigger

**Noel Keywood admires the sound and the technology of Deltec's new 'Bigger Bit' Bitstream digital to analogue convertor.**

experiencing difficulties and, in the meantime, trying to obfuscate the issue in buyers' minds until they can get a product out. I hear and read many disingenuous mutterings about DAC 7's performance being no better than that of old Philips chips that Philips themselves are none too proud of. The mutterers are still using these old chips of course.

It is the almost-obscene haste with which they have introduced new chips in order to cure old ills that has put so many manufacturers into a spin. There are two background reasons. Philips realise they are in a race with the Japanese for the world CD market. They desperately need to be seen to be able to produce top flight convertor technology that can match or surpass low-bit systems like MASH coming from Japan. The second reason follows on from the first: their commercial survival depends upon being innovative and in front. Management restructuring and a more aggressively competitive outlook have been introduced by Jan Timmer, the Gorbachev of Philips.

So DAC 7 is not a happy accident, a laboratory innovation that got onto the market by oversight or mistake. No matter what small, specialist and tardy hi-fi companies say about it, DAC 7 is the latest and best in Compact Disc technology. It's Philips' best shot. Realising this and knowing how important it is to improve sound

bomb proof construction. It looks distinctive too of course.

Earlier Deltec convertors have had two green LEDs: one for power and a second indicating digital lock. The latter has been omitted from Bigger Bit. One solitary green LED sits in the centre of the front panel, showing only when power is on. In fact, this convertor will lock onto and convert 48kHz inputs from DAT, 44.1kHz inputs from CD and 32kHz from satellite.

The rear panel carries two digital inputs, one electrical and one optical. Deltec only started using the latter when a higher speed optical link than that commonly used could be found. High performance optical cable should be used in consequence. I have always preferred the softer, mellower sound provided by optical linking. But it was the case with PDM-TWO, and now with Bigger Bit, that the higher speed of the optical link narrows differences between optical and electrical. Whereas they once preferred electrical linking to the CD transport mechanism, Deltec now seem to have veered toward a preference for optical linking. The convertor defaults to its optical input if both are connected. However, since the whole point of optical linking is to eliminate the ground return, any electrical link should be removed.

Two unusual items on the rear





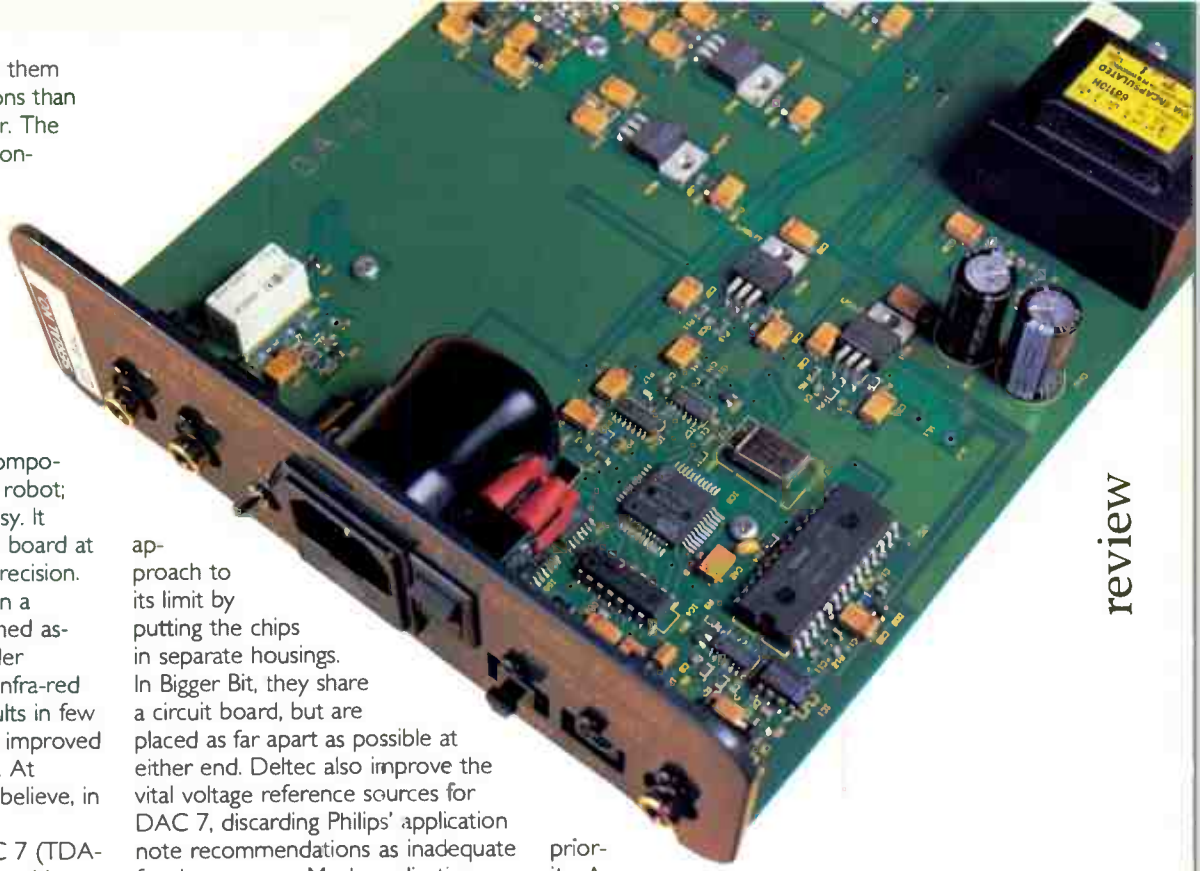
made miniatures. Deltec use them for other, less obvious, reasons than low weight and size however. The components have a better construction and shorter lead lengths; they offer improved sound quality as a result. You can see them in the photographs as clusters of tiny, black squares, surrounding the bigger, oblong chips on the green circuit board of the Bigger Bit.

Small size means SMD components must be handled by a robot; even tweezers are too clumsy. It places them onto the circuit board at high speed and with great precision. A board can be assembled in a matter of minutes. The finished assembly is then soldered under controlled conditions in an infra-red oven. Total automation results in few rejects, better reliability and improved consistency of performance. At present, Deltec are alone, I believe, in using SMD technology.

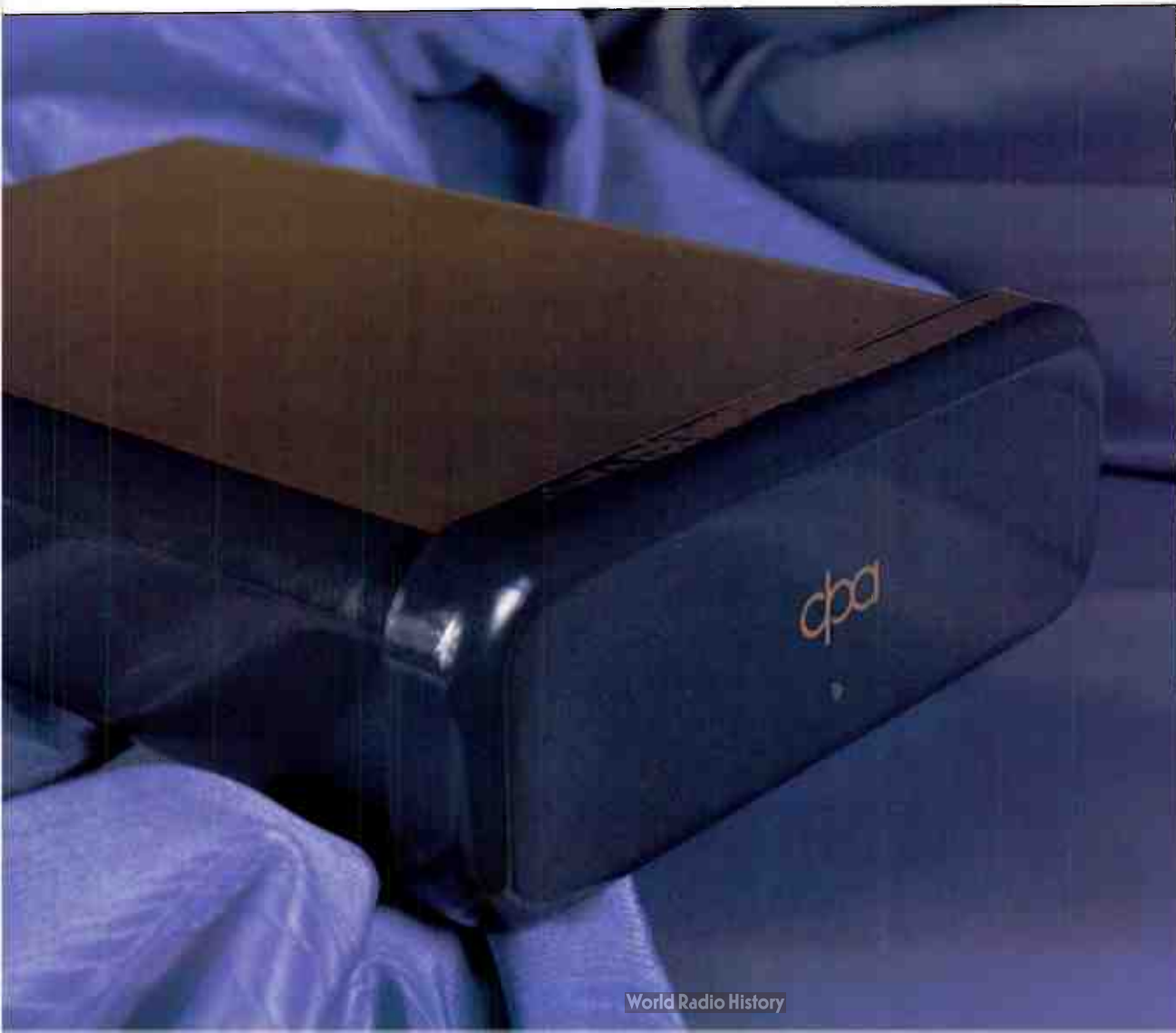
The whole point of DAC 7 (TDA-1547) was to remove this sensitive one-bit, switched capacitor convertor stage from the SAA-7350 and put it onto a separate chip where it would not suffer from interaction with earlier circuits. PDM-TWO takes this

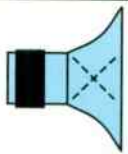
approach to its limit by putting the chips in separate housings. In Bigger Bit, they share a circuit board, but are placed as far apart as possible at either end. Deltec also improve the vital voltage reference sources for DAC 7, discarding Philips' application note recommendations as inadequate for the purpose. Much application note circuitry is designed to be cheap, even in products such as this, believe it or not. Too many hi-fi manufacturers - especially mass producers - cynically place low cost as the top

priority. As manufacturers themselves, Philips tend to think in the same vein, so meeting this common requirement comes naturally enough to them.



review





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**What's new Pussy Cat?**

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Low cost, unsophisticated circuitry does commonly compromise sound quality. One of Deltec's strengths is the vigour with which they discard this sort of thing. It marks out Bigger Bit as one of the most thoughtfully engineered applications of DAC 7 to date. Looking at the cheap circuits and components that even some of the better UK names use in their DACs, rightly suspecting few will know better, I believe this is likely to remain the case.

### Sound Quality

As I expected, the Bigger Bit contains most of the elements that characterise the PDM-TWO's sound, but in lesser quantity and with a slightly more diffuse presentation. The basic impression of solid but hard wrought images on the sound stage remains, making the presentation a strong, forward one. It confronts your senses, rather than subtly appealing to them. Vocalists are starkly embodied, forward and close to listeners, for example. In this respect I found the Bigger Bit as frank and unforgiving in its presentation as the PDM-TWO. It is significantly less mellifluous sounding than most DACs, including Deltec's own non-DAC 7 types. Bigger Bit hits you with a musical performance, it does not make it wash over you. I would describe it as brutally honest rather than sparing.

Part of the impression is caused by a sense of glare in the upper mid-range. It is difficult to know whether this is an inevitable by-product of improved insight - and Bigger Bit has enormous insight - or whether it is characteristic of Philips or Deltec's circuitry. Until more DAC 7 equipped convertors come onto the market, this has to remain an open question. What I can say is that the Bigger Bit gives a more lucid insight into the mixing and production work behind most Rock recordings, revealing cross fades, gates and artificial reverberation more plainly than any other convertor I have come across, except for PDM-TWO.

In spite of the roll down in treble output revealed by measurement, Bigger Bit is not a dull or warm sounding DAC. Almost the reverse in fact. Whilst it doesn't sound bright or sharp, the apparent upper mid-range prominence - or glare as I called it - imparts a lighter and clearer character to the convertor than is usual these days. Manufacturers are now commonly rolling down treble to get a warm, cohesive and amenable sound from CD. Bigger Bit offers a strong contrast to this approach. Being an opposite, as it were, makes it stand out even more.

The few reviewers that have

heard PDM-TWO, and I consider myself fortunate to have been the first, agree that it possesses astonishingly powerful, solid and deep bass. This is one of its biggest surprises, because bass quality is rarely much of an issue between convertors. I was a bit disappointed to find that whilst Bigger Bit does have solid and articulate bass, it doesn't have the mind bending slam of PDM-TWO.

Take it for granted that in sound staging this convertor is one of the best available. Deltec are sensitive to stage depth. It is a partly a function of low level information retrieval, a property the convertor does not lack.

### Conclusion

The Bigger Bit is a very effective implementation of Philips' DAC 7 chip. Other manufacturers are already running into problems with this new device. Deltec are now so conversant with Philips digital technology that they are strangely alone in being able to bolt their new super-chips into capable support circuits with speed and success. Bigger Bit offers the benefits of DAC 7, notably a starkly lucid and revealing representation of a performance, at a reasonable price, bearing in mind that this is one of the most technologically advanced CD convertors available anywhere ●

### Measured Performance

Deltec convertors are alone in my experience in breaking the usual relationship between measured frequency response and sound quality. Almost without exception, DACs (Digital to Analogue Convertors) with even a slight overall treble droop in their frequency response possess a warmer sound with less divorced treble than flat response DACs. Only the first PDM-I, with its particularly marked response droop obeyed this empirical rule. Otherwise, Deltec convertors sound open and clear across their treble regions.

Frequency response of the Bigger Bit, seen in the analysis, clearly shows a pronounced droop above 5kHz, just like that of its predecessors and current stablemates. It is due to the analogue output filtering I am told. Perhaps, as Deltec speculate, it is the nature of their output filters that avoids the usual slight warmth others rely upon for an aurally smoother and more palatable presentation of music.

Whatever, the filtering does its job well enough. In conjunction with digital filtering, provided by a Yamaha chip that Deltec prefer, the Bigger Bit produces virtually no spurious outputs. I usually measure products from -50dB down to around -70dB. With the Bigger Bit, nothing at all appeared on the screen of the analyser, meaning all products were more than -80dB down. This is an exceptionally good performance.

Noise was much less evident than usual from Bitstream (or Japanese low-bit systems). With or without pre-emphasis it measured -100dB or less. Again, this is a very good result.

The new DAC 7 arrangement provides unmatched linearity from Bitstream, fulfilling the promise of negligible distortion. The distortion analysis reveals that at normal music level (-30dB), distortion harmonics are not detectable, being less than 0.005% - if they are there at all. At lower levels quantisation distortion does become apparent, but still it measures less than usual. Down at -90dB, which is a lower limit for Compact Disc, the Bigger Bit produced just 1% distortion with a dithered signal. It betters all other convertors in this respect.

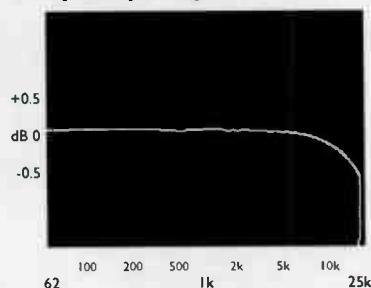
In short, Deltec have been very successful in their application of Philips' new DAC 7 chip. Although it shares a circuit board with the SAA-7350 that feeds it,

unlike PDM-TWO where the two components reside in separate housings, Bigger Bit still measures all but perfectly. It possesses an unparalleled measured performance by present standards.

### Test Results

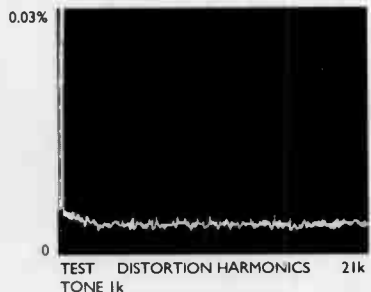
Frequency response	4Hz-21kHz	
Distortion		
-6dB	0.004	0.004
-30dB	0.005	0.005
-60dB	0.4	0.4
-90	29	30
-90dB		
dithered	1%	1%
Separation	left	right
1kHz	-122	-112
10kHz	-104	-95
Noise		-100dB
with emphasis		-102dB
Dynamic range		110dB
Output		1.96V

### Frequency Response



Pronounced treble roll off

### Distortion




No visible distortion (less than 0.005%) at -30dB music level

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S.E.C.



## METAL CONE Loudspeaker

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# the first metal cones?

Claims of originality in Metal Cone loudspeaker technology make Richard Kelly see red. He tracked down a metal cone loudspeaker that is now more than thirty years old.

“Hell's teeth” and other such expletives, I sayeth to mineself, what's new about metal as a cone material? It does rather gall me to read a manufacturer suggest or claim its useage as their own 'break-through'. I suspect it is designed to sucker the less knowledgeable of the hi-fi buying public - or is it just that they know so little about their subject, they really don't know it has all been done before?

With the numerous claims of originality in metal cone technology in mind, it is with great delight that I resurrect a pair of GEC metal cone speakers that made their debut at the Radio Show in - wait for it - 1951! I don't suppose for one moment that they were the first either. To whom the honours go for this I've yet to find out (I have hit a research barrier here. If one of you out there can help, please write in).

As you can see, the cabinets of GEC's loudspeakers are hardwood veneered and curiously attractive. The actual design is, to quote their own sales blurb: "The widely acclaimed 'Periphonic' cabinet system, which

uses a combination of two Metal Cone Loudspeakers and four Presence Units arranged to exploit fully their excellent qualities. "Details available on request" the leaflet says. Well wouldn't you just know it, I missed out on the last set of details by about thirty years!

The owner of these loudspeakers freaked out when I waved a screwdriver around and suggested a few tweaks that might be in order. So, not being able to take them apart to give you more insight into their construction, I will only say that the two cone units operate in a push-pull arrangement, with two presence units on board and another presence on either cabinet edge to improve dispersion.

Not the most descriptive of reports I grant you, but so as not to tear the original Tygan grille, it would have been necessary to dismantle the whole assembly to see what's up front and how the drivers are cabinet controlled. These are the only pair that I've ever come across and to spoil their originality would be tantamount to vandalism. John Baker



**Richard Kelly's monthly  
look at budget hi-fi - old,  
new, borrowed or blue.**



GEC produced metal cone loudspeakers back in the '50s, seen at the forefront here. Behind is the presence unit described in the article.

of Clear Crystal Systems, who kindly brought them over for our appraisal, agrees and is unusually dextrous with a 100w soldering iron when displeased. As such, I merely listened to them, with screwdrivers at bay. I thought it wouldn't be unfair to partner them with Denon's PMA-350, which I quite like, with the drive

coming from various sources that were passing through the office. I gently wound up the volume wondering when I would exceed their 12w peak rating and get extensively modified myself.

Fortunately I reached a listenable volume without any dramatics and settled down to hear what was

initially interesting. The first noticeable aspect of their sound that shone through for such an old design was how well they imaged - not as good as my old Quads, but none the less they had a fair amount of depth of stage with an equal amount of height. If I was to quantify the Quads as being an infinitely large window, the GECs are French windows, pretty wide but still restricting the overall picture. All the same, singers and soloists held their positions well with very little if any image shift, which I had not really expected with such an unusual arrangement of drivers. There are some current designs that do not fare as well in this particular aspect of a speaker's performance.

Tonally though, it's a different story. The first impression is of a lack of sparkle which gives way to a realisation that it's all happening rather matter of factly. Lacklustre or turgid are other words that spring to mind. It wasn't that individual instruments blurred and merged or that they were distorted; in fact they all sounded integrated and clean. Female vocals were rather veiled, sounding a bit down in the mix, but at the same time still sounding open and sweet. Any close mike work lost its immediacy and the feeling of being there...well it wasn't there, if you follow my drift.

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## Great Hi-Fi Stories... No. 3

### The Customer is always right (sometimes).....

"I'd like to buy the best double cassette player you've got," he said, striding into the shop. Without hesitation, I recommended the Yamaha KXW900. "What sort of system will you be using it with, sir?" "Oh, the best of course." How stupid of me; I should have known.

My recommendation must have brought out his impulsive side: he said he'd take it straight away. Later that day he phoned.

"That Yamaha cassette player I bought from you - it's not making a sound. My son's an expert on hi-fi, and he can't hear anything either!"

"I'm very sorry to hear that, sir - are you sure the loudspeakers are properly connected?"

"Well, all I know is that the cassette player isn't working..."

"How about the amplifier - is that properly wired up?" He sounded confused by my question. I tried another one.

"Sir, you do have an amplifier and speakers, don't you?"

"Er, no - would that make a difference?"

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I felt that there was this demon of a speaker hiding in there somewhere; it was just waiting for enough power to unleash it. Suddenly the bass would get some balls, the midrange would open up and come forward and the treble soar. But I fear that I had driven them as far as they would stand. At best, their performance can be described as having a dry and clear overall picture from the back row with your own hearing tackle turned down a few dBs. I must admit to actually liking the drive units themselves all the same. If you come across any of these speakers for about £60 or less they might prove to be an investment; or, if you're into acts of hi-fi vandalism, they might prove to be nice little speakers when tweaked with good quality cables and capacitors, little spiked feet, new grilles, cabinet damping...Shut-up, Kelly! You're gibbering. **RK**

## THE G.E.C. METAL CONE DRIVE UNIT

It's fascinating to read the sales brochures of these units. Written in typically early fifties prose, it nonetheless uses many of the sales buzzwords that appear in today's literature. Phrases such as 'high quality of reproduction', 'unequalled bass performance' and 'appeals particularly to music lovers' still feature strongly in the loudspeaker copywriter's arsenal.

G.E.C.'s Metal Cone Loudspeaker drive unit, known as BCS1851 to its friends, is now long forgotten by G.E.C. themselves. Manufactured in the fifties, the brochures that we have on the units date from 1957, when it cost £9.5s (£9.25), tax paid. While G.E.C. suggested that this drive unit had an effective frequency range of 30Hz - 20kHz, it had some wibbly bits in the middle parts of its spectrum, so they recommended supplementing the driver with the BCS1852 'Presence' unit. This was designed to fit into the centre of the metal cone driver, replacing the small Bakelite cone plug, making the complete drive unit similar to a metallic version of a Tannoy drive unit.

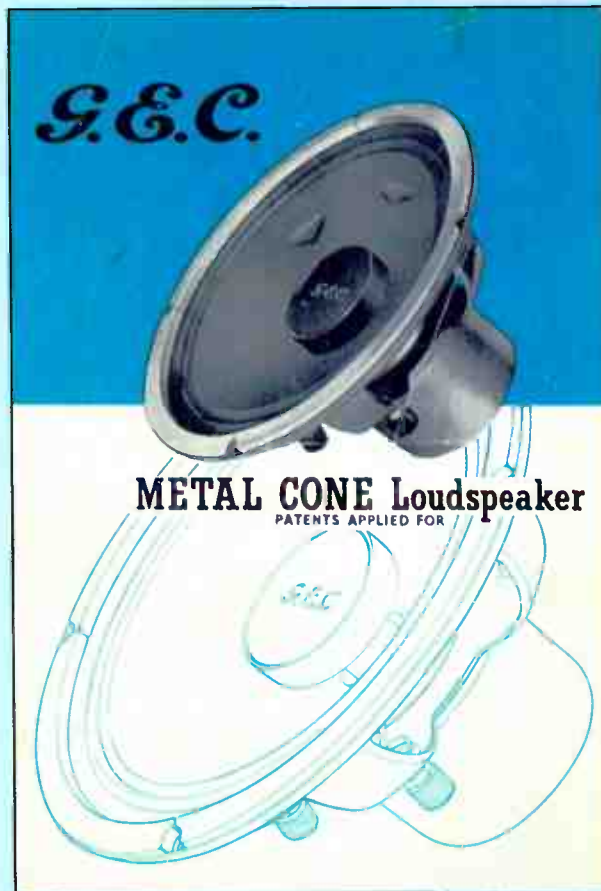
The Presence unit added what was referred to as a 'smooth "lift"' to the upper mid-range, which was said to give the effect of listening in the immediate proximity of the instruments. This mid-range unit cost an additional £3.19s.6d. Add to this the cost of the 'Loaded Port' cabinet and the 'Auto-Transformer' to match the drive units into a 15 ohm load

(£17.10s and £2.17s.6d respectively) made a grand total of £33.12s per loudspeaker. This appears to be highly expensive for the time, which might explain the rarity of the loudspeaker units today.

Little survives about these loudspeakers today. Aside from the brochures, the only other information that could be found was mostly about the applications for the drive units. Aside from being a brief overview of the then current state of the art in loudspeaker cabinet design, this gave some insight into the wood working requirements that the metal cones needed. What can be gleaned from the surviving specifications was that the drive unit had a Duralumin cone with specially shaped deformations to tune out any nasties in the overall frequency response. These small, local deformations controlled frequency response problems, without creating cross modulation, muddling the sound of an orchestra. A Bakelite bung helped to give the unit its smooth sound. Research was put into the plastic surround and the large Alcomax III ring magnet. The voice coil was wound on a metal former, to aid its rigidity and high frequency performance.

Aside from the metal finish of the cone, the drive unit looked essentially like any other drive unit of the time. The little presence unit, on the other hand, looks like a jet engine, with its turbine-like appearance. Beneath this, there was a metallised diaphragm - I suppose one could almost say a metal dome tweeter. Little information survived about this unit.

It appears that the drive unit did have quite a large amount of research



put into it, prior to its launch. This could explain the smooth imagery and accessible, if laid back sound to modern ears. As befits a loudspeaker built in the fifties, the metal cone drivers have a maximum power handling of about twelve watts, with a continuous power rating of half that figure. This would, sadly, have sealed the drive unit's fate in the transistor age, when more and more watts became available. **AS**

**GEC's pamphlet printed in 1957.**

**GEC's metal cone loudspeaker cabinet had an internal chamber with a secondary rear drive unit which can be seen in this shot.**



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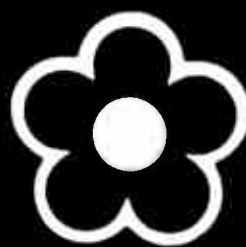
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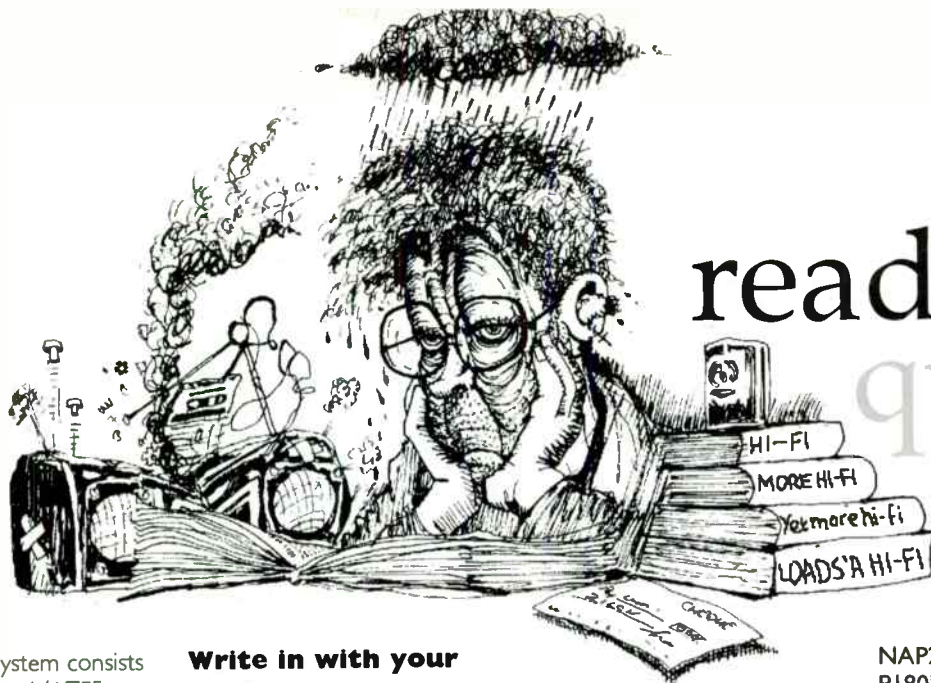
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# readers' queries

● My present system consists of a Linn LP12/Ittok/ATF5; A&R A60 amplifier and Linn Kan Mk1 speakers wired with Naim cable.

I feel that I could make improvements in a couple of areas.

- 1 Replace amplifier with a Linn Intek, Audiolab 8000A, or save some more and get a pre-power combination?
- 2 The turntable sits on a heavy cabinet - I cannot use a separate table. Would a Mission Isoflat or Mana Sound Frame improve matters?
- 3 With an amplifier upgrade, would different speaker cable suit the system better?

**B Johnson,**  
Leigh-on-Sea

The Linn Intek and Audiolab 8000A integrated amplifiers all suit the Linn Kan Mk1. It would be best to go for a pre/power combination, if it were at all possible. The Kans love a bit more muscle behind them; while they sound good with a small integrated, they really sing when used with a pair of Naim 135's or Linn's LK-280/Spark power amplifiers. If you are going toward either Linn or Naim amplification, use their own cabling. Your own NAC A4 cable may be a little old and in need of replacement, judging by the rest of the system.

While we are on the subject of the age of your system, if the Audio Technica AT-F5 was purchased at the same time, I would strongly suggest that it was looked at, as it may be seriously past its prime. The AT-F5 is now no more, but the AT-OC5 is a good replacement. If you are happy with the AT-F5, I see

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no reason not to go for the OC5, should it become necessary.

If it's really impossible to site the Linn on its own table, then the Mana Sound Frame, which is designed to work with the Linn, would be a good compromise. The Mission Isoflat is better suited to supporting Compact Disc players; its squidgy feet work well with CD, but are a nightmare for a suspended turntable like the Linn. **AS**

● My system comprises a Linn LP12/Ittok LVIII/K9, QED A240SA amplifier and Peerless 65/2 kit speakers on Appolo stands.

The overall sound is smooth, warm and clear, but I would like a bit more crispness and attack.

As the cartridge is due for renewal shortly I am considering the AT-OC5, to take advantage of the moving-coil facility on the amplifier.

My main problem concerns the speaker upgrade. The only speakers I have heard that I like are the Epos ES11, Acoustic Energy AE1 and possibly the Naim IBL's. The speakers must be positioned against a new plasterboard wall either side of an arch.

I'm not sure the ES11 would sound vastly different from my current speakers, but would my present amplifier drive the AE1's or the IBL's? Any suggestions gratefully received.

**B Horswill,**  
Haverfordwest, Dyfed

First, the cartridges. The AT-OC5 has caused lengthy discussion at the Hi-Fi World office as to its merit, especially in Linn arms. While it is capable of great detail and listenability, it can sound overbright and even fierce in the wrong system. The QED's MC stage, as is often the case in integrated amplifiers, is not its strongest point; if it is possible, listen to the cartridge in the context of your system before shelling out cash. A new K9, or similar good MM cartridge may be a better choice.

Moving to the loudspeakers, bearing in mind the amplifier, the Epos ES11's would be the only choice out of the three. Acoustic Energy AE1's are a current-hungry window into the quality of a system and would prove too taxing for the QED. They work best with power amplifiers like Naim

NAP250's, Musical Fidelity PI80's, Alchemist's monoblocks and big US amps, like Threshold's. Any of these amplifiers, when connected to a suitable preamplifier, will increase the budget considerably.

Naim IBL's are less taxing on the amplifier, but they still demand the highest quality amplification to produce satisfying results. Minimum here would be a £400-£500 integrated amplifier. The Epos ES11's while not as sensitive as the Naims, do offer a less uncompromising alternative, with a sound quality that puts many loudspeakers, often costing far more, to shame. **AS**

● I am a Swedish hi-fi enthusiast. When I drove to Malmö to visit some hi-fi shops last week I found Hi-Fi World in an international Press Centre. I bought it and three other British and one German hi-fi magazines. When I returned home I found it quite to my taste.

I will take the opportunity to ask for advice. I have a Manticore Mantra with the 'middle' arm from the same company and an Ortofon MC30 cartridge. The pre-amp is a Musical Fidelity MVT, the blue one. Now I'm looking for a power amplifier and loudspeakers to suit the rest. I have had my eye on the MF P270 and a pair of Snell EIII's. I like the 'air' in the EIII. The P270 I have not listened to but I have heard it would work fine with the MVT. What do you say? Any other ideas?

**M Gunzel,**  
Karlskrona, Sweden

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The Snell E111 loudspeakers, especially if used with heavy Huygens stands, do have a wonderful 'air' and openness as you say. As they are highly efficient, they do not need a large powerful amplifier to drive them well. While the MF P270 is a good amplifier, with masses of power in reserve, you may find happiness with a small valve amplifier. Try to have a listen to the Art Audio, Croft or Concordant Exultant (modified Quad II) power amplifiers. Alternatively, try listening to the Audio Innovations Series 200, 800 or 1000 pre-amplifiers with a matching Audio Innovations power amplifier. Depending on budget, this could go from the modest 200, right up to the deeply impressive First and Second Audio triode amplifiers. This, combined with Audio Note cable throughout and a good moving coil transformer, would seem to fit together as quite a logical and sonically well-matched system.

On saying this, however, the P270 does match the MVT pre-amplifier well and would be worth considering. This would give a more 'impactful' sound than the valve equipment mentioned, but possibly at the expense of some of the mid-band 'air' that you have mentioned. **AS**

● My current system comprises an Arcam CD transport/BB3 converter, Alpha 2 amplifier and Castle Durham speakers, Audioquest Ruby interconnect and Linn K20 cable. My next upgrade is to be to the amplification. My short-list includes the Audiolab 8000C/8000P, Musical Fidelity P180 or MA50. I'm unsure, however, what pre-amp would suit the Musical Fidelity amps for roughly £300. Are there any other combinations of about the same price which I should listen to? I prefer the minimum of facilities such as tone controls. My musical tastes range from Jimi Hendrix and Led Zeppelin to Prokofiev and Mozart. What speakers would match these amps for around £500-£600?

**Ashley C. Stokes,**  
Birmingham

Musical Fidelity's own 3A pre-amplifier is well suited to the MA50 power amplifiers, in both a visual and musical sense. The NAD, Croft and Art Audio pre-amplifiers would fit this system well. The Heybrook C3/P3 combination could also be worth a listen. Otherwise, your choices will produce a sound quality that is easy to sit in front of.

In terms of loudspeakers, a lot depends on the size of room, musical tastes and the amplifier that you decide upon. At the £5-600 level, few inherently poor loudspeakers could survive the competition from the outstanding models that abound. This means that there are many that are very good, but very different. Epos ES14's, NEAT Petite, TDL Studio 1, Rogers Studio 1a and ProAc Studio 1 Mk2 all spring to mind, here. My preference would be the ProAc, but all of these are worth auditioning. **AS**

● It has been about fifteen years since I last read a hi-fi magazine, and a couple of months ago I picked up your magazine, and lo and behold! - the spark was rekindled in matters hi-fi. But what a change has come about since my Garrard 301/Quad 22 amps and tuner and Jordan-Watts speakers.

I am tempted to build anew, but all I have at present is a Yamaha CR450 receiver which is a bit long in the tooth, but O.K. Also, very recently, I had a Technics RS-B565 cassette deck as a present. I couple it via the Yamaha to the Jordan-Watts GT's. This gives music via radio, which we listen to a great deal, along with a large selection of Classical tapes. A good selection of LPs, many as yet unplayed, completes the picture. Now to the crunch. Can you advise me as to the sort of system I might require to give me a moderate-ish hi-fi set up on a budget of say £500 and a bit! This need not include a CD player for the present, but a recommendation for the future would be welcome.

Having read a little about a certain Pioneer A400 amplifier, and being duly impressed,

would this be suitable to build round? My listening room is approximately sixteen feet by nine, if it helps.

I have gone on a bit, I know, but as I am nearly a senior citizen, I feel I must settle down to some serious listening.

**E. J. Jinks,**  
Redditch, Worcester

The choice of turntable to keep within the budget is somewhat limited. The Rega Planar 2 or Planar 3 are both superb sounding; the 3 comes with a brilliant arm, worth the price alone. These were reviewed in our August issue. Audition a Thorens TD280, which price-wise sits in the middle. A good basic cartridge is the Arcam C77, which has the advantage of taking a better quality stylus at a later date; as does the Ortofon 510. Rega's own Bias is worth a listen, too.

It would be worth looking at amplifiers in the bracket below the Pioneer A400, too, at around the £200 mark. I find the Arcam Alpha 2 a good allrounder, detailed and cheerful, and one that's hard to beat; it's being replaced by the Alpha 3 (reviewed last month, which should also be auditioned) so may well be reduced in price soon. We also recommend the Denon PMA 350 and the Creek CAS 4040s3 - the latter with a better disc stage, which is important here. A new amplifier is the Aura 50, though some people find this too restrained. Now for the 'and a bit'. This leaves very little for loudspeakers, and since you listen to radio a good deal, it might be worth listening to the Denon TU-260L, a real bargain at £100, to see if this is better than using the tuner section of the Yamaha. This would mean retaining the current speakers, which I'm afraid I don't recollect, though the Jordan drive units were (and are!) very good. If you feel they must be replaced, try the Goodmans Maxim II's at £90. It's no longer easy to persuade some dealers to let you audition equipment at home, particularly as you may not be able to find all these items in one place, but many will allow you to return an item if it doesn't come up to expecta-

tions in your system within seven days. There's no harm in asking. **EB**

● My system consists of all-Technics equipment, an SL-P477A CD player, RS-B465 cassette deck, SU610 amplifier and a pair of Wharfedale Diamond IV speakers. The amplifier has provision for two pairs of speakers. What I wish to know is, could I use both the 'A' and 'B' speaker outputs together to one pair of speakers. The speakers have only one pair of connectors each. Would this improve the sound, or would this cause damage to the speakers or amplifier? The output from the amplifier is 30 Watts per channel. Would this increase to 60 Watts per channel to the speakers using 'A' and 'B' together?

**David Hall,**  
Wakefield, W. Yorks

Most amplifiers with 'Speaker A' and 'Speaker B' outputs are simply intended for you to be able to use a second pair of speakers, powered by the one amp., in another room. Usually, there's a selector switch to switch between them. If the amplifier allows the two to be used at the same time, then the load drops from 8 ohms to 4 - and some speakers don't behave properly, though the intention is to keep the speakers' sound at about the same volume the single pair would have produced. An amplifier usually does produce more watts into 4 ohms than 8, but it doesn't necessarily double. This is useless for bi-wiring, as the idea is to separate the low frequencies which go to the mid/bass unit, and the high frequencies which go to the tweeter at the speaker end, not the amplifier end. Bi-wirable speakers have a crossover which is in two parts - one for the tweeter, one for the mid/bass, and need separate pairs of cables from the single loudspeaker output terminals of the amplifier. The Wharfedales are not bi-wirable, but don't worry. The benefits gained depend as much on the quality and design of the amplifier as the speakers. **EB**

The latest in the stream of Brits to join in the flood of Bitstream-based Compact Disc player designs is Musical Fidelity with their £400 CD I. It's built around both a Philips transport and Philips SAA-7323 Bitstream chip. The analogue stage is the same as that used in the Digilog converter, liked in its day - and since - for a well-rounded sound.

Made to mix-and-match with other Musical Fidelity equipment, the new CD I is finished in matt charcoal grey, with chamfered top and bottom edges like the tuner (reviewed last month) and B1 amplifier which accompanied it in part of the listening tests for this review. It's simple and restrained. The drawer is finished in perspex to match the display window, both of which have slightly chamfered upper edges to carry a styling break across the upper edge of the player. The company name is in larger white letters than previously, with

legends in the traditional Musical Fidelity blue.

The whole layout of the small grey oblong control buttons is neat and unfussy. From the left, an on/off rocker switch with red LED to show power on; then the drawer and display panel with Index, Track and Scan buttons underneath, and the other main controls - Open/Close, Play, Pause, Stop, Program and Repeat arranged in pairs vertically to the right. It's possible to cue a CD by Index numbers, which proliferated, certainly on Classical discs in the early days, but which player manufacturers often ignored. Of course, as the facility to drop into a single specific recitative in an opera, say, was dropped on the discs in consequence, the equipment manufacturers started putting the ability to select Index numbers back into the players again. The functions are all duplicated on a slim remote handset which includes a calculator-type 1-9 numerical pad for

track programming.

The display shows Track numbers, elapsed time in minutes and seconds, and selected functions, such as Repeat, all in green. There's a neat little oval indicator, reminiscent of a tiny halo over a Saint's head in some Italian fresco. This reminds you that the disc you've inserted is either the standard five-inch or three-inch one - the drawer takes both without the need for an adaptor ring.

Hidden from normal view on the back panel are the usual two phono sockets for the analogue output, one for coaxial digital connection and a Toslink optical digital output socket. These last two are incorporated so the player can be used as a stand-alone transport. I tested it in both modes. Since we had a new B1 integrated amplifier to hand it seemed a good idea to put them together for a while.

Anthony Michaelson, founder of Musical Fidelity, made a passing reference to 'tone-shaping' when he brought the CD I round to the office. I didn't question him further at the time, because I wanted to maintain a quite open mind, untrammelled by any preconceptions before I heard it. A few minutes and a hurried gallop through half-a dozen tracks - done just to ensure the gear was working - had everyone quite struck by the sound.

It seemed engaging and lively, without any obvious nasties. Accurate? In the sense of baring the breast and being utterly ruthless, perhaps not; but since attempts at this often result in nothing more than an unexceptional and, in the end, bland sound, this was hardly going to be a black mark. Musical - in the sense of feeling a performance going on in the room, certainly.

Half of me - a bit more than half, to be honest - respects neutrality and ruthless accuracy in Hi-Fi equipment. The other half of me is dismayed when the result is a pile of recordings on the carpet which are invisibly labelled 'unlistenable', or 'technically horrid.' What I'm not sure I want to live with - though I appreciate many do - is equipment that is always 'kind' to the software and attempts to remove the dilemma.

Acoustic guitar, in this instance a series of Spanish compositions played by Eduardo Fernandez, was clearly going to be one of the CD I/B1 combination's strengths. It was very strong, well forward but not exaggerated in size or scale, and had a forceful presence. The touches of detail - fingers sliding up the neck of the guitar, a palm slapping the body of the guitar - were all present and enlivened the performance. Daniel Barenboim's piano was suitably heavy, and many elements of his idiosyncratic but involving performance came over, though lacking the last ounce of sheer power in the growling thunderstorms of the crescendi. There was 'sturm' in plenty, but not quite enough 'drang.'

Both classical orchestral works and rock music demonstrated a warm sound, with the sharp or jagged edges smoothed off somewhat. The Academy of Ancient Music's Schubert Octet, a

### Measured Performance

Musical Fidelity use Philips Bitstream technology in their new CD I player, they tell us - the chip hides on the underside of the circuit board and is inaccessible without surgery, so we have to take their word on this. Designed to give lower distortion and a cleaner sound from Compact Disc, it has become widely adopted by European manufacturers, whose example Musical Fidelity follow. Their only previous digital component was the rather good Digilog stand-alone convertor.

We were told that the CD I possesses the same output stages as the Digilog. The latter was a sixteen bit processor though. The CD I has less distortion, at least over the upper reaches of its dynamic range. Sadly, at low signal levels the CD I actually gets worse in its resolution - and hence distortion - than Bitstream is supposed to. Down at -90dB it was all but failing to resolve the signal at all, even in the presence of dither. In contrast to this, good Bitstream processors can these days output a signal with just 2% of distortion. The CD I averaged 70%. It really puts up a very poor showing in this respect.

Frequency response has a slight overall downward trend toward high frequencies. This sort of gentle slope down does produce a 'warm' tonal balance, something our listening tests confirmed. In this respect the CD I is slightly tailored, but then so are plenty of other UK machines, like the Arcams for example. Even Philips and Marantz are getting in on the act, realising that a small amount of slope can make subtle but quite significant changes in the perceived character of an item.

Channel separation was uniform at around -92dB right across the audio band. Noise was well suppressed, measuring -98dB under normal conditions. This is a low figure, especially for Bitstream, which can be very noisy. Effective filtering above 21kHz probably contributes to this result, since unwanted high frequency signals produced by the interaction of various tones were fairly well suppressed. At 2.4V, output was around +1dB up on the usual specified 2V, but I have measured higher. High output helps in any shop comparison the player may have to endure. **NK**

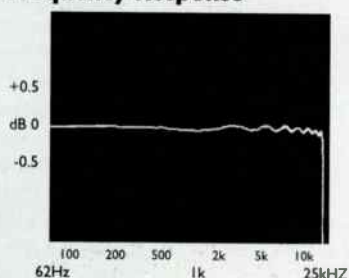
Except for low amounts of distortion up around normal music level, the CD I measures comparatively poorly for a Bitstream player.

### Test Results

#### Frequency response

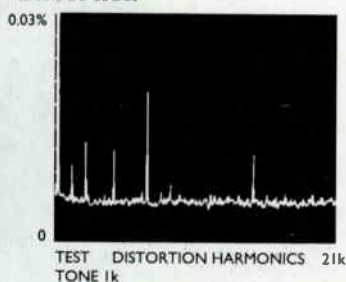
4Hz-20.8kHz			
Distortion	-6dB	0.003	0.003
	-30dB	0.026	0.026
	-60dB	0.77	0.7
	-90	94	55
	-90dB dithered	85	48
Separation	left		right
	1kHz	-92	-91
	10kHz	-94	-94
Noise			-98dB
	with emphasis		-100dB
Dynamic range			-104dB
Output			2.4V

#### Frequency Response



Slight overall response fall adds warmth

#### Distortion



Low-ish distortion of 0.026% at normal music level



gloriously 'together' recording which can sound, with all the woodwind and strings, like an organ in full flight, had all the fulsome glory of a great cathedral organ. It is actually a drier sound than this, more chamber organ than St. Paul's, but it was a far more 'musical' performance than it normally appears. Rock drumkits were less successful, lacking tightness and reducing the 'boppiness' of the whole. Emphasis on the mid-band tended to subdue some sounds at the expense of others, ending up with a slightly muddled effect - though without the listener having to strain to enjoy the music.

Switching to the optical digital output and using a Deltec Little Bit cleaned things up markedly. Tracy Chapman lost some of the overly nasal tone which had made it difficult to follow the words, yet it placed dynamics and inflection out in the open. Orchestral sound, while retaining a slight bloom in the middle registers, also blossomed like a tulip field. Some Schubert Lieder displayed a glorious soprano voice and narrow but realistic piano. Perhaps the top notes didn't soar as freely as they might, but this was an enjoyable drawing room representation of a chamber performance, with little to fault about it. The rock music tautened as well, though there still wasn't the pile-driver force that hard rock fanatics love to feel their heart beating in time to.

As listening went on, it became clear that the CD1/BI combination was tailored to absorb the worst in a CD and make it musical, almost whether or not it was willing. The more critically one listens, paradoxically, the more evident this seems, yet it never becomes disturbing. The CD1 simply never gives up. In complex free jazz, like Omette Coleman's Song X, the saxophone didn't

become raucous, as it often does, but the multi-stranded instrumental complexity melded together and the interplay of instruments and drums never quite leapt out at the listener. This combination is not a Savile Row silk suit, more off-the-peg serge; not rough, exactly, but comfortable and run up to suit a fairly broad cross-section of different tastes.

There's always an aesthetic difficulty with Musical Fidelity designs - together, they fit together like Bauhaus furniture, and their slim elegance and that subdued blue lettering always looks attractive. The designs are subdued enough not to shock the eye when placed next to some other company's gear, but the question now is whether, taken away from a Musical Fidelity amplifier, the new CD1 can stand on its own four rubber feet.

Many of the same virtues were quickly apparent through our standard Deltec/Quad/Celestion sub-woofer reference system. Choral and solo vocal works possessed a glorious sweetness without any strain. Again, maybe the absolute power of a top C was a little subdued, but there was a delicacy through the whole of the mid-band. The punchiness of rock music was unfortunately also subdued. Dynamics overall seemed too restrained to feel the real sweaty force of rhythm guitars or heavy bass work. The lower frequencies, evident in both orchestral lower strings, drumkits and electric guitars, were soft and rounded. The result was a tendency to soften the impact of performances as well.

The Musical Fidelity CD1 is a curious beast. It has so many of the best qualities of the tuner reviewed last month; an embracing warmth, a relaxed presentation and an ability to resolve fine inner detail in chamber music, instrumentals or

**Musical Fidelity's new one-bit Compact Disc player, the CD1, is kind to the sound of CD, Eric Braithwaite found.**

## friendly fidelity

vocal works, especially over the middle frequencies. This is combined with a soundstage that is cohesive over its width, but doesn't bring out the nuances of recorded ambience. Nor does the CD1 allow the listener to follow orchestral sections or a multi-tracked mix with insight and absolute clarity. It is CD-friendly; it's not a player which will disappoint by grossly inaccurate tonality or a ruthless laying bare of recording faults. Musical Fidelity owners will no doubt find its 'tone-shaped' special sound instantly attractive; others would be advised to ensure that they listen to both the co-axial and optical digital outputs through a DAC converter of their choice, which was the mode I preferred, and felt gave a more truthful representation ●



Eric questions Richard Kelly (right) at the show

## The Audiofile Hi-Fi Show

DOLPHIN HOTEL, ST. IVES SEPTEMBER 1991



Our buckets and spades were pulled out of the cupboard and stacked up ready, then someone told us: this was the other St Ives. It sits landlocked in the middle of Cambridgeshire, not on the pretty coastline of Cornwall. As a venue for a hi-fi show, being held by the Audiofile of St. Ives, the town has other merits: Cambridgeshire is the homeland of British hi-fi. So we deflated our water wings and offered other support instead.

The show was held in the Dolphin Hotel on the banks of the Great Ouse. Sunday, 1st September turned out bright and sunny, but that didn't keep the interested and dedicated away. To our surprise, people came not just from Cambridgeshire, but from places farther afield, like Tilbury and the Isle of Wight. We straggled up from London by car and train; I particularly enjoyed seeing the yellowing fields and green trees of Cambridgeshire in late summer. It was a pleasant contrast to the cityscape that is Berlin, endured days earlier whilst covering the Funkausstellung show.

Illustrious names like Quad, Mission, Meridian and Arcam inhabit the area around St Ives, most of them being in Huntingdon. Our guess that many well known manufacturers would be at this show was right - even Quad had a room. They rarely attend shows nowadays. Although they have a new tuner, the remote controlled FM6, it goes out to dealers later in the year and was not on display. A pair of ESL-63s electrostatic loudspeakers were doing sterling service, running from a complete Quad system comprising 306 power amplifier, 66 preamplifier and Quad CD player.

Whether Quad's attendance was due to the proximity of the hotel to their factory, or because of the insistence of The Audio File's Beverley Reynolds remains to be seen. It was good to see Quad back on the show trail in this country; we hope that this is not just a one off appearance.

Another rare exhibitor to the show world was Rega Research. Their display was simple, but nonetheless colourful, friendly and effective. Playing nice Rega records through different coloured nice Rega turntables, cartridges, amplifiers and loudspeakers, Roy



Gandy (founder of Rega) and his team were equally happy answering questions about their new cookbook as they were on their hi-fi equipment. Throughout the show, anybody who said something along the lines of "Good sound, but great cakes", was almost guaranteed to have come from the Rega room.

Most of the other exhibitors were more regular attendants to shows. Of these, no-one could complain at the excellent organisational skills that went into producing such a slick event. On a hot, sticky Sunday, even the most hardened exhibitor had nothing but praise for both the Dolphin Hotel and The Audio File staff.

Those regulars that attended included such luminaries as Linn and Naim. Most exhibitors rooms were packed throughout the show; both these manufacturers often had queues forming outside. As such it was difficult to see what the two companies were displaying. Linn Products did have their Kaber Aktiv system playing, using a range of Linn's own records. This produced a healthy trade in Linn records for both ourselves and those in the accessories tent by the river.

One of the most surprising events of the show was the complete absence of a turntable in Naim Audio's display. Their new CDS Compact Disc player was running throughout the day via the huge DBL loudspeakers. Many felt that the CDS was the biggest talking point of the show, causing both discussion and controversy whenever it was mentioned.

Aside from Linn and Naim, many of the other manufacturers had similarly packed rooms. ProAc's new Tablette II loudspeakers were another of those products that proved popular with the public and the trade alike. We thought that ProAc had one of the better sounds in the show. Their larger Response loudspeakers were being used by Audiolab (also local manufacturers) in what seemed like a reciprocal arrangement (ProAc were using an Audiolab amplifier). Audiolab were displaying their monoblock amplifiers tested by Hi-Fi World recently, along with the forthcoming digital-to-analogue convertor and tuner.

Ruark were displaying their current range of loudspeakers, including their latest house-friendly Rhapsody design. Sony were seemingly displaying every product in their extensive range. This included a range of RDS tuners and DAT players.

Other Japanese manufacturers at the show included Rotel, Yamaha, Marantz and Denon. The last were exhibiting, among their cassette decks, the latest in 'designer' or 'lifestyle' systems. One was a half-sized model that featured a brushed titanium-effect finish. Very slick!

Denon also provided us with the loudest sound at the show. It came in the guise of a red Toyota Sport parked outside and armed with some of the most stonky in-car hi-fi. There were many other cars displaying their sound systems, but Denon's was the most memorable because of its pain-level sound. The downside was that even with the engine idling, the battery went flat within a few hours. Denon reps. were to be seen getting their hands oily wrestling with jump leads, whilst less ambitious mortals - and rivals - looked on with "well, what do you expect" smirks. The in-car in-joke was asking Denon folk how many CDs to the gallon their car does.



**Above:** Mission had the largest room to accommodate their massive 767 loudspeakers.

Marantz were busy improving on the image that their 'Special Edition' CD players and amplifiers have created. Aside from the highly impressive and expensive Music Link system, Marantz were showing a new range of pre/power amplifiers, which we hope to listen to soon. Staying with the letter 'M', Mission had one of the largest display rooms at the show - and they filled it with the sound of their massive 767 loudspeakers. The new products talked about in our Berlin Show report were not on display now. The 767 loudspeakers took Mission's upgrade path to a logical extreme, as these run from a plethora of Cyrus Two amplifiers and PSX power supplies. When asked if there were any new products at the show, Dave Marchant of Mission answered "Yes - our polo shirts!"

Restrained black polo shirts were not apparent at Musical Fidelity's stand. Aside from their new CDI CD player, Odysseus valve integrated amplifier and other new products, the room featured an eye catching Pizza-esque tie, worn by the demonstrator of the day, Tim Woods.

KEF were showing their new Q range of loudspeakers. The Q60 (£379) played most of the day, but Q80s and 90s were on hand. So were the new Reference 103/4s, tested in our last issue. Kef tell us that the new and less expensive K series will be launched soon. Their loudspeakers were being driven by Alchemist amplifiers, which we also tested in our last issue.

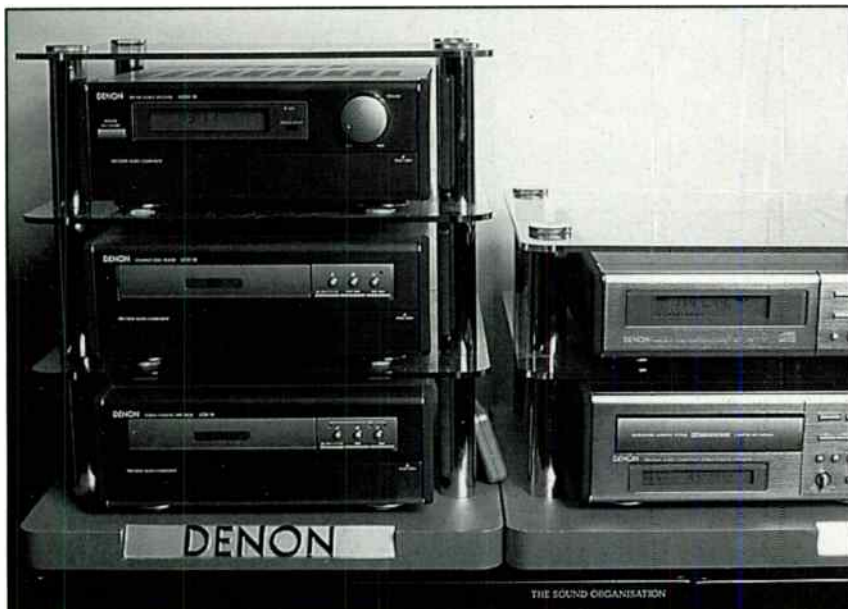
On show in the Meridian room was a 602 transport feeding D600 active loudspeakers which now use Bitstream technology. Arcam had a prototype of their new cassette deck on display, plus their own new Delta 2 loudspeakers as well as Vandersteen loudspeakers which they are now importing from the US. Deltec ran a new monoblock power amplifier and had their new Bigger Bit digital convertor operating. It uses Philips' latest DAC 7 chip which gives it a great advantage in sound quality.

Roksan displayed a complete system, including amplifier and new Radius turntable. I believe this was the first time these products have been on show to the general public in the U.K. What definitely was new to the world was the smaller Roksan amplifier, on static display, but soon to head for the shops.

In all, the Audiofile Show was a hot, but relaxing and pleasant event, that had attracted many of the big names in hi-fi to a small but pretty town in Cambridge-shire. Both the exhibitors and the show goers had much to see and much to talk about. The event seemed a resounding success; we all staggered away exhausted but happy. The organisers looked pretty pleased with themselves and - most importantly - the many visitors we talked to, who had travelled from far and wide, expressed their satisfaction too. For them in particular, it was easier to have a chat with the exhibitors than is so often the case. Let's hope the same benefits can be enjoyed again next year. Small but well organised and attended shows like this seem to be popular with everyone ●

**Far left:** Quad had a colourful display above their system, comprising CD player, 66 pre-amplifier and 306 power amplifier.

**Left:** Denon were showing new titanium finish 'lifestyle' system.





# A BIG THANKS...

to all manufacturers and customers who attended our hi-fi show, and a big thanks to Hi-Fi World

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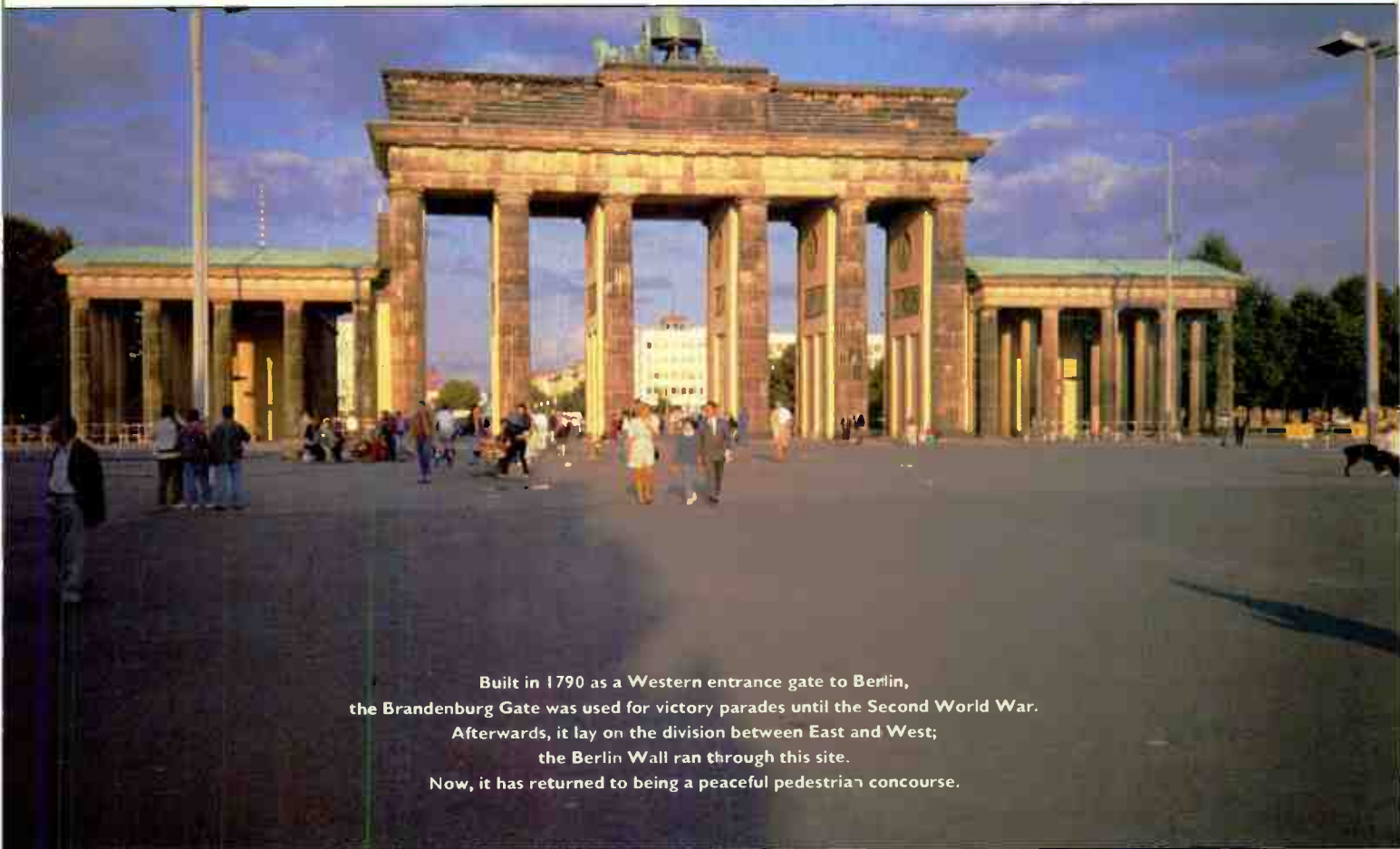
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Built in 1790 as a Western entrance gate to Berlin, the Brandenburg Gate was used for victory parades until the Second World War. Afterwards, it lay on the division between East and West; the Berlin Wall ran through this site. Now, it has returned to being a peaceful pedestrian concourse.

## *Funkausstellung Hi-Fi Show*

BERLIN, AUGUST 1991

The last time I visited Germany's huge electronics fair, the Funkausstellung in Berlin, half my time was spent hassling through Checkpoint Charlie and its Underground equivalent to enter the East. I wanted to see whether the bleak and threatening world we were told about could really exist. The reality appeared worse than the descriptions.

That was some time ago. Now those barriers have gone. The fortifications, grim faced guards and grimy concrete blocks have been despatched into the annals of history so effectively that no trace appears to remain. This time around, when I visited the great Brandenburg Gate with Steve Harris, Editor of Hi-Fi News, it sat serenely in the evening sun, free from traffic or crowds - and border guards. Now, the only signs of the military are to be found on the tables of the street traders; their caps and insignia have a value at least.

Well away from the East, or its previous ideology I should say, the Funkausstellung has changed too, although a little less. For a hi-fi enthusiast there used to be little of real interest; televisions, video recorders and midi-systems filled the halls. The different world on the other side of the wall exerted a far greater attraction. This time around I got a surprise: the Funkausstellung had gained a large hi-fi section and I found that German hi-fi is getting as tweaky and specialised as that of the UK. German hi-fi products are now so well designed, built



Bright modern stands made a good setting for High End hi-fi products.

and finished (in particular) that they are starting to make our own look lacklustre and unexciting. Yet at the same time I saw suspicious similarities. Heavily plated front panels and chassis were popular, as were huge power supplies, glass and acrylic turntable platters and felt mats. Even more surprising were the numerous specialised turntables; I thought the Germans would be less appreciative of an 'old' technology like vinyl disc, but it wasn't so.



**Above:**  
The MBL  
pulsating  
sphere  
loudspeaker

**Far Right:**  
This  
massive  
turntable  
is made by  
Symphonic  
Line of  
Duisburg.

The indigenous German hi-fi manufacturers, few of whom export to Britain, had a wide range of well designed products on show. I was taken aback by a pulsating 'sphere' loudspeaker from MBL of Berlin that looked like an alien lifeform. It aims to mimic the notional ideal of a true point source loudspeaker, radiating sound equally in all directions from just one point in space. Flexible segments form a rugby ball shape. Pushed upward from below by a normal motor assembly, they bow outward, like segments of an expanding orange I suppose you could say. The tech. spec. claims flat frequency response and impedance, plus near-perfect all-round dispersion. It was one of the most novel loudspeakers I have ever seen.

This product wasn't the only surprise. Far less obvious but arguably of greater consequence was the Burmester 916 belt drive CD transport. Burmester say that "we developed a CD transport in which the laser unit has been decoupled from motor vibrations via belt drives. Similar to successful designs in analogue playback systems (i.e. belt drive record decks), the CD turntable contains heavy mass for stability and vibration damping. The laser unit has been acoustically decoupled from

showing a range of Sphinx amplifiers, some of which were hybrids having valves in the pre-driver stages and FET output devices.

Various weary UK hi-fi journalists and manufacturers were



**Right:** Belt  
drive  
reaches  
Compact  
Disc in the  
Burmester  
916  
transport.  
It is a top  
loader: a  
stabilising  
disc can be  
seen in the  
far left  
corner.



the chassis by a spring loaded sub-chassis system similar to the design of first rate analogue turntables." When I asked for details, Dieter Burmester popped out of a small office and enthusiastically showed me the innards. With a twinkle in his eye he said "Mr Linn would like this one, don't you think?" The transport, which is a top loader complete with stabilising disc, costs 8,000 Deutschmarks (£2,700) in Germany.

There were many specialist heavyweight turntables for LP, all belt driven. Biggest of all was a monster by Symphonic Line of Duisburg. Prominently displayed and attracting a lot of passing attention was a 'Connoisseur' by Grundig. Smothered in gold pate, it even possessed a gold plated SME 3009 arm. Gold, chrome and brass finishes were very popular in general with German manufacturers, in some cases to excess. Grundig even picture a gold plated valve in their Fine Arts top-end catalogue.

Valve amps were not so numerous as they are in the UK, but I spotted a few lurking in corners. A Dutch company were

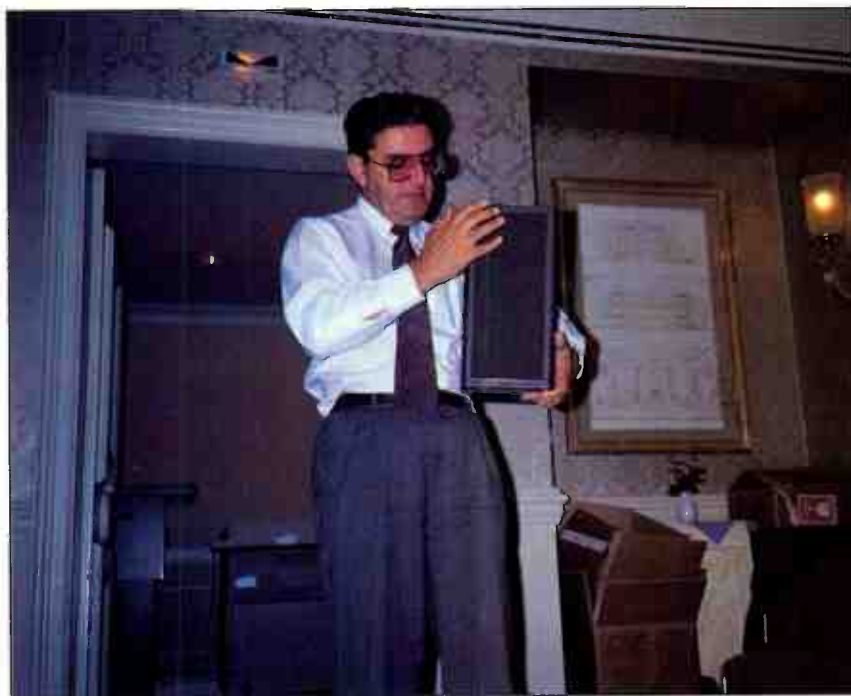
slogging around the halls, most of them complaining about the size of the venue and the heat. Yearly it is held in the same exhibition building, best described as four giant two-storey aircraft hangars, split into halls and laid out in a square around a central garden. This year there were no less than 571 exhibitors, yet the organisers claim there is not enough space and in future the fair will have to find more accommodation! But this is an electronics fair where everything from transmitters to telephones is on display. Finding the hi-fi in this sea of electronics would be like finding a sprat in the Atlantic, except that it now occupies its own space in two halls, quaintly described as housing 'High End' hi-fi. I'll leave you to guess what lurked in another two 'low-end' halls; I took one look and hastily made off in the other direction.

All the major Japanese manufacturers had huge displays, as did Philips. Many also had early morning Press Conferences sched-

uled into the calendar, with the inevitable argy-bargy between Sony's Mini Disc (MD) - a miniature Compact Disc - and Philips Digital Compact Cassette (DCC) drawing swarms of Euro Press hounds, including myself of course. The gist of Sony's message was that Mini Disc continues to gather support and that, contrary to rumours, it is not a spoiler operation to confuse the market for Philips Digital Compact Cassette. We were told that EMI, Virgin, Warner and others had promised to 'support' Mini Disc by supplying music for prerecorded discs. This is crucial to the success of any new medium, so not unsurprisingly Philips also reaffirmed 'support' from the music industry for Digital Compact Cassette in a press conference held on the following day. They also unveiled new DCC recorders and reminded us that Matsushita (Technics/Panasonic) of Japan have agreed to manufacture DCC products too. Philips look to be a nose



**Left:** Senior Philips engineer, Gerry Wiertz, lectures a small audience about the world market available to DCC.



Exceptions were B&W and Celestion, both of whom seemed more in tune with German market requirements.

Arcam had sent over a prototype of their new Dolby S cassette deck, which I spotted in a glass case. This was its first public outing. Just days later I bumped into a second prototype at the Audiofile Show in St Ives, Cambridgeshire. John Dawson, managing director of Arcam, said it would cost "around £700". Dolby S is said to be substantially different in operation from the earlier Dolby B and C compression systems and a considerable improvement too. Dolby S decks should have a dynamic range of around 80dB - enough to rival DAT and DCC. The Arcam recorder has a twin capstan transport and a siamesed head, both bought from Japan. It should be interesting.

The Funkausstellung was bigger and better than it has been for serious hi-fi; it now gets plenty of stand space. But even though the guards and military have gone, I found East Berlin retains its attraction ●

**Far Left:** Henry Azima, of Mission, reveals one of his new loudspeakers in a hotel press conference.

**Below:** Spotted in a glass cabinet was a prototype of Arcam's new cassette deck.

ahead of Sony in this contest, having gained software and hardware support, as well as showing a range of prototype recorders and players. These included budget and expensive domestic recorders, a car player and a personal stereo.

Mission were exhibiting and they also announced the introduction of four new loudspeakers: the 761i at £150 and three '750 range' models: the 751 at £180, 752 at £280 and 753 at £380. I was especially interested by their new DAD5 Bitstream CD player. This has an on-board Philips SAA-7350 digital-to-analogue convertor chip, but can be upgraded with DAC5, an external convertor that houses Philips' latest DAC7 chip (TDA-1547). The player and convertor cost £300 apiece. My limited exposure to DAC7, courtesy of Deltec's PDM-Two, has shown it offers greatly improved sound quality from CD.

A wide range of British hi-fi products were being displayed by their respective German importers. Many looked lacklustre against the imaginatively designed and colourfully finished German products.



**I**t struck me forcibly when reviewing the three portable Compact Disc players elsewhere in this issue that none of them, if used as a stand-alone player at home, would shame a budget hi-fi system. On the move, through the headphones provided, it is hard to rate their sound much higher than a decent personal cassette player. In one case at least, the phones in the box looked, sounded and felt like the kind you might grudgingly expect to be given along with a ten-pound throw-away personal off a market stall. Apart from cavilling at the makers' parsimony, it seemed a good idea to ask a couple of manufacturers if they could supply something better, in terms of sound quality at least.

Increasingly, the headphones coming onto the market are designed with sensitivities, impedances and physical sizes to suit the personals more than home hi-fi systems. All four of the headphones reviewed here are a case in point. The two Aiwas are definitely pocketable, and both pairs come with a plastic carry case that would slip easily into a shirt pocket; even the larger of the two Sonys would slip into a pocket - though of a brief-case rather than a jacket. The products of the two companies represent different design criteria. The Sonys both have headbands, while the Aiwas are in-ear types. The latter may be small and pocketable, but they are far from universal; it may be that I have odd-shaped ears, but I generally have trouble persuading all but a few to stay inserted even for the length of a



## canned sound

**Four pairs of headphones suitable for personals  
opened up by Eric Braithwaite.**

single side of tape, let alone a Compact Disc. They do, however, exert less pressure on the ears than headband types, preventing that uncomfortable warm-eared feeling that develops and which I know a lot of people dislike.

A relatively small size is obviously a serious selling-point. It seems few Walkman users really want to be seen jogging through the streets with a pair of closed back studio quality headphones like the big Beyers wrapped around their ears; in fact, that is probably all for the best. One of the reasons that most headphones sold for using with personals are 'open-back' (that is, that tizzy sound dissipates into other people's ears from the back, as well as into the owners' from the front) is that they allow some notion of what is going on around the wearer to seep into the skull. This awareness of the world around them is more likely to be of several tons of articulated lorry creeping round a corner to assassinate them than of their neighbours wanting peace and

utter quiet to cope with a tricky two-down and six-across, but the first is life-threatening after all. Come to think of it, so is the second if the crossword filler is six and a half foot tall; maybe those requests not to be anti-social in the manuals have a point after all.

The point I should be making, if I wasn't so distracted by the leakage of sound from the back of headphones around me, is that open-backed and in-ear phones present rather a different perspective or the music from the way we listen at home. Instead of the music being in front of us as it is from loudspeakers, it appears to fill the head from ear to ear, or rather oddly, to either curl around the back of the head or over the crown. This is known as 'lateralisation'. It can take a bit of getting used to, and I know some people who simply cannot tolerate it.

However, anyone who picked up a personal cassette player for the first time and was lucky to have a pair of decent hi-fi headphones, will have been startled at the

sheer amount of detail they could reveal. The sound, after all, is heading straight for the pinnae where it belongs, without colorations from boxes or reflections from walls interfering with it on the way. Any problems that arise in terms of the quality of the sound are caused by the type and kind of driver used. Since the unit has to be pretty small - headphones the size of crash-helmets seem unlikely to gain favour as a fashion accessory - bass for one thing is going to be restricted; Aiwa have come up with an intriguing idea in this respect, and two of their 'pipe-phones' as they call them, with supposedly increased bass response out of proportion to their tiny size, take their place in this review.

All four 'cans' were tested on the Technics portable (the best of the bunch in this month's review) to see how they fared, and through a 'proper' hi-fi system to assess absolute sound quality.

### SONY MDR-84 £32.00

The largest of the group, these phones have a pliable vinyl headband which sat comfortably even on my balding pate, with oval-shaped earpieces on swivelling plastic forks which sit on top of the ears. They turned out to be a cosy fit, without being tight. Impedance is 24ohm (1kHz), sensitivity 107dB/mW, power handling 40-100mW and frequency response 10Hz-24kHz.

Treble and mid-range was clean and clear, transients sharp and tight. Bass was somewhat light, lean and lacked weight on orchestral music, but this is hardly surprising. The Rory Block track, from last month's



Although these little in-ear phones displayed a good, clean, but narrow soundstage, with mid-band tonal qualities that were very respectable, the treble was distinctly fierce. Rory Block's voice had a edge to it, also giving the upper notes on the blues harp quite a sting. Violins were seriously wiry. For once, I found the 'social' switch (the treble cut) and the bass boost on the Technics portable CD player useful - combining both took the edge off vocals and violins, gave a bit more solidity to cellos and drums - but turned the lower reaches woolly. Either these phones are really designed for listeners to machines that roll off the treble pretty sharpish, or they're intended to give the illusion that people really can hear 30kHz instead of a treble that is simply uncomfortably bright. While detail was clear in a tightly located soundstage, and piano ralletandi were rendered with all the notes and no muddle, the instrument had a distinctly toytown sound and instrumental tones were lightweight. I had some difficulty persuading them to stay stuck, developing a crick in the neck and a rather odd way of talking to people without turning my head for fear they became dislodged.

## SONY MDR-W501L £32.00

These are in-ear types but with a soft headband, similar to their larger siblings but narrower. Lacking the swivelling fork - which looked to me a bit flimsy - these appeared quite strong. Indeed, they are Sony's 'Sports' headphones, supposedly water-resistant. Note, not 'waterproof', the instructions clearly say they are not intended for music loving scuba divers. It didn't rain over the weekend I was testing these headphones; because they were on loan I didn't dare take them into the shower, so couldn't check how resistant they really were. Sensitivity is 108dB/mW, impedance 18ohms, power handling unspecified, but a maximum of around 50mW I suspect, and frequency response 10Hz-24kHz.

These showed much of the strengths and a very similar tonal balance to the larger Sonys, with a similar over-the-top-of-the-head soundstage. Inevitably leaner in the lower mid and bass (really, there's just a lower-mid) imagery and detail was commendably clear and clean. Rory Block's voice was just a little sharper, transients just a trifle tizzier. The drums were more papery, but there was a good impression of studio ambience. Orchestral music showed good perspectives and commendable detail, though strings had a wiry sound. Piano showed clean upper notes, and a realistic midrange, but turned a little loose in the bass. The ralletandi were more confused, with the notes run together in a wodge, instead of the rapid succession being distinguishable. There was obviously some mid-band emphasis, but instrumental tonality was quite realistic if a little light-weight. If anything, because the drivers fit snugly into the ears, they were lighter and more comfortable to wear than the MDR-84s. Unlike the larger cousins, which sensibly have a single cable running from the left

earpiece to the plug, these have a Y-shaped cord. Active sportsmen might find themselves more easily entangled in the wiring.

## AIWA HP-J7 £26.00

A second pair of in-ear phones from Aiwa, also utilising the 'pipe' idea. This time though, the tubing is hidden in a horizontal projection from the earpiece instead of a vertical one. Whether it was this, or that these phones had a thin rubber-like ring round them instead of the thin foam of the HP-D9s, I don't know, but these felt a good deal more secure in my ears. Claimed frequency response is a less exaggerated 8Hz-25kHz, impedance 16ohms, sensitivity 105dB/mW and power 10-40mV. The fashion instinct has been diverted in these from colouring a pair of tiny organ-pipes gold into the 'fashion' case, which has a garish gold edge to it, and is, heaven help us, shaped like an ear. Presumably this is so we won't mistake it for a cigarette case or powder compact when fishing in our pockets or bags.

Again, if any signals were coming through at 8Hz, my own grey cells remained intact, with no fewer dying off than is to be expected at my age anyway. Treble, while not as fierce and sharp as the HP-D9s, was distinctly over-bright, though the mid-range displayed commendable detail and imaging precision. Lower mid was not as tonally accurate or as pleasant as the Sonys and sounded slightly bitter. Instruments were less easy to follow, and the soundstage developed a wider spread to left and right. Rory Block's voice whined rather, and the blues harp showed transitions from middle range to upper notes with a small hiccup followed by a fairly fierce zing. Large-scale orchestral works simply lacked weight and presence; string tone was sour, while rapid successions of notes on piano became a muddled and rather tinny. Curiously, these were the only headphones which didn't clearly mark which was Left and which was Right.

### Summary

Two of the sets came with a screw-on 1/4 in jackplug adaptor, the Sony MDR-W501Ls and Aiwa HPD-9s, though I would only recommend the former for use at home. Regardless of the merits (imaginary or otherwise, as far as frequencies like 3Hz go) the 'organ-pipe' Aiwa HP-D9s were the better of the two pairs from this company, and while more detailed than the in-ear (and pipeless) ones supplied with the Technics player, I preferred the latter's smoother overall balance, mid-range muddle notwithstanding. The Aiwa HP-J7s, while less fierce, were also thinner and muddled. Of the two Sonys, the Sports model showed the limitations of size, with a slight but noticeable increase of sizzle in the treble. It really was only the larger MDR-W501Ls that stood up for the quality the Technics portable could offer and packed it into the earlobes relatively uncoloured. They might not be the most convenient to carry, and they look unmistakably like headphones, but they were the only ones which could also satisfactorily be used for late-night listening at home while the neighbours are asleep. In the end, size - at least of the diaphragm in the earpiece - counts ●

front cover CD, had a blues harp as clear as a bell and a clearly defined harmonica. Vocals were precisely placed and the drumming sounded as taut and clean as it did on my electrostatics at home. Tonality was pleasantly bright without being either over-subdued or over-emphasised and was also free of spitting or sibilance. Detail - the rapid steps of some hapless engineer on a Chandos recording making his escape from the studio came over clearly at the beginning of one track. Not a lot of bass however, and the soundstage appears more between the tops of the earlobes than the ears themselves. Overall, the MDR-84's are clean and unfatiguing, with an excellent amount of detail.

## AIWA HP-D9 £41.00

I wondered if some Aiwa designer had been reading the motto round the edge of some of our pound coins. It reads 'Decus et Tutamen' - useful and decorative. The decorative part here is the two miniature gold-coloured organ-pipes which dangle vertically from each earpiece. These give the odd illusion that the wearer has had his (or her) ears pierced in the wrong place. Known as 'bass pipes', these are a kind of miniaturised transmission line. Frequency response, therefore, is claimed to be from 5Hz - 30kHz, though I can't say I heard any evidence of it; any 5Hz signal with any power behind it would of course turn all the little grey cells into a little grey bowl of porridge. Impedance is rated at 16ohms, sensitivity at 108dB/mW and power from 10-50mW.

## COMPACT DISC

**AIWA XC-700** £170  
Using Philips SAA-7350 Bitstream chip, this player sets new standards of smoothness and clarity at the price.

**NAD 5420/5425** £170/£290  
One of the best implementations of Japan's MASH low-bit system, offering a big, solid sound with plenty of weight.

**PHILIPS CD-850** £400  
All the finesse of top quality Bitstream, with an open, balanced and involving performance.

**ARCAM ALPHA ACD I** £420  
Offers a warm, full bodied sound with big bass.

**ARCAM DELTA 70.3** £699  
Arcam's first Bitstream player. Its refined, but powerful sound sets the standard at the price.

**MERIDIAN 206B** £950  
'Entry level' Meridian player. Detailed, with a wide soundstage, but somewhat lacking in 'joie de vivre'.

**NAIM CDS** £2937.50  
The current talking point in the world of hi-fi. A worthy contender for the 'best CD player in the world' throne. Perfect partner for a Naim system.

## D/A CONVERTORS

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Three solid performers that can transform a mid-price Compact Disc player with a digital output. They get progressively better as the price gets higher.

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Sets up a wide, open stage and places a captivating performance within it. Spectacular Bitstream technology at a very low price.

**AUDIO ALCHEMY DIGITAL DECODING ENGINE** £376  
Paperback sized Bitstream convertor that offers a serious upgrade for the price. Sweet, open and detailed.

**MERIDIAN 203** £495  
Impressively detailed and complex sound, if a little lacking in involvement.

**MICROMEGA DUO BS** £499  
Superb, warm, rich analogue-like Bitstream sound, from the idiosyncratic French. Latest guise suits a wide variety of convertors, as opposed to earlier versions.

**DELTEC PDM SERIES II** £595  
Spacious representation with strong embodiment of performers. Natural and relaxing, but superbly refined and subtly impressive.

**MERIDIAN 606** £1200  
Now revamped to allow for the DAC-7 Bitstream, the earlier 606 was a fine performer, improving on the traits of the 203, but still a trifle uninvolved at times. We shall see how the DAC-7 version fares.

**DELTEC PDM-II** £2000  
Uses Philips new Bitstream DAC-7 super-chip to give a performance of unparalleled drama. Frighteningly deep and controlled bass, master tape standards of fidelity. Very forthright; a trifle violent in its truthfulness. Literally - stunning!

## TRANSPORTS

**ARCAM DELTA 170** £620  
An easy yet tidy sound that underpins digital convertors well.

**MERIDIAN 200** £750  
Well built transport mechanism which lends a fine sense of solidity and detail to music. Well suited to non-Meridian DAC's too.

**TEAC P10** £1400  
Orders events in a precise manner, lessening time domain confusion and blurring. Succinct and impressively controlled.

**MERIDIAN 602** £1500  
As with the 606, this improves over the 200 transport. Good build quality and a strong sound, if a touch bland when used with the wrong DAC.

**PINK TRIANGLE LITTLE PINK THING** £392  
Good-looking, neutral sounding turntable. Excellent soundstaging capacity and decent bass. Best partnered with a Rega, Roksan or Linn arm.

**NOTTINGHAM ANALOGUE SPACEDECK** £590  
Idiosyncratic turntable, with its high mass platter and distinctive looks, that is both fast and goes deep. Well partnered by the Space Arm (£380) and the Analogue Tracer II cartridge (£175) from the same company. Usually used in the context of a valve-based system.

**MICHELL GYRODEC** £595 (£695 with RB300)  
Highly underrated turntable. Impressive build quality, virtually unmatched by the other British high-end manufacturers. Very solid, dry sound. Plenty of bass and good soundstaging. In some systems it can sound a little bland; in others, excellent. Better than ever with its new power supply.

**PINK TRIANGLE PT EXPORT** £676  
Terrific soundstaging abilities, good bass and a neutral performance that improves upon the LPT considerably. Works with all the arms listed with the LPT, plus the SME range.

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**REGA PLANAR 2** £155  
The first of the real 'hi-fi' turntables. Excellent value for money, having been spent where it matters - the arm and the bearing. Quite transparent and lucid, it fares well against some more expensive turntables.

**SYSTEMDEK IIX-900** £190 (no arm)  
Great package. A suspended turntable that is easy to set up and takes a variety of arms (the Moth arm being the obvious choice). Sound quality is surprisingly natural, if not as precise as some.

**REGA PLANAR 3** £249  
Improves upon the Rega 2 in almost every way. Sets an impressive standard that others strive to beat.

**MICHELL SYNCHRO** £265  
Very well built turntable. Distinctive looks. Solid, stable sound, with good bass at the price. Bit lacking in involvement and detail.

**LINN BASIK** £285  
Fitted with Linn's excellent Akito tonearm, the Basik is very much in the Linn mould. Its timing and pace are superb. Very musical.

**LINN SONDEK LP12** £679  
Still one of the finest, after all these years. Brought into the 90's by the Linn Lingo (or Pink Triangle's Pink Link) power supply at £496 extra, the LP12 has always been the turntable by which all else is measured in this country. Tuneful and musical, placing dynamics above imagery in its list of priorities.

**ROKSAN XERXES** £695  
Fast, tight and clean, some have described the Roksan (especially with its Artaxerxes phono pre-amplifier) as almost CD-like in its presentation. A good alternative to the LP12.

**VOYD VALDI** £699  
Similar to the Pink Triangle, the Valdi is an expressive performer, with a deep bass that sneaks up on you. Matches Audio Innovations equipment well.

**PINK TRIANGLE ANNIVERSARY** £1175  
One of the finest sounding turntables in production, the Anniversary takes the listener nearer the recording studio than almost any turntable. Suits the same arms as the PT Export.

**TOWNSHEND ROCK REFERENCE** £1995  
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## TONEARMS

**REGA (MOTH) RB250** £178  
Excellent value for money. The one piece Rega arm. Lucid and graceful.

**REGA RB300** £115  
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**LINN AKITO** £137  
Different presentation to the Rega arm. Not quite as happy with expensive MC cartridges as the RB300, it nevertheless shines with cheaper MM's (especially on all Linn turntables).

**ROKSAN TABRIZ** £165  
Good bass and not too tizzy for the price. Works very well in Roksan (naturally) and Pinks.

**LINN ITTOK LVIII** £560  
Great dynamics, excellent timing and delves deep into the lower registers. Latest models use refinements developed on the Linn Ekos.

**NAIM ARO** £752  
Unipivot tonearm with a seductive soundstage and a lot of character. Can resolve an vast amount of information from a groove. Works well in a Linn, its sheer freedom of movement makes it difficult to use with a more 'springy' deck.

**LINN EKOS** £1097  
A sort of 'Turbo' Ittok, the Ekos improves upon the strengths of the Tik-Tok, making it more transparent and dynamic, without becoming overtly so.

**SME SERIES V** £1247  
Probably the finest built of all pick-up arms, the V seems to have little to criticise about it, on the right turntable. Some suggest that it can sound polite; it performs (without getting in the way of the music) with grace and artistry. Strong soundstaging properties; it does not appear to have the problems associated with other arms at frequency extremes.

## CARTRIDGES

**AUDIO TECHNICA AT95E** £118  
Probably the finest starter cartridge. A little bright, scratchy and a trifle thin, it still represents excellent value for money.

**ARCAM C77** £22  
Good all rounder. Quite neutral and tidy, but a bit lacking in life. Works very well in old arms. Can be upgraded by stylii changes.

**ORTOFON 510** £30  
Even-toned, with excellent bass and good stereo imaging (all due to its solid body) for the price. Also upgradable via stylii.

**GOLDRING 1020** £49  
Sweet sounding cartridge, similar to the Ortofon in many ways, but has less clattery treble. The mid point of their 1000 series cartridges.

**LINN K9** £89  
Can sound a bit forward and lacking in bass in some turntables and arms; the Linn nevertheless has a tight, crisp sound, with plenty of speed of attack. It is also quite detailed.

**ROKSAN CORUS BLACK** £110  
Very expressive and musical cartridge. Coherent and detailed, it can be a little bright in some systems.

**AUDIO TECHNICA AT-OC5** £122.95  
Needs an exceptionally good front end to sound good, its resolution of detail is very good for the price. A cautious recommendation, as it can easily sound raucous and fierce in the treble.

**SHURE VST-V** £173  
Excellent tracking moving magnet cartridge. The Shure offers some of the fine detail of MC's with the brusque-ness of an MM.

**ORTOFON MC30 SUPER** £270  
Despite being detailed and analytical, the MC30 still sings a seductive song. Very solid body.

**GOLDRING EXCEL** £499  
Smooth, detailed and refined sounding cartridge. Bit relaxed and easy on the ear, but still high in enjoyment quotient.

**LINN TROIKA** £798  
One of the most musical cartridges ever, the Troika uses a three point mounting. As such, it is somewhat limited to Linn and Naim arms (and would usually appear on the LP12).

**LYRA CLAVIS** £980  
The cartridge that currently resides at the top of the U.K. music lovers' list. One of the finest cartridges ever made. More music than hi-fi!

**ORTOFON MC5000** £1500  
The big information retriever. Can resolve more detail from the plastic than almost any other cartridge around. Slightly too analytical for some tastes.

## CASSETTE DECKS

**DENON DRM-400** £140  
The least expensive usable cassette deck available. Plays prerecorded tapes well and produces acceptable recordings. Variable bias, wobbly speed.

**TECHNICS RS-B665** £180  
Unusually speed stable, giving clean clear recordings; poor with metals. Plays prerecorded tapes well. Good for piano.

**NAD 6325** £160  
One of the best at the price: superb with pre-recorded tapes and makes excellent recordings. Awkward to use.

**AKAI GX-52** £200  
Fine recordings from the GX head on all tape types; good replay too. Excellent all round.

**NAD 6340** £220  
Unmatched ability with prerecorded tapes and makes very stable recordings on all tape types.

**NAKAMICHI CASSETTE DECK 2** £300  
Especially good with metal tape, with which it makes fine recordings. Excellent with prerecorded tapes too, but slightly inferior to NAD.

**NAKAMICHI CASSETTE DECK 1** £600  
Our sample had poor speed stability, but otherwise the Cassette Deck 1 offers a good, if somewhat overpriced, all round performance.

**NAKAMICHI CR-7E** £1500  
As cassette goes this is the ultimate - and better than the Dragon. Near perfect recordings on all tape types; replays prerecorded tapes extremely well too.

## TUNERS

**DENON TU-260L** £100  
Sensitive and has a clean, balanced sound. Astonishing value.

**NAD 4225** £159  
Fine, spacious presentation; smooth and easy sounding. The best under £200.

**ION SYSTEMS FMT-1** £259  
Fine minimalist tuner with good stereo, deep bass and excellent detail. Probably the cheapest 'real' tuner on the market.

**ONIX BWD1** £395 (exc power supply + lead)  
Great partner for the OA21s, as it can be powered from the amplifier, the tuner has a wonderful open clarity, that belies its price.

**NAIM NAT-02** £853  
Little box, big money, dead good. Try and find better unless it's a . . .

**NAIM NAT-01** £1377  
All else is mere artifice. If you want better radio reception, go and live in the BBC's studio.

## AMPLIFIERS

**NAD 30201** £149.95  
Well known budget classic. Its crown has slipped a bit of late, but it still represents the standard to beat. Distinctive 'NAD' sound.

**DENON PMA-350** £169.99  
The usurper to NAD's throne. Packs a lot of punch for the money. Phono stage not as strong as the rest of the amplifier.

**MISSION CYRUS ONE** £200  
Well-known British amplifier. Minimalist appearance, suitable partner for most equipment.

**CREEK 4040S3** £220  
Easy on the ear, the Creek seems better suited to LP than CD.

**PIONEER A-400** £230  
One of the most controversial and popular amplifiers today. Excellent sound, especially when partnered with extremely esoteric source components. As with the PMA-350, weakest link is the phono stage.

**ONIX OA21S** £350  
Yet another minimalist amplifier, the OA21 has the rare combination of detail, finesse and balls.

**AUDIOLAB 8000A** £350  
Well-built amplifier with a strong following. Very neutral sound for the price.

**NAIM NAIT 2** £389  
The classic small integrated amplifier is still hard to beat. New CD only version is not so hot, though.

**LINN INTEK** £398  
Since the price reduction and sonic improvements, the Intek has become a worthy competitor for the Nait, but has more power.

**ION OBELISK 3** £399  
Great stereo, with a punch. Ion Systems' top integrated puts build and sound quality far above big boxes or loads of buttons. Upgradable with their X-PAK-1 power supply and can also make a fine stand alone pre-amplifier.



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SME 12" Arms, Ortofon Arms and Heads,  
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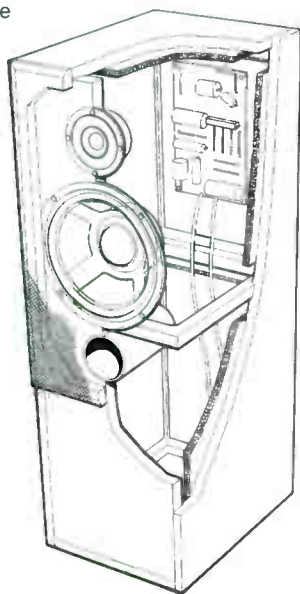


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**KEF 101/2** £495  
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**NEAT PETITE** £525  
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**TDL STUDIO I** £599  
Smallest transmission line loudspeaker. Good imagery, well focused (when positioned properly) and some of the deepest bass you can imagine. Slightly room dependent.

**PROAC STUDIO I MK 2** £612.25  
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**NAIM IBLs** £815  
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**AUDIO NOTE AN-J£799 (Copper Wired) £999 (Silver Wired)**  
Excellent soundstaging, a natural performance and high efficiency from these derivatives of the Snell design. A good match with Huygens stands. Work well with valves, especially Audio Innovations/Audio Note equipment. Silver wiring is a worthwhile option.

**LINN KABER** £1198  
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**TDL STUDIO 4** £1499  
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**NAIM SBL** £1527  
Highly suited to the Naim system, the SBLs are impressive, dynamic, powerful and expressive sounding, especially in active guise. May prove too intense an experience for some people!

**QUAD ESL-63** £2072  
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**LINN ISOBARIKS** from £2190  
Few who listen to Isobariks working properly cannot fail to be stunned into submission by their gut-wrenching dynamics. A bit larger than life at times. If the Quad is an academic, the 'bariks are the Mike Tyson of the loudspeaker world.

**NAIM DBL** £6000  
Huge, active-only loudspeakers, which make even the powerful Isobarik quake in its boots (stands?). Can produce immense sound pressure levels. Not for the squeamish!

**MERIDIAN D6000** £7500  
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**TANNOY WESTMINSTER ROYAL** £10000  
Vast full-range horn loudspeakers, which are very popular in Japan. Incredibly dynamic and detailed, with a rich sound and efficiency that lends itself toward valve amplification.

# world music CD

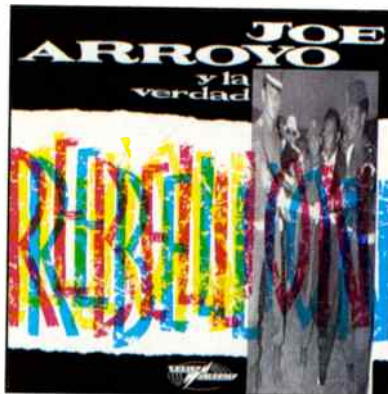
**This month's Compact Disc couldn't be more appropriately titled, says Malcolm Steward. Hi-Fi World joins forces with World Circuit to bring you music from all four corners of the planet - World Music, no less!**

World music means different things to different people. To the narrow minded the expression conjures up thoughts of alien sounds of no relevance to them or their way of life. To the more receptively inclined it means an opportunity to explore the way in which other cultures express their emotions and feelings through music, a global occupation which knows no boundaries.

The selections chosen for this month's CD capably demonstrate that the Western world has no monopoly on musical invention and also that there's a great deal of truth in the notion that music is the only truly universal language. Paul Simon's *Graceland* album, which fused the sounds of Africa and Latin America with contemporary Western rock, did much to popularise 'ethnic' music, and showed many thousands of listeners that there was nothing alien or inaccessible about it. The tracks which World Circuit have supplied us with are more pure examples, not modified to suit Western tastes and sensibilities. You'll find, however, that even in their most chaste forms these kinds of music still connect and communicate effectively. Often far more so when they're not diluted or over-Westernized. You'll also recognise elements of more familiar strains of music, evidence that the communications industry is shrinking the world rapidly. How else would reggae find its way into Egyptian music?

We hope you enjoy this small selection from World Circuit's extensive and intriguing catalogue.

**TRACK 1**  
**JOE ARROYO Y LA VERDAD**  
**Yamulemao**  
from the album *Rebellion*  
CD (WCD 012), LP (WCB 012),  
Cass. (WCC 012)



Colombia is well known for its stimulating exports. Here's one which you can't get arrested for sampling - Alvaro Jose Arroyo, one of the country's foremost Salsa exponents. He's also one of the most inventive of its practitioners, his particular style drawing on a broad spectrum of other genres which pervade and augment the base ingredients of this infectious dance music. On this album you'll discover what happens when the indigenous Cumbia trades licks with a whole host of colourful ingredients from Jazz, Latin, Calypso, Zouk, Merenge and Cuban Son. The *montuno* track featured here benefits from a vocal performance inspired by singers of the African continent. The complexity and density of hard-core Salsa can be hard work for the uninitiated but Arroyo's arrangements make his eclectic music rewarding for the die-hard fan and accessible to those who are less familiar with it.

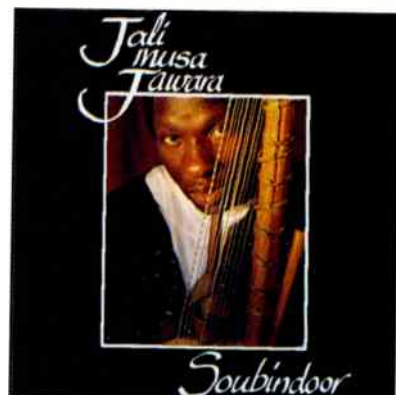
**TRACK 2**  
**BLACK UMFOLOSI**  
**Hlalanathi**  
from the album *Unity*  
CD (WCD 020) LP (WCB 020),  
Cass. (WCC 020)



The kind of music Zimbabweans Black Umfolosi perform, Zulu township close harmony singing, first came to real prominence when Paul Simon enlisted Ladysmith Black Mambazo to sing on his *Graceland* album. The group featured here takes its name from a regiment of crack rebel Zulu troops who, during the early nineteenth century, broke away

from Chaka Zulu and moved North to found Ndebele society. Its music celebrates the praise poetry and proverbial sayings used in the past to encourage Zulu warriors and to celebrate their victories. Hlananathi is a plea to God to stay with us always: beautifully sung and recorded on the group's first UK tour it capably demonstrates the atmosphere which can be created by - and the stunning power and colour of - eight unaccompanied voices.

**TRACK 3**  
**JALI MUSA JAWARA**  
**Afrique du Sud**  
from the album *Soubindoor*  
CD (WCD 008), LP (WCB 008),  
no Cassette.



Guinean Jali Musa Jawara is a virtuoso kora player who contemporises the instrument's traditional sound by using tuning which makes it approximate that of a guitar, which he also plays. Accompanied by a balaphon/marimba player, a guitarist and two female singers, his inspired performance of *Afrique du Sud* merges the Mandinka rhythms and melodies he learnt as a child with the scat singing and guitar techniques of jazz musicians. It's an intriguing juxtaposition but it works. Jali's kora-playing brother, Mory Kante, is probably better known to European listeners but his approach is a little too high-tech for me. Jali Musa Jawara, despite the Western influences in his music, stays closer to his roots, his music better retaining its individuality and identity.

**TRACK 4**  
**LISANDRO MEZA**  
**Las Africanas**  
from the album *Lisandro's Cumbia*  
CD (WCD 026), Cass. (WCC 026),  
no LP.



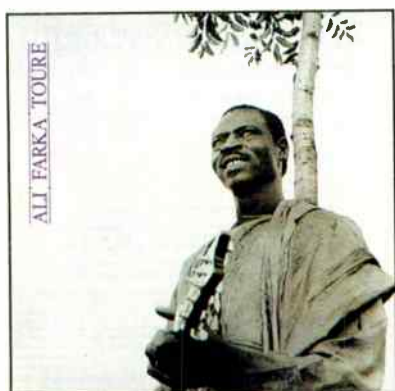
Lisandro Meza is a highly regarded artist in his native Colombia. He plays in the national Cumbia style, which with Salsa and *son caribeno* is the main constituent of *la musica tropical*. Cumbia is a music which lends itself to evolution and refinement when it adopts new influences but it is always characterised by its metronomic rolling beat. Like all Latin American music its rhythm is fundamental to its appeal and the beat, regardless of all else, naturally steers a direct course for a listener's feet and hips. Meza sings and plays accordion and is backed on this track by a band which plays with clockwork precision. Our selected track, *Las Africanas*, is typically vibrant, colourful music readily conjuring images of streets teeming with carnival-goers.

**TRACK 5**  
**ABDEL GADIR SALIM**  
**ALL-STARS**

**Bassama**  
From the album *The Merdoun Kings Play Songs of Love*  
CD (WCD 024), Cass. (WCC 024), no LP.



Bassama is probably the ideal introduction to Sudanese music, blending as it does an almost European pop sensibility with the mysterious sounds of the Arabian sub continent. The All-Stars line-up looks pretty conventional at first sight with electric and acoustic guitars, bass, saxophones. Then you spot the violins and the leader's Oud, a lute-like instrument. The resulting music, as rich in Arab harmonies and rhythms as it is in instrumental colour, is potent and entrancing. At times tense and slightly (melo-) dramatic this is music of a sumptuous nature, highly evocative and magnificent. Music in which you can luxuriate.



**TRACK 6**  
**ALI FARKA TOURE**  
**Bakoyterye**

from the album *Ali Farka Toure*  
CD (WCD 007), LP (WCB 007), Cass. (WCC 007)

Warning bells normally ring loudly when I see the word 'legendary' appended to the description of a musician on his album sleeve. Ali Farka Toure, the singer, guitarist and percussionist from Mali is different: he deserves the appellation. His voice is mesmerising, his guitar playing inventive and masterly. If your taste is for music that's spartan but powerful this track will appeal strongly. At its most involved just two voices, guitar and calabash combine in rhythmic harmony to form an ascetic but spell-binding whole that's refreshingly open and capacious. All commentators on his music inevitably make reference to one John Lee Hooker whose acoustic blues have much in common with this man's music. The similarity might not be immediately apparent but it's there and unmistakable. All you need to ask is who was influenced by whom?

**TRACK 7**  
**OUMO SANGARE**  
**Diaraby Nene**

from the album *Moussolou*  
CD (WCD 021), LP (WCB 021), Cass. (WCC 021)



Oumou Sangare is a young female vocalist from the Wassoulou region of Mali. On this track she sings about love, equating cold with fighting and jealousy while coolness represents honesty and well being. The song's arrangement is traditional Wassoulou, a slow but insistent rhythm overlaid with soaring vocal lines which conjure the sound of the wind sailing through the Wassoulou forest. The recording is brilliant and became an all-time best seller for executive producer Ibrahim Sylla who was responsible for Salif Keita's runaway success. *Soro*. *Diaraby Nene* sounds completely up-to-the-minute - but listen, there's not a synthesizer to be heard, just rippling guitar lines, bass and drums, and violin adding some rawness to the texture of the music.

**TRACK 8**  
**BLACK UMFOLOSI**  
**Umangivuka**

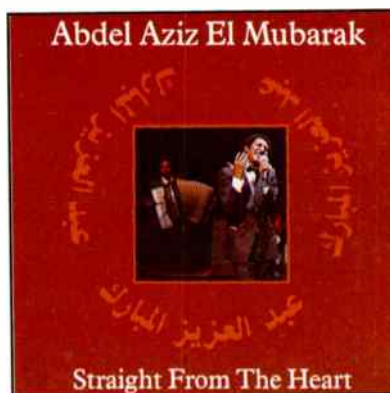
from the album *Unity*  
CD (WCD 020), LP (WCB 020), Cass. (WCC 020)



The second track from a *cappella* singers Black Umfolosi offers another chance to sample this outwardly simple music's inherently complex harmonic intertwining of eight vocal lines. A second opportunity to investigate the rich tapestry that can be woven with rhythm, melody, harmony and the human voice uncomplicated by instrumental intervention.

**TRACK 9**  
**ABDEL AZIZ EL MUBARAK**  
**Lah Ya Galbi**

from the album *Straight From The Heart*  
CD (WCD 010), LP (WCB 010), no Cassette.



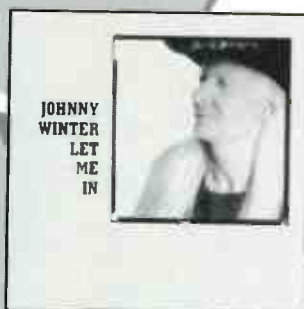
Abdel Aziz el Mubarak is one of Sudan's most popular singers, heard here with his regular backing band which strongly features accordion and strings to produce a sound that's very different and unlike most heard on the African sub-continent (although there's some similarity to *rai*). Captured playing live in Hackney, North London, this up-tempo number betrays the many modern, urban influences that have touched the musicians. The most recognisable element is, however, more pure, the hypnotic sway of the singer's voice having the unique and immediately recognisable traditional Islamic timbre ●

# Virgin Varied Roots



**Micheál Ó Súilleabháin**  
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**Johnny Winter**  
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CD · MC · LP

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Neil Slaven, Vox.



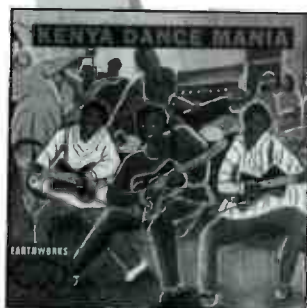
**The Golden Palominos**  
*Drunk with Passion*  
CD · MC · LP

Return of Anton Fier's legendary combo featuring Amanda Kramer, Bill Laswell, Richard Thompson, Bob Mould & more.



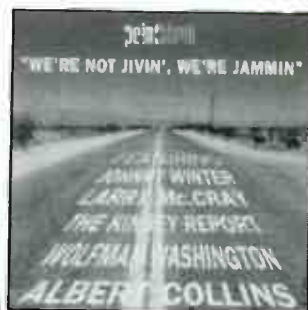
**Various Artists**  
*Jit The Movie*  
CD · MC

Get Jitted! 6 songs from the movie + 6 other Zimbabwean smashes.



**Various Artists**  
*Kenya Dance Mania*  
CD · MC

Grind those hips! The ultimate collection of sensual rumbas from east Africa.



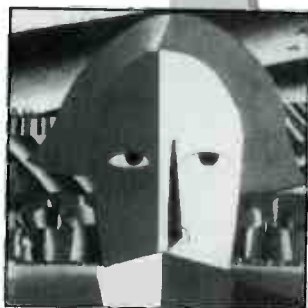
**Various Artists**  
*We're not Jivin'*  
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Budget price sampler featuring Albert Collins, Johnny Winter, Larry McKay & more.



**Nusrat Fateh Ali Khan**  
*Shabazz*  
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**Dmitri Pokrovsky Ensemble**  
*The Wild Field*  
CD · MC · LP

"Wedding songs, flute frenzy and passionate stuff from southern Russia... The bottom is that this is a lively and emotional collection"  
Stuart Bailie-NME



**Musicians of the National Dance Company of Cambodia**  
*Homrong*  
CD · MC · LP

The company's resolve is heroic, effectively rebuilding their culture from the ground up in ten years; and there's a fragility to the music that's appropriate"  
Andy Gill-The Independent



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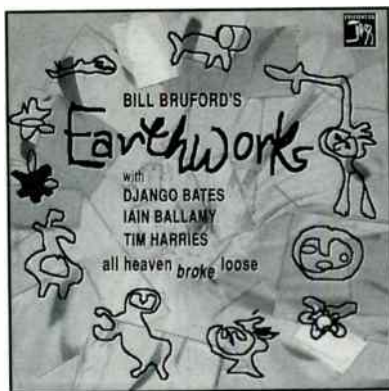


**THE GOLDEN PALOMINOS**  
**Drunk With Passion**  
VENTURE CD: CDVE 905

● The press release which accompanied this disc sums up The Golden Palominos so succinctly that I'll quote its first paragraph unashamedly. "... anyone who's ever owned more than two records has probably played the imaginary line-up game... asking questions like: 'What if Art Blakey had joined The Dead?' or 'What if Max Jaffa had been in T-Rex?' Most of these questions don't go further than their asker's bedroom walls... (although Bob Fripp did once say that he formed King Crimson to see what Hendrix playing Bartok sounded like). But for ten years one group has provided a genuine missing link between Fairport and PIL, between Ornette Coleman and Husker Du: the supergroup you can listen to between meals without losing your appetite (or your cred), Anton Fier's Golden Palominos."

In its latest incarnation the agglomeration known as The Palominos includes Fier on drums, Bill Laswell on bass, Nicky Skopelitis and Richard Thompson on guitar, Carla Bley on organ and Amanda Kramer on backing vocals and keyboards. There are appearances by Michael Stipe of R.E.M., giving a fabulous vocal performance on the opening track 'Alive And Living Now', and Bob Mould forming the Husker Du connection. In previous lives the group has been a meeting place for musicians from diverse disciplines - Jack Bruce, Syd Straw, Art Lindsay, Jamaaladeem Tacuma and John Lydon have all been involved in Fier's genre-mixing exercises.

The music on this disc is fundamentally rock which is readily accessible in spite of its left-of-centredness. What sets this particular hybrid apart from the mainstream is its depth and sophistication. Oh, and its production and arrangement work, both credited to Fier, are nothing less than exquisite. The album is the work of a veritable supergroup, without any of that species' self-destructive and musically stifling ego problems.



**BILL BRUFORD'S**  
**EARTHWORKS**  
**All Heaven Broke Loose**  
EDITIONS EG CD: EEG 262 017  
LP: 212 017

● There's something vaguely annoying and perplexing about most albums where rock musicians attempt to play jazz. The lack of any authentic feel for the music generally results in a hybrid which doesn't satisfy listeners of either persuasion. That having been said it's not a criticism which you could apply to this latest effort by Bill Bruford's evolving jazz project Earthworks.

Bruford is best known for his stints behind the drum kits of bands like Yes, King Crimson, UK, and, albeit briefly, Genesis, all bands from rock's 'progressive' period. This saw rock music being introduced to the disciplines of the jazz and classical repertoires, sometimes to its benefit and, more often than not, to its detriment.

The music on All Heaven Breaking Loose is far removed from the seventies' 'conceptual' excesses and pomp. It is purely contemporary electric jazz, and features some very considered and tasteful playing by all concerned: Bruford on drums - electronic, acoustic and chordal varieties, the latter being a set-up where striking the drum pad triggers keyboard pitches - Django Bates on keyboards and horns, Iain Ballamy on sax, and Tim Harries on acoustic and electric bass.

The band's compositions on this their third album stand up to examination well and there's a wealth of instrumental colour and texture to satisfy listeners who, to quote Thomas Beecham, may not like music but absolutely love the noise it makes.

**This month you'll be pleased to hear that you're spoilt for choice. Close your eyes, stick a pin in the page and buy the album it has marked. You won't go wrong with any of these.**

# malcolm steward



**OMAR DYKES**  
**Blues Bag**  
PROVOGUE CD: PRD 70282  
LP: PRL 70281

● The young PR who phoned me about Omar Dyke's new solo album (Omar Dykes is the Omar of Omar and The Howlers) knew just what to say to make sure I looked closely at this CD when it arrived: "You're a blues fan", she said, "you'll enjoy this CD. It has acoustic music on one side and electric on the other." Neat, I thought, a CD with a B-side.

As it turned out, Blues Bag is a regular disc but its contents are split: early tracks feature just Omar and his guitar, with a bit of help from Fingers Taylor on harp. Later on he's joined by Howlers Bruce Jones on bass and Gene Brandon on drums. Whether alone or accompanied his music cooks, due in no small part to his caustic powerhouse of a voice and strident guitar playing.

Dykes describes his music as

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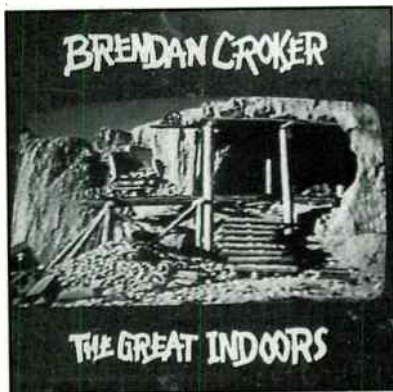
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"Mississippi-Texas Rock & Roll" and "Deep South three chord and tumble blues" a result of his formative years in Mississippi and Louisiana where the music was intense and smouldering. On this album, he pays respect to that tradition, the music being stripped of all decoration and unnecessary baggage, lean, mean and straight to the point.

Regular readers will know that I've little time for dilettante attitudes to the blues: Omar Dykes is an authenticist, having started playing at the age of thirteen in the only places he could, the black edge-of-town clubs where he was the only white kid. This education has served him well and his versions of songs by the genre's masters are true to the original spirit. It's particularly nice to hear someone pay tribute to Robert Johnson by playing 'Gotta Good Friend' instead of the customary covers of 'Crossroads' or 'Dust My Broom'.



**BRENDAN CROKER**  
**The Great Indoors**  
SILVERTONE ORE CD 517

● Brendan Croker is probably best known as part of Mark Knopfler's Notting Hillbillies - indeed the Dire Straits guitarist guests on The Great Indoors - but this is only one of the strings to his bow. His career is founded on a devotion to acoustic music, his influences including Doc Watson, John Fahey, Leo Kottke, Skip James, Blind Blake and "a wealth of blues, old-timey and cajun musicians."

All these elements and more can be heard on this album which was recorded in the US country-capital of Nashville, with acclaimed producer Barry Beckett. It's country-based music but tinged with strains as diverse as New Orleans swamp pop, rural blues and soul. Naturally local musicians played a part in the recording and as well as Knopfler's guitar contributions there's also some picking from Chet Atkins to be heard.

If the thought of a singer from Leeds playing country music has you worried, or if you imagine that The Great Indoors resembles the yuppie midi-system slush that was the NH album Missing Presumed Having A Good Time allow me to allay your

fears. This music has relevance and surpasses the last - eponymous - album he released in his own right with his band The Five O'Clock Shadows. It's also great fun from start to finish, and I don't often speak that favourably of music that comes within a hundred miles of the C&W genre.



**THE BLUES BAND**  
**Fat City**

RCA CD: PD75100 LP: PL75100

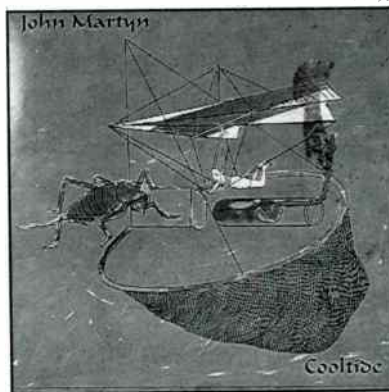
● The Blues Band first came to my notice with their limited edition Official Blues Band Bootleg Album back in 1980. The band consists of rhythm and blues veterans Paul Jones, Dave Kelly, Tom McGuinness, Gary Fletcher and Rob Townsend.

Jones was a leading figure in London's 60's blues scene working with the likes of Alexis Korner and Brian Jones and later becoming vocalist with Manfred Mann. Then he diversified into songwriting, DJ'ing and acting both on stage and television. He's also ranked as one of the UK's top harmonica players. Dave Kelly, singer and guitarist, is one of the country's top bottle-neck players and has worked with blues greats like John Lee Hooker, Howlin' Wolf, Buddy Guy and Son House. Tom McGuinness worked with Clapton, Manfred Mann and with Hughie Flint in McGuinness-Flint and Gallagher and Lyle. Rob Townsend played with Family and Medicine Head then embarked on a career as a session drummer before replacing Hughie Flint in the Blues Band line-up.

Quite a pedigree, I'm sure you'll agree and Fat City is as slick and polished an album as you'd expect from such a talented outfit. In fact, it's going to be a little bit too slick if you're looking for an Official Bootleg clone. If you're not and you're prepared to accept that time seems to have eroded some of their music's more abrasive edges you'll be well pleased with this, their seventh album.

Listening to this disc you'll still spot glimpses of the band which brought you gritty, rough and ready tracks like 'Boom Boom, Out Go The Lights' and 'Talk To Me Baby' but Fat City's Blues Band is decidedly tamer than the Blues Band of yore. All the songs

on this album are self-penned, there are no classic covers although these still figure in the band's live sets, and perhaps that has something to do with it. I'm just concerned that they're drifting towards the middle of the road. Any further slippage and they'll find their music playing as background entertainment at dinner parties. At the moment they're still safe.



**JOHN MARTYN**  
**Cooltide**

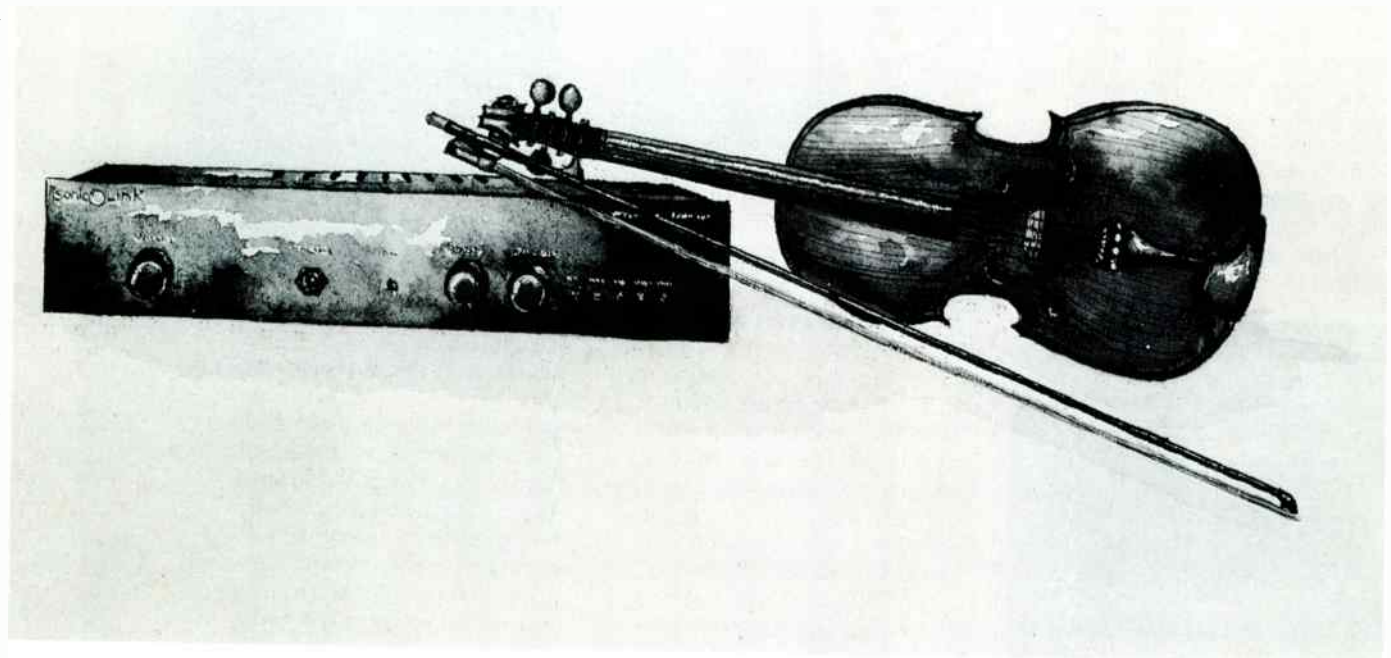
PERMANENT RECORDS LP: PERM LP4

● Though he's never been an astounding commercial success John Martyn is a very highly respected singer, guitarist and songwriter. Having started his career as a 'folkie' his music currently incorporates distillations of rock, blues and jazz styles, lending it an eccentric and highly individual character. Its themes have varied from album to album; Bless The Weather pitched heavily towards jazz whilst One World saw him exploring Caribbean musical flavours.

For Cooltide he's shifted into a jazzy vein, his line-up of backing players including the celebrated saxophonist Andy Sheppard, but with funk overtones injected by some nifty bass lines. His disturbingly elliptical lyrical prowess still pervades and the vocal delivery is as laconic and late-night as ever. In fact, the whole album with the exception of a couple of up-tempo numbers has a mellow, relaxed feel, aided by a mix which often sees the backing instrumentation drifting like a diffuse cloud of smoke behind Martyn's gravelly, slurred, laconic Glaswegian voice. With his frequent use of repetitive lyrics and this ethereal background playing listening to Cooltide can become close to being hypnotised at times. It takes tracks like the animated 'Father Time' to snap you out of the trance.

The music is comfortably distanced from the mainstream rock formula and although its mellowness might make it superficially appealing to the Sade-cum-Dire-Straits-on-CD type of listener it has more value and worth than such transient midi-fodder. It might be cool but that's no reason to dismiss it lightly.

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## RECORD OF THE MONTH

**JOHN LEE HOOKER**  
**Mr. Lucky**  
 SILVERTONE CD: ORE CD 519

★ A question: what do Albert Collins, Ry Cooder, Robert Cray, John Hammond, Booker T. Jones, Johnnie Johnson, Van Morrison, Keith Richards, Carlos Santana and Johnny Winter all have in common? The answer is that they all figure on Mr. Lucky, the latest album from blues giant John Lee Hooker.

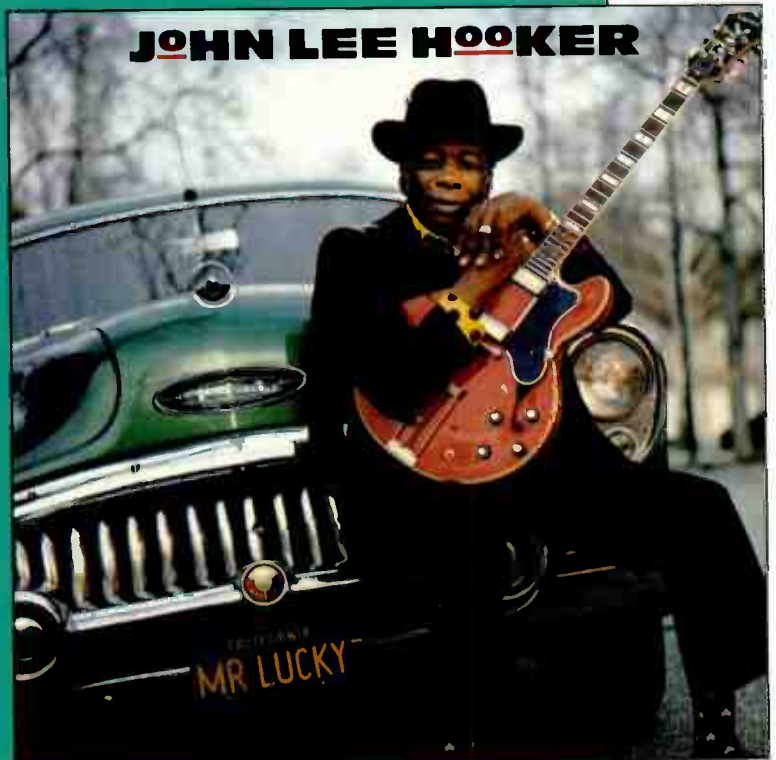
Last year's Hooker album, *The Healer*, drew a lot of critical acclaim but whilst it was a good record it didn't, in my

opinion, really deserve the eulogies it received. *Mr. Lucky* is a whole lot better, even the man himself says so: "This album is a lot stronger... there's some dynamite people on it." Now that's certainly true but it's Hooker who makes this album the towering success it's destined to be. "All my songs tell stories that people can relate to," he says, "and the way I play it, they can feel it. I don't have all those fantastic chords, just a funky beat and a drive. That's all you need to boogie." Going

back to *The Healer* I realised that this what what seemed lacking on that disc. Hooker sounded like he was drowning in a sea of celebrities. On *Mr. Lucky* he is the dominant player, in spite of the star-studded entourage that surrounds him.

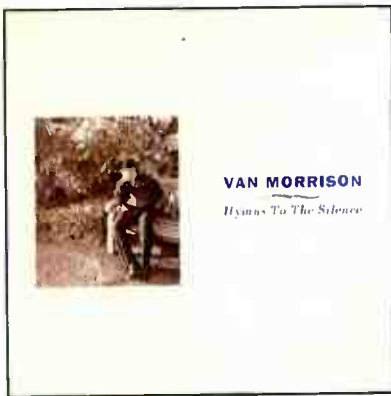
Feel free to disagree but have a listen to this disc and then tell me that it doesn't communicate more directly, that it doesn't touch the nerve more pointedly. Where *The Healer* had one or two tracks that appealed strongly, every single number on *Mr. Lucky* is a killer. The opener 'I Want To Hug You' features Johnnie Johnson's ribald piano, and the title track which follows sees Hooker and Robert Cray trading licks. On 'Backstabbers' Albert Collins' guitar blisters the paint on the studio walls, whilst on 'This Is Hip' Hooker teams up with Ry Cooder

and his troupe of sidemen for a bar-room shuffle. Van Morrison and organist Booker T accompany him on the tantalisingly slow-burning and gospel-tinged 'I Cover The Waterfront', the first of two tracks where Hooker lays down his guitar, making way for John Hammond's plaintive slide and harp on 'Highway 13'. Carlos Santana's wailing Gibson heralds the beginning of the funky amble of 'Stripped Me Naked', the second occasion that Hooker leaves the picking to another player. In Santana's capable hands the guitar will blow anything that's not nailed down



clean out of the room. In 'Susie' Hooker takes up his instrument to swap lines with Johnny Winter, another player who can match the serrated edge of his raw playing style. If it's rawness that you crave check out the track which follows where Hooker and Keith Richards join forces. The album closes with the back-to-basics 'Father Was A Jockey' perhaps the song that's closest to Hooker's roots, right down to the lyrical innuendo of "My father was a jockey, taught me how to ride..."

That's where this album succeeds more than *The Healer*; for me it's closer to the real John Lee Hooker. On that album he seemed like a passenger, whereas on *Mr. Lucky* he sounds like he's right up front in the driving seat, which is exactly where he deserves to be.



**VAN MORRISON**  
**Hymns To The Silence**  
 POLYDOR LP:849 026-1 CD:849 026-2

● I've loved Van Morrison's work since the mid-sixties when he fronted Belfast R&B outfit, Them. Since that time he and his music have become increasingly mystical and visionary but the ecstatic, soulful voice remains the same. Whether he's delving into his romantic Celtic heritage in the company of The Chieftains (who also feature on this album) crooning jazz-oriented ballads, singing straightforward R&B, or exposing his spiritual side with a public word in God's ear, the voice remains unmistakable.

The four sides of *Hymns To The Silence* - a double album from Van The Man at long last - give you twenty-one tracks in one convenient package, and see him meandering through genres aplenty, each being treated with profound respect, sensitivity and conviction.

I find that listening to Morrison can be an intense and moving experience: his voice possesses a magical quality which seems to allow it to transcend the constraints and limitations of a hi-fi system and communicate really effectively with his audience. Incongruous for a man who once suffered chronic on-stage nerves.

Morrison's music has reflected his increasingly religious leanings since the 1979/1980 albums *Into The Mystic* and *Common One*, and I'm sure I would have parted company with any other artist at this point in his development: as far as their music's concerned I think that performers should keep their beliefs to themselves. All too often when singers bare their souls I feel moved... to reach for the sick bag. With Morrison I actually find his confessional stance quite touching. He's unique.

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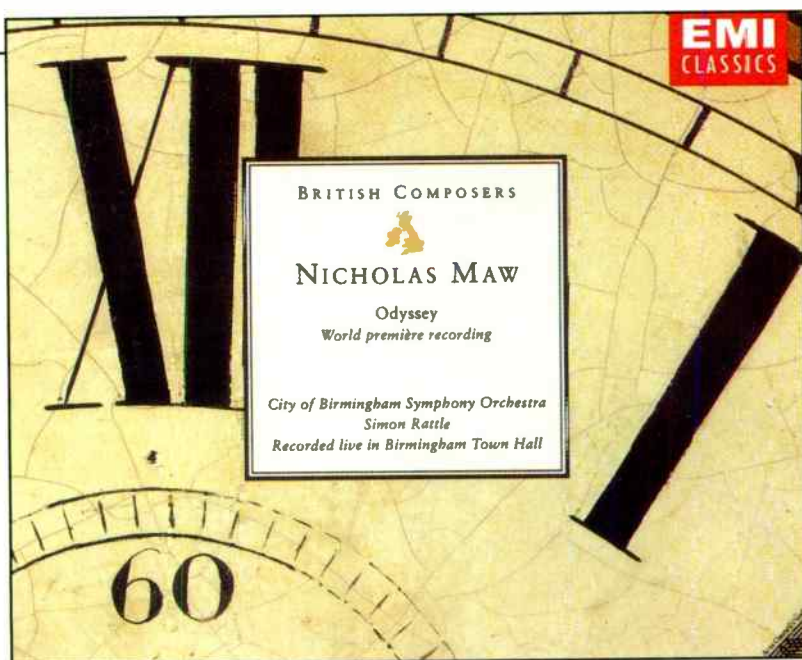


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## RECORD OF THE MONTH

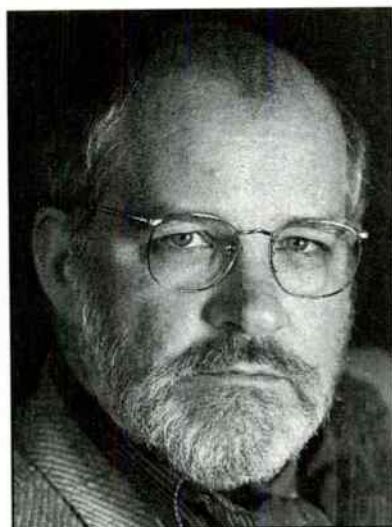
★ There are few people more worth avoiding than classical music snobs. The very worst types are those who utterly eschew music from British composers; the second worst are those who won't listen to anything written by a composer who hasn't been dead for at least a hundred years. Imagine then, the predicament of one Nicholas Maw. Born in Grantham in 1935, and still alive, Maw seems set to face the fate of so many contemporary British composers - complete disregard.

It would be all right if he composed twelve-note or repetitive stuff - modern classical noises that are utterly discordant but attract a cult following from fans who arrogantly claim others don't understand what they so admire. Maw doesn't try to be trendy; instead of pressing electronic buttons to spew rhythms forth he actually composes using notes on staves. The result of this adherence to true Romantic Classical tradition is music which is richly harmonic and simply pleasant to listen to. 'Odyssey', almost twenty years in the making, is probably the boldest statement of his musical philosophy he is likely to make.

### NICHOLAS MAW ODYSSEY

City of Birmingham Symphony Orchestra; Simon Rattle.  
EMI CDS 7 54277 2

★ "One of the great masterpieces of English music of the last fifty years," trills conductor Simon Rattle when giving his saintly opinion of Nicholas Maw's 'Odyssey'. And he's dead right. Five minutes longer than a



NICHOLAS MAW  
Photo: Jane Bown

soccer match (without extra time), it was recorded last October in the Birmingham Town Hall and is a live single take affair on disc. Commencing with what Maw calls a "gigantic upbeat" - a sort of lifting up of themes which expand and, in time, blossom into an immense 44-bar tune with the cellos. It is the main tune of the entire work; Simon Rattle has said that it is the longest he has ever recorded.

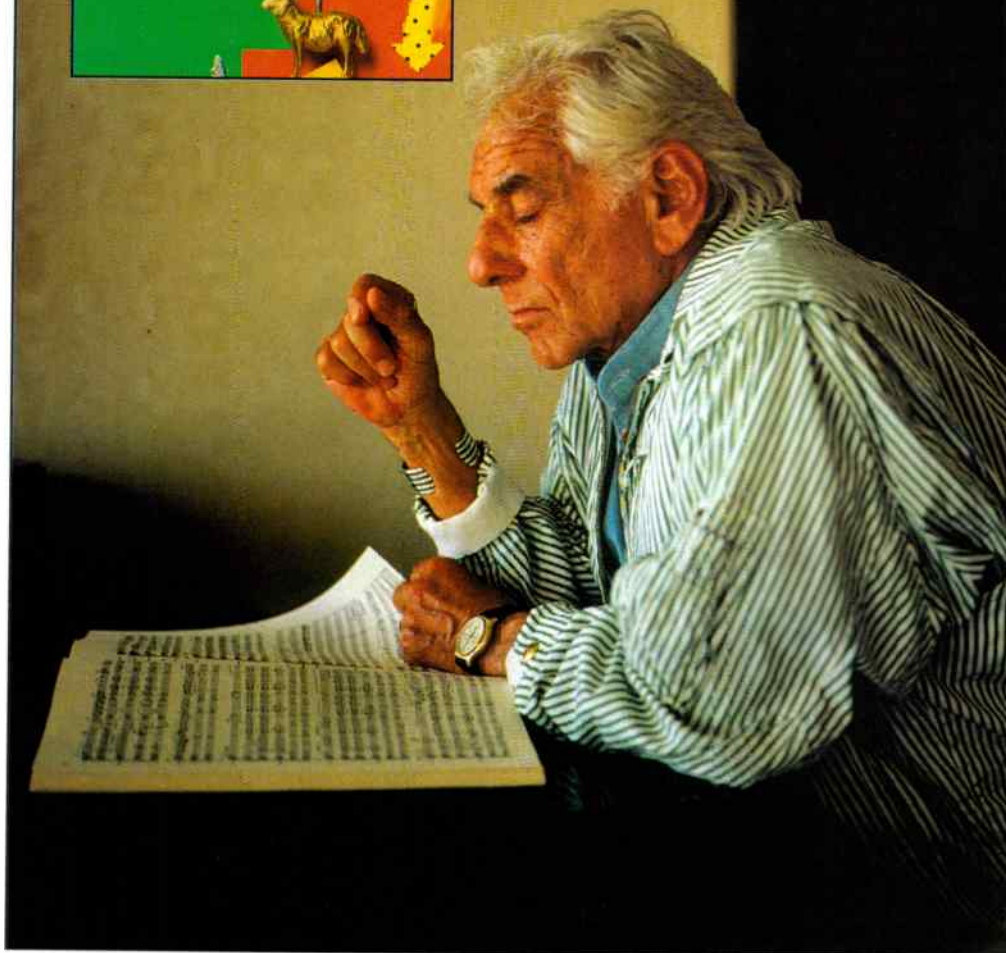
The huge opening relaxes with a clarinet solo and an intermezzo with pastoral overtones follows, connected, we are told, with the countryside near Wincanton in Somerset. The score then develops and flows in a most engaging way; there is so much going on that the piece truly does become a splendid - almost staggering - musical experience.



Peter Herring is taking a short break; in the meantime his place is filled by that Gay Lothario of the hi-fi business, Andy Giles.

**British composer Nicholas Maw's epic new work Odyssey takes centre stage as our Record of the Month, but Leonard Bernstein's long-awaited complete recording of Candide is not far behind it. There's more Bernstein in the form of his tantalising Second Symphony and I also recommend new recordings of music by Bartok, Shostakovich and Tchaikovsky as well as a vintage issue of Mozart piano works played by the great Sviatoslav Richter.**

*andy  
giles*



**LEONARD BERNSTEIN**  
Photo: Susesch Bayat/DGG

There will be those amongst the avant-garde who will consider this stunning achievement to be old hat - not modern enough. But this is not a journey into the past, more a recognition of what can be produced by one committed to present-day reflection and a genuine belief in the idea of old and new being able to interact in musical terms.

This performance is quite outstanding in both its authority and conviction. Rattle and the CBSO drive it with poise and energy, sustaining all their powers through to the final Epilogue. The recording is superbly engineered and will flatter any hi-fi system: there is a huge dynamic range and one feels totally involved with the orchestra and at one with them in their sheer bliss at being able to play this incredible work.

Do yourself a real favour. Buy it.

### LEONARD BERNSTEIN CANDIDE

London Symphony Orchestra;  
Leonard Bernstein  
DEUTSCHE GRAMMOPHON 429 734 2

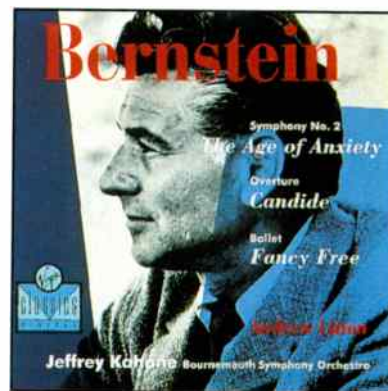
● This is the final revised version of Bernstein's comic opera based on Voltaire's biting satire on facile optimism. It has to be final now, because Bernstein is, alas, no longer with us. He can't re-work the score any more - unless from the heavens, which I wouldn't put past him!

Candide was a complete disaster on Broadway when it was premiered in 1956. I suspect it was not quite what the audience expected, falling as it does, between musical comedy and operetta. Broadway punters would probably not have understood the message ("Who is this guy Vol-Taire anyway," I hear them cry) nor would they respond too well to the satire. It just wouldn't be funny enough.

Hal Prince staged the work in 1972 at the Chelsea Theatre with some success, but there were the same problems. Candide is a rich black comedy which Voltaire ad-

dressed to an intellectual elite; setting it to music and retaining the humour clearly isn't easy. Having said all that to colour your view, it's probably best not to attempt to pigeon-hole the thing - just listen to it.

It is marvellous, full of splendid tunes and great, easy-on-the-ear music. The famous overture, a very popular encore piece, kicks the performance off in lively style and, although the pace alters and changes throughout, Candide is nothing if not highly enjoyable. Don't for gawd's sake try to make any sense of it, though!



### LEONARD BERNSTEIN Symphony No 2, 'The Age of Anxiety'; Overture to 'Candide'; Ballet, 'Fancy Free'

Bournemouth Symphony Orchestra,  
Andrew Litton  
VIRGIN CLASSICS VC 7 91433 2

● W.H. Auden arrived in New York early in 1939, remained in the United States as an immigrant during the war years and completed The Age of Anxiety, the last of his longer poems, there in 1947. Dedicated to John Betjeman it was awarded a Pulitzer Prize the following year, and Bernstein, already having declared himself "fascinated" by it, took it as title and subject of his Symphony No 2 which he completed in March 1949.

It is a work for solo piano and orchestra; on this disc Jeffrey Kahane as the soloist puts in a fine performance as he weaves through the complex movements with ease and style. Andrew Litton, too, seems at home with the score, and the Bournemouth Symphony Orchestra respond accordingly, as indeed they do to Litton's sharp, witty rendering of the short overture from Candide. I know it is difficult not to have fun with this rousing piece, but this is an outstanding performance.

Bernstein's ballet Fancy Free was premiered in 1944 and it tells the tale of three sailors on shore-leave in New York where they meet up with three girls with whom they dance, then quarrel, then make up again. All simple stuff and the music is hardly an

effort either, anticipating, as it does, West Side Story. The ballet has an interesting opening - Bernstein's own 'Big Stuff' sung by Billie Holiday is heard played on the jukebox in the bar where the sailors meet the goils. A first class collection of Bernstein's works from the 1940's and 1950's, this particular pressing is almost demonstration quality.



**BELA BARTOK**  
**String Quartet No.4; 44 Duos Vol. I; String Quartet No. 6**  
 The Endellion String Quartet  
**VIRGIN CLASSICS VC 91189 2**

● The Endellion String Quartet play this selection of Bartok's string compositions so well you would think they had been written for them. Bartok was busy writing Chamber Music in the late 1920's, but he started a third string quartet after hearing Berg's Lyric Suite in 1927. His Fourth, generally considered to be more satisfactory, was finished a year later. It is a classic example of the 'arch form' whereby two related outer movements frame a further pair of scherzo-like movements which themselves enclose a slow movement... Geddit? Well, don't worry, Bartok says it all for you in the music. The Fourth is at times a quite ravishingly beautiful work, yet also a trifle eerie. The other-worldly atmosphere Bartok achieves is stunning. His Sixth String Quartet, written in the momentous year 1939, was his last and is distinctly valedictory in form. The melancholy within it was in part due to Bartok's profound sadness at the death of his mother just as the year ended. It is not a bleak work; but it is totally moving and involving.

The violin duos of 1931 which accompany the two quartets were written as instructional pieces and all of them represent Bartok at his most essential. A fine collection, excellently played.



**DMITRI SHOSTAKOVICH**  
**Trio No. 2 in E minor**  
**PYOTR ILYICH**  
**TCHAIKOVSKY**  
**Trio in A Minor**  
 The Friend-Solomon-Hugh Trio  
**ALTARUS AIR CD 9033**

● The Shostakovich Trio Opus 67 was written in 1944 at the height of World War II. It is intensely haunting and moving, and at its first performance in Moscow, with Shostakovich himself playing the piano, it created such an impression that it was immediately banned by the Stalinist authorities.

The sombre tone is maintained throughout, even during passages of a dance-like character; even when the music becomes more energetic one is aware of the deep sense of sorrow and passion lurking within the score. This may sound like heavy going and to some extent it is; but serious music is as much about capturing moods as anything else and this poignantly conveys Shostakovich's utter condemnation of the evil stalking the world's stage at the time. The trio, Rodney Friend, Yonty Solomon and Tim Hugh, acquit themselves with both deference and sympathy to the work.

After that the Tchaikovsky Op. 50 Trio seems a mere trifle, but be assured, it is not. Dedicated by the composer to 'The Memory of a Great Artist' (Tchaikovsky's close friend and musical advocate Nikolai Gregoryevich Rubinstein, brother of Anton Rubinstein the pianist) the Trio is said to be a most eloquent elegy for a life-time's friendship between the two men. Whatever the theme, it is one of Tchaikovsky's truly great shorter works, monumental in its force and fascinating in its structure.

The Friend-Solomon-Hugh Trio are well-equipped to meet the challenges Op.50 presents, playing with flair and understanding throughout. Finely recorded and well recommended.



**WOLFGANG AMADEUS MOZART**  
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 Sviatoslav Richter; English Chamber Orchestra, conductor Benjamin Britten  
**MEMORIES HR 4366-67**

● Now here's a gem. The chance to wallow in no less than five of Wolfie's glorious works for piano taken from live performances by Sviatoslav Richter, three at Aldeburgh in 1966 and 1967, and two at Prague in 1968. The recordings were originally made in mono and have been superbly transferred to CD as part of the Memories series. Richter is a masterful Mozart translator and this two-disc set is a must for any serious admirer of the great man's piano works. The G Major KV283 Sonata kicks off the collection leaving one to marvel at the undoubted genius of both composer and pianist only long enough to draw breath to listen to the C Major KV309. Brilliant in every way, this is followed by the twelve delightful variations from 'La Belle Francaise' KV353.

Ben Britten conducts the English Chamber Orchestra in a sparkling performance of the great E Flat major Concerto (KV482) and joins Richter in the Piano Sonata for four hands in C major KV521. Without going into the CD v.Turntable debate, this is one collection that really is probably better served by the digital format. Music of this texture and form requires as much silence as can be achieved during playback and would be utterly destroyed by the odd crackle or pop. On a good CD system, with the sensibly forward presentation and wide dynamic range of this disc, the music is extraordinarily good - even by the standards of those involved!

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# Hi-Fi World special audio accessories

A range of high quality audio accessories selected by us for their usefulness and effectiveness.



## KONTAK

Contact Cleaning Fluid  
Kontak is an effective two part cleaning solution that removes contaminants from electrical connectors of all sorts. It is applied with pipe cleaners supplied. Clear instructions list the most sensitive contacts that need treatment in a hi-fi system, although items like fuses which are not mentioned should also be treated.

The dirt that Kontak removes is clearly visible on the pipe cleaners, demonstrating just what degree of contamination contacts have reached and what Kontak is achieving.

Users commonly express surprise at the amount of dirt and contamination Kontak removes. After application, a system regains its original life, sparkle and vigour.

**KONTAK ..... PRICE: £21.20**



## ANTI-STATIC RECORD SLEEVES

Translucent antistatic record sleeves from either Tonar or Nagaoka, according to availability. A surface treatment makes them anti-static, lessening dust attraction. This helps keep records pristine. They are supplied in packs of fifty. We suggest you regularly change sleeves in order to prevent trapped dirt contaminating records, especially after cleaning. The record label is clearly visible through these sleeves, an aid to easy identification.

**LP SLEEVES (50) .... PRICE £7.50**

## NAGAOKA CD CLEANING KIT

As with cassette deck cleaning kits, we don't recommend the 'cogs and wheels' cleaners and choose not to sell any of them. Tests we have carried out with a Cambridge CD-1 CD Quality Control Unit clearly show that careful manual cleaning is the the most effective way of removing all types of surface contaminants without causing damage to the disc.



Remember that CDs must not be scratched - even finely. Tests showed that the Nagaoka kit was the best all round cleaner. It has a solvent and a chamois leather pad which, together, bring the CD surface back to almost as-new condition.

**NAGAOKA CD CLEANING KIT ..... £10.50**



## SORBOTHANE CD FEET

Four big, round rubber feet, 50mms in diameter and 18mms deep. Made from a soft, slightly sticky feeling form of artificial rubber known as Sorbothane, these feet have the peculiar ability to soak up vibrational energy, due to their high internal kinetic losses. Some people go nuts with them, swearing they improve everything, from the TV to the fridge! We sell them for use (as intended) with CD players, turntables and various other hi-fi components that might be sensitive to vibration. They improve sound quality by providing a more stable platform. Well-nutty and a lot of fun.

**SORBOTHANE CD FEET ..... £24.95**



## NAGAOKA ROLLING RECORD CLEANER

The big drawback with most record cleaners is that they fail to remove all types of dirt. Brushes pick up fluff, but they redistribute

fine dust around the grooves, causing noise build up. Nagaoka's rolling record cleaner actually lifts dirt from the bottom of the groove - even fine dust. It uses a peculiar form of sticky coating on a soft foam backing. Dirt of all types - especially fine dust of the sort left by brushes - is removed completely. It is lifted from the record's surface, and no deposits are left behind. This is an effective way to dry clean a record.

**ROLLING RECORD CLEANER ..... PRICE £10.20**



## PIXALL MK II RECORD CLEANER

Simple in both function and design, and made in the U.K, this uses a roll of sticky tape which lifts the dust out of the record groove. Three or four passes will clean the record very effectively, and can reduce static at the same time. After each pass, the dirty length of tape can be peeled off and thrown away, reducing the risk of any gritty particles picked up being ground back into the vinyl. When the tape roller runs out, a replacement is simply clipped in. This is one of the most effective ways of cleaning an LP.

**PIXALL MARK II .. PRICE £10.75  
REFILL ROLLER ..... PRICE £2.75**



## NAGAOKA STYLUS CLEANER

Here's another simple but effective cleaning kit from Nagaoka. It consists of a stylus brush and cleaning solution. Use carefully to keep your pickup cartridge stylus and cantilever clean.

**STYLUS CLEANING KIT . £2.50**

## AUDIO TECHNICA GREEN CD RING STABILIZER

These are detachable green rings which are fitted round the circumference of the Compact Disc. The non-slip material allows the disc to be picked up without



touching the playing side and leaving fingernails. It also raises the disc slightly from any surface it's placed on, avoiding scratches if you don't replace it directly in the jewel box, as you should! It also adds a tiny but significant degree of mass to the outer edge of the disc, improving its stability and reducing vibration when it rotates at high speed inside the CD player. Green absorbs stray red laser light, so reducing random reflections within the disc, much like a green pen. So the rings perform many useful functions - and they are removable too! Improvements to the sound include better focussed and firmer images, plus a generally denser and richer sound.

**GREEN RING STABILIZER (5) .....£6.50**



**GOLD PLATED 4MM BANANA PLUGS**

We have a new style, heavy duty, gold plated banana plug with a unique type of axial solderless connection for loudspeaker cables. The wire is stripped back and pushed into a clamping collar, which is then screwed down tight. It will accept cables up to 6mm outside diameter and up to 4mm conductor diameter, holding them firmly and more evenly than the usual grub screw arrangements. They are supplied in a set of four.

**BANANA PLUGS (4) ..... £8.00**

**SIDE ENTRY 4MM BANANA PLUGS**

Similar to the plugs described

above (i.e. gold plated, heavy duty) but with side entry for heavy loudspeaker cables of up to 5mm conductor diameter. The screw clamp grips the cable over its full diameter by applying pressure with a non-rotating cylindrical slug.

**SIDE ENTRY BANANA PLUGS (4) ..... £10.00**

**GOLD PLATED SPADE CONNECTOR**

For amplifiers with loudspeaker screw terminals, here is a heavy, duty gold plated spade connector. It has the same unique axial clamp connector as the 4mm plugs described above.

**SPADE CONNECTOR (4) £10.00**

**ARCAM RCA PHONO PLUGS**

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**RCA TYPE PHONO PLUGS (4) ..... £14.95**



**LASAWAY GREEN PEN**

When red laser light hits the silvered reflective surface of a disc, some of it scatters and is later

reflected back off the disc edges, causing optical interference. Because green is far removed in the light spectrum from red, an opaque green coating effectively absorbs this scattered light, reducing interference signals reaching the laser and improving sound quality. The green coating is applied to outer and inner edges. It has been formulated by one of Japan's largest companies, Mitsubishi, to be harmless to the CD itself.

**LASAWAY GREEN PEN ... £7.00**



**AUDIO TECHNICA CD LENS CLEANER**

Here's a product for smokers in particular. However, seeing the peculiar haze that can coat windows even when there are no smokers about suggests this clever little gadget is a necessity for one and all. It is a laser lens cleaner for your CD player, beautifully made by Audio Technica. Contained in the pack is a disc with fine brushes on it. Each brush takes one drop of cleaning fluid, then it is inserted and played. The brushes gently clean the laser lens, removing oil, grime, dust and other airborne deposits like nicotine (ugh!). Audio Technica recommend use once a month

**CD LENS CLEANER ..... £15.30**



**AUDIO TECHNICA ELECTRONIC STYLUS CLEANER**

Scared of damaging your stylus when cleaning it? Try this amazing little device - an electronic stylus cleaner that vibrates guage right off the tip! Powered by a small AA battery, it's a doddle to use and

safe too. Just rest the stylus on its high speed vibrating brush and watch dirt get driven off automatically.

**ELECTRONIC STYLUS CLEANER ..... £19.95**

**LASERGUIDE**

The clear polycarbonate of Compact Discs scratches easily. Measurements we have carried out show that scratches, being closer to the silvered reflecting surface where the laser beam is focussed, are much more of a problem than fluff, finger marks, etc. They demand heavy error correction and often overwhelm a players capacity to substitute in spare programme information held redundantly for this purpose. Interpolation is then used to cover up the problem - which means guessing what the missing signal was like in order to fill in the gaps.

The only answer is to fill in scratches, lessening their ability to act as optical prisms capable of scattering the laser light. Laser-Guide is an optically engineered silicone treatment that claims to do this, reducing randomly reflected light by up to 50%. It is claimed that Laserguide improves stereo depth and openness. Just apply to the disc surface.

**LASERGUIDE ..... £14.95**



**AUDIOQUEST OPTICAL LINK Z**

This is a wide bandwidth, ultra high performance optical cable for digital links, made by Audioquest. The most common use is linking a CD transport to a digital-to-analogue convertor. It is available in 1 metre and 2metre lengths with conventional TOS-link connectors.

**OPTICAL LINK Z (1M)..... £69 (2M)..... £99**





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