

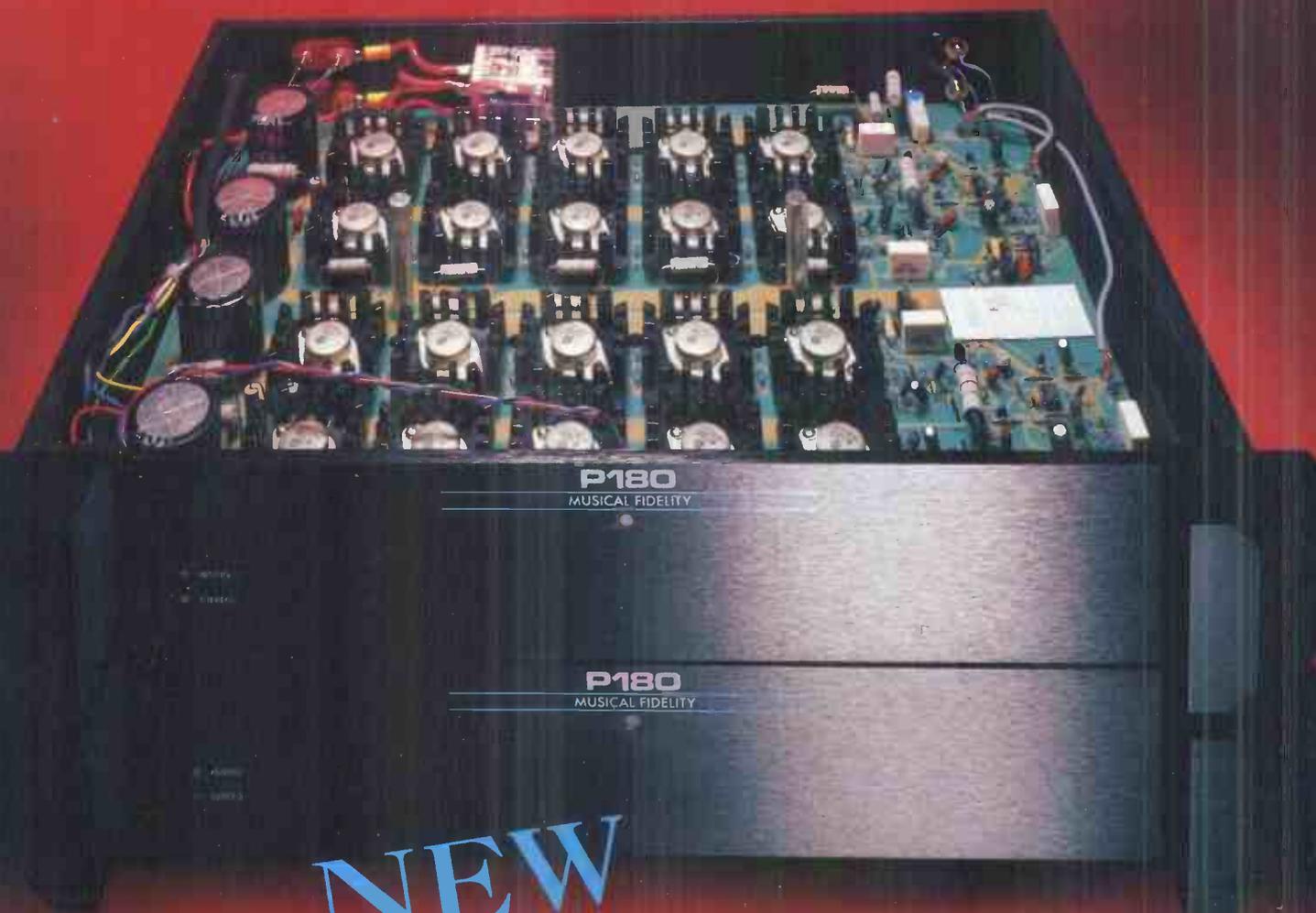
# Hi-Fi WORLD

MAY 1991

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**NEW**  
REGA  
AMPLIFIERS  
Elex & Elicit



**NEW**

## MUSICAL FIDELITY P180 POWER AMPLIFIER

- NAIM NAT 02 tuner
- CASSETTE DECKS six around £200
- KEF 101-2 loudspeaker
- VINTAGE LEAK TROUGHLINE tuner
- SECONDHAND RECORD STORES
- SONIC LINK DM20 GOLD amplifier



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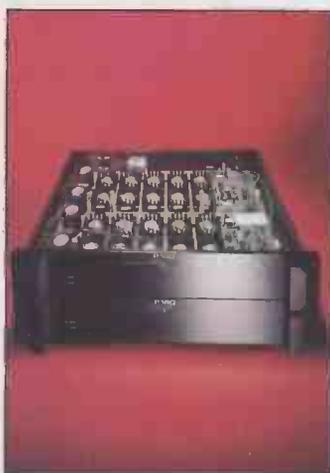
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# Hi-Fi WORLD

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## NEW INFINITY RANGE

Infinity have released a new range of loudspeakers designed for the British market. All of the designs feature bi-wiring with gold plated sockets and have specially shaped cabinets to reduce diffraction.

The two way models - RS 10, RS 20 and RS 30 - are priced at £149.95, £199.95 and £299.95 respectively. All of these use Infinity's Flycell high frequency drive unit which, it is claimed, offer excellent damping properties and a transparent sound without the stridency found in many metal dome designs.

The three way models - RS 40, RS 50 and RS 60 - are priced at £499.95, £499.95 and £649.95 respectively. The two top three way models feature a development on Infinity's Emit high frequency technology. The Emit-R is said to combine optimum frequency response with extremely low distortion.

trade winds

trade winds

Hi-Fi World brings you all the latest news from the hi-fi industry



de winds

de winds

de winds

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de winds

## PROAC NEWS

Unhappy with the performance of metal dome tweeters, Proac have replaced the units of their Studio 1 and Super Tower loudspeakers with a soft dome unit.

After lengthy tests and modifications were made, a 1" dome was used along with changes to the crossover design and cabinet damping. Proac claim this has resulted in a smoother, more transparent sound in both loudspeakers.

Prices are unaffected and remain at £612.25 and £1225.50 respectively.



winds

winds

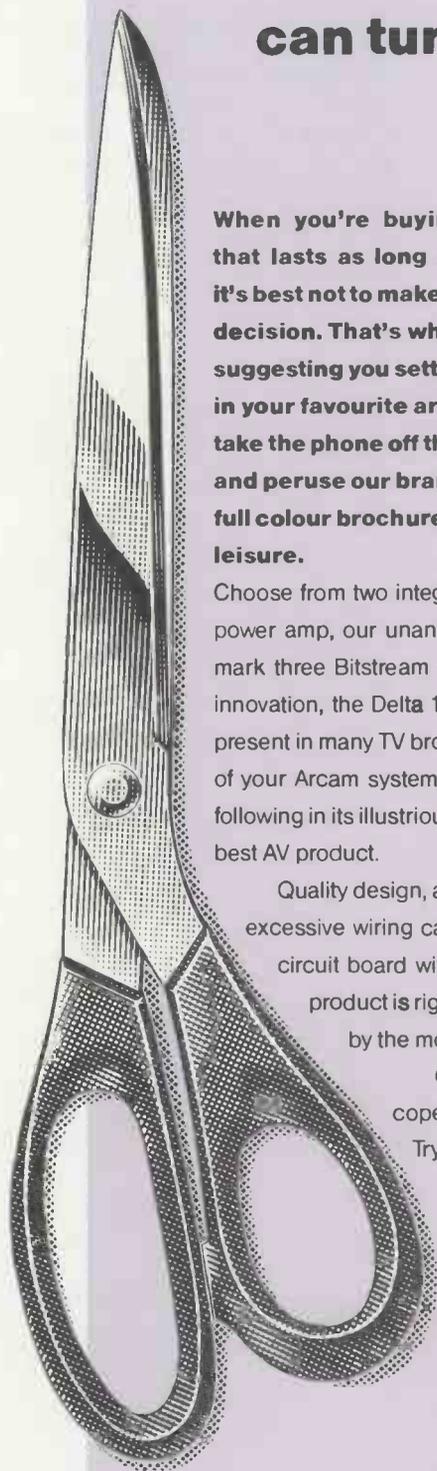
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## these simple tools can turn this ad into a full colour hi-fi brochure



**When you're buying hi-fi that lasts as long as ours it's best not to make a hasty decision. That's why we're suggesting you settle down in your favourite armchair, take the phone off the hook, and peruse our brand-new, full colour brochure at your leisure.**

Choose from two integrated amplifiers, a tuner, a CD player, a CD transport, a digital preamp, power amp, our unanimously acclaimed Black Box digital to analogue converter (now in its mark three Bitstream version), and the Delta 2 speakers. Then, of course, there's our latest innovation, the Delta 150 NICAM TV tuner. This decodes the digital stereo sound signal now present in many TV broadcasts ... what a wizard wheeze to let you get even more enjoyment out of your Arcam system: moving pictures to accompany CD quality sound! The 150 is already following in its illustrious predecessors' footsteps by winning the 1991 What Hi-Fi? Award for the best AV product.

Quality design, allied to simplicity of construction, is the key to our success. For example, excessive wiring can cause all sorts of problems, so our boffins prefer a single fibreglass circuit board with military specification soldering. And, just to make sure, every single product is rigorously tested and repeatedly checked. By the fussiest of computers and by the most finely tuned pairs of ears.

Our 'simple is best' philosophy extends to the controls, too. If you can cope with a pen and scissors, any Arcam component will be a piece of cake. Try it and we'll send you a brochure to feast your eyes on.

Alas, to give your ears a similar treat, you'll have to visit your nearest Arcam dealer.



**ARCAM**  
audiophile products

I'd like to look before I listen. Please send me my free colour brochure.

Name:

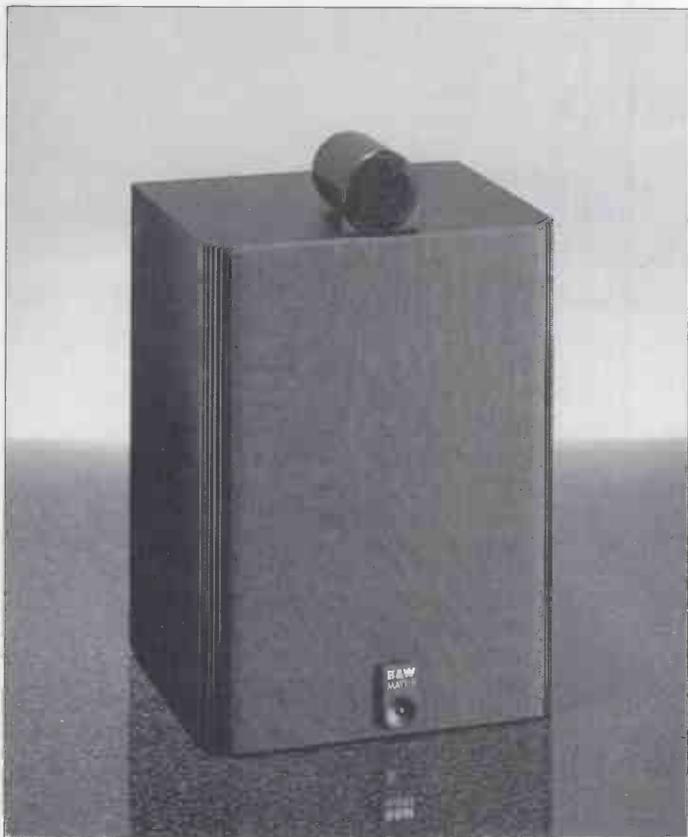
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POST YOUR COMPLETED COUPON TO:

ARCAM, PEMBROKE AVENUE, DENNY INDUSTRIAL CENTRE, WATERBEACH, CAMBRIDGE CB5 9PB. OR TELEPHONE: (0223) 440964 FAX: (0223) 863384

IN THE USA: AUDIO INFLUX CORPORATION, PO BOX 381, HIGHLAND LAKES, NEW JERSEY 07422-0381. TEL: 201-764-8958 IN CANADA: AVALON AUDIO LTD, UNIT 17, 975 FRAZER DRIVE, BURLINGTON, ONTARIO L7L 4X8, TEL: 416 333 4633



## B&W MATRIX 805

B&W developed the Matrix 805 in response to Abbey Road Studio's need for a high quality, yet small compact monitor.

Both of the 805's drive units are of B&W design and manufacture; the mid/bass driver features a Kelvar cone with a 30mm high temperature voice coil wound on 3 Kapton former. High frequencies are handled by a 1" metal dome unit which is a variant of that used in the Matrix 801 model.

With good aesthetic appeal being a long term B&W policy, they have again employed Kenneth Grange of Pentagram for industrial design.

The 805s can be supplied for use either horizontally or vertically in a wide range of finishes, including - to order - semi-gloss black or white and rosewood. Priced at £595, they will compete with such designs as the Acoustic Energy AE1/2 and Monitor Audio Studio 10/15.

## A MUSICAL EXPERIENCE

The Audio File, St Ives based hi-fi dealer, are hosting a hi-fi show to be held on September 1st for one day only.

Named "A Musical Experience", it will take place in: The Dolphin Hotel, London Rd, St Ives, Cambridgeshire. Exhibitors will include: Hi-Fi World, Linn Products, Arcam, Naim Audio, Denon, Meridian, Quad, Monitor Audio, JPW, Mission/Sansui, Sony, Roksan, Musical Fidelity, Dual and Rega.

Further details on: 0279-506576 (B.Stortford) or 0480-66123 (St.Ives).

## THE DESIGN SHOW

With an emphasis on design and construction, The Design Show will take place on Sunday 12th May at The Chesterfield Hotel, Malkin Street, Chesterfield, S41 7UA - nearest to junction 29 on the M1.

Exhibitors are: Kelvin Labs, Concordant, Origin Live, Nottingham Analogue Studios, Moorgate Acoustics, Reference Music Systems (Avondale Audio), Sonic Link and Pentachord.

Admission is free. For more details contact Les Wolstenholme on 0246 200096

## HELMET TV

A press release from Philips components, which arrived close to April although we are told it is genuine, describes their new fashion oriented colour television.

"Designed like no other set" - which you can hardly deny - The Discoverer features 40 channel pre-sets, on screen graphics and a sleep timer.

Launched this month, the 14" Discoverer is priced at £249.99



## IN BRIEF...

**SANSUI** is making a return to the analogue market with the introduction of a brand new turntable — the SR21 I.G. Manufactured and jointly developed, by Dual of Germany, it is very suitable for use with Sansui's The System. Price is £149.90 including a fitted cartridge.



**MONITOR AUDIO** have announced an addition to their extensive loudspeaker range the Studio 5. Featuring Monitor Audio's latest technology it contains a new 5" ceramic/aluminium alloy coned bass driver and a gold anodised tweeter. Price is £599.95, Hi-Fi World will have a full review next issue.

**CONGLETON HI-FI** is a new specialist retailer at: 1A Duke St, Cheshire CW12 1AP. Phone: 0260 297544. Promising out of hour demonstrations (including Sundays). Products stocked include: Linn. Royd. Naim. Luxman, Arcam, Revolver Audio Innovations, Epos Voyd and Marantz.

**AUDIO EXCELLENCE** has announced the opening of a new shop at: 65 Park Street, Bristol, BS1 5PB. Tel: 0272 264975. The Bristol branch of Audio T was previously at this site. We are told that a mutually beneficial change of ownership was agreed and, as both shops are BADA members, all warranty work will be honoured.

# another little bit of good news

What makes the DSP/DPA 50S outstanding is its sweetness, subtlety, smoothness, rich musicality, and last but not least its power. These superb qualities make the DSP/DPA 50S insurmountable when compared with other amplifiers within this price range.

MACAU DAILY  
NEWS

50S POWER AMP

The sound of the PDM-1 is very near perfection: from reproducing focus, proportion of musical instruments to the beat, rhythm and tempo - the PDM-1 makes all these qualities comparable to that of the analogue.

SONIC REVIEW -  
HONG KONG  
PDM ONE DIGITAL TO  
ANALOGUE PROCESSOR



The superb quality of PDM-1 makes its name among the top of the best D/A convertors in the world; in addition to this, the PDM-1 is the best buy among them all.

SING TAO EVENING  
NEWS - HONG KONG  
PDM ONE DIGITAL TO  
ANALOGUE PROCESSOR

The PDM One series 2 is a chef-d'oeuvre of high technology, and more especially of what we call "musicality".

LA NOUVELLE REVUE  
DU SON - FRANCE  
PDM ONE DIGITAL TO  
ANALOGUE PROCESSOR

This is one of the most impressive amplifiers I have ever heard.

HI-FI REVIEW  
50S PRE-POWER AMP

"...which sets new standards in transparency and detail resolution at this price, or virtually any other for that matter!"

HI-FI CHOICE 50S PRE-POWER AMP

It offers a level of sound quality quite beyond anything I have encountered to date - and it isn't going out through my front door.

HI-FI REVIEW 50S PRE-POWER AMP

Listening to this unit is the hi-fi equivalent of having your ears syringed.

WHAT HI-FI? THE LITTLE BIT DIGITAL TO ANALOGUE PROCESSOR

dpa

---

Deltac Precision Audio Limited, Unit 7 East Moors Business Park, East Moors Road,  
Cardiff, South Wales, CF1 5EE. Tel: (0222) 482818 / 494042



# readers' reply

**Send your letters to:**

**Hi-Fi World Letters**

**Page, 64 Castellain**

**Road, Maida Vale,**

**London W9 1EX.**

● My letter concerns some basic issues that anyone starting a hi-fi magazine really must consider.

I like the intelligent commonsense without breezy brashness in your first issue. Danny Haikin's piece was excellent from my view as a passionate music-lover and listener over forty years. Hi-Fi is a means to an end - but what end? Surely the life-enhancing presence of music in the home, which may mean being reminded of real-life music, but not necessarily trying to imitate it. The moment when listening stops being as keenly enjoyable as it should be is the time to think about improvements, but "perfect reproduction" is a meaningless and misleading concept.

Keep up the standard, and try to clarify above all. You still leave me confused, as all journals do, by the difficulty of ever coming to a clear conclusion about anything, because:

- every reviewer and expert disagrees with every other with such conviction and authority: recommending their own preference and ignoring others' without clearly arguing the case (if there is one).
- comparative reviews of anything always miss out several other models of note which should have been at least mentioned, making it very hard to gain a reliable picture of what is available
- significant patterns of technical development cannot be separated from fashions.

Even the instructive in-depth analysis of just one topic or model is rather useless if the writer does not acknowledge other people's findings or alternative models (the approach used in academic research for good reason). One answer is the publication of frequent comparative reviews by a panel, carefully presented and backed up by full summary lists (the practice of at least one of your competitors). Few hi-fi shops themselves are sufficiently stocked or knowledgeable or flexible enough to help; they have their own prejudices and limitations.

Whatever you do, a useful contribution would be some careful analysis of the very problems I have mentioned, which I'm sure causes anxiety

to others. Why is there so much contradiction and so little sound argument?

**Owen Manning  
Sheffield.**

- Incurable twirly tweaker that I am, I was hugely impressed by Mr Sircom's review of the Nookie Valve Stylus Gauge and can hardly wait to get my arm on one

Providing that, just as Roksan issued a pair of gloves with my turntable (wouldn't play a record without them), you include at no extra cost a full radiation suit - with wellingtons, a Geiger counter and, above all, a Lapis Lazuli cartridge. Blue is my favourite colour

**William Jones  
Cambridge**

- Congratulations on the birth of your new magazine. Having been a faithful follower of Hi-Fi Review for several years, enjoying immensely the growth to its peak and being frustrated at its decline. I was not surprised when it failed to appear last month. I was understandably delighted to discover Hi-Fi World at my local W.H. Smiths. even though the cover price was somewhat higher than the competition. Furthermore, the cream of HFR's contributors are there together with a lot more besides. And you have even managed to include contributions from Malcolm Steward, my favourite reviewer.

Before I get too carried

away can I make a plea that you don't allow two things to happen that really got up my nose about HFR. Firstly, poor quality paper and photographs, these seem to have slipped into the middle of your first issue.

Secondly, please don't re-gurgitate the same old record offer section, favourite equipment list, accessory club, system set-up etc, month after month. When you are a regular reader this means that a good percentage of the magazine has been seen many times before. Why not have regular items in alternative months, after all they don't get updated very regularly in any case. Better still, why not have a magazine packed with reviews and editorial from cover to cover?

All moaning aside, on the evidence of the first issue, HFW is a thoroughly enjoyable magazine and long may it prosper.

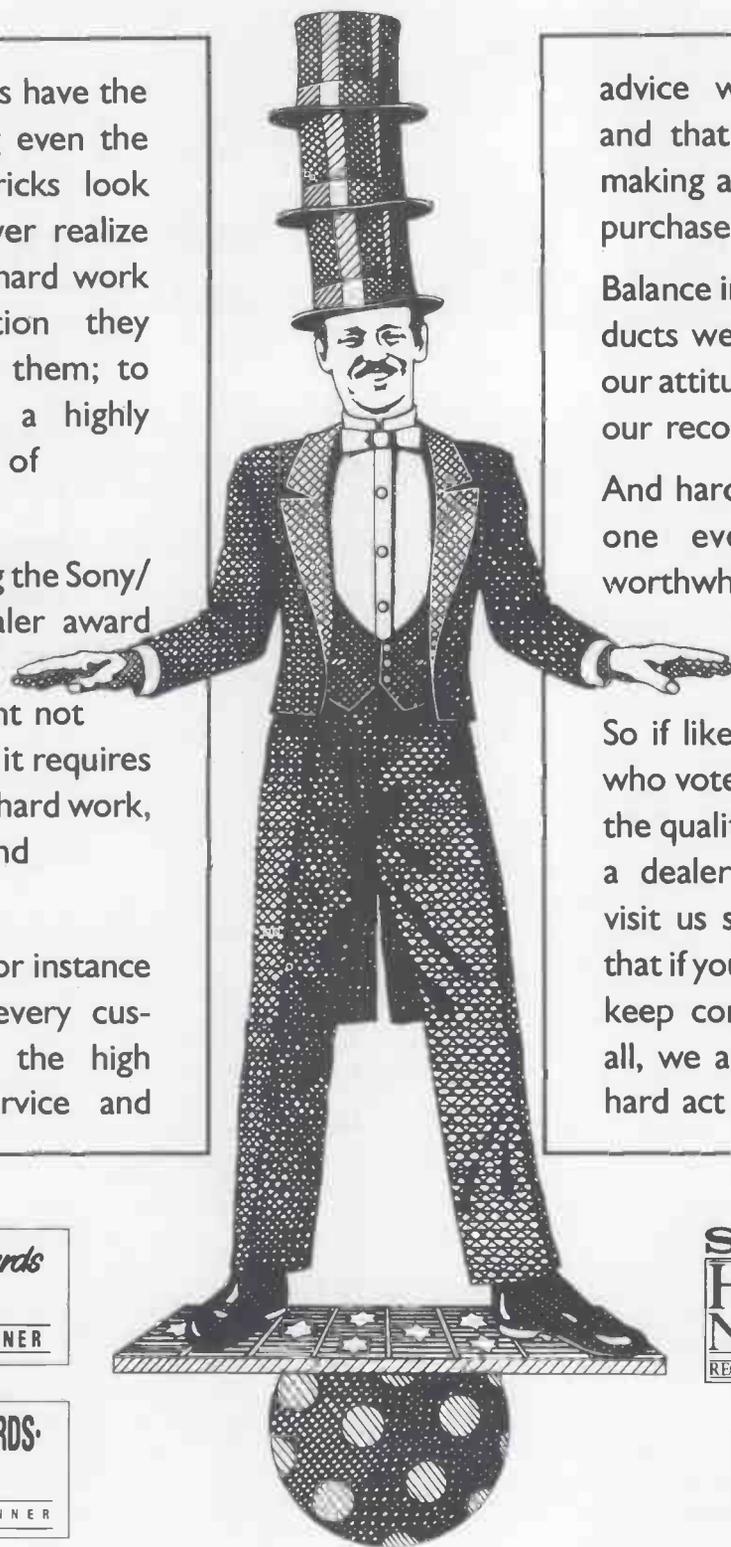
**C. Aldridge  
Cheshire**

# A HAT-TRICK FROM THE AUDIO FILE

Great performers have the knack of making even the most difficult tricks look easy so you never realize just how much hard work and determination they need to perfect them; to say nothing of a highly developed sense of balance.

A bit like winning the Sony/Hi-Fi News dealer award for three years running - it might not look difficult but it requires the same sort of hard work, determination and balance.

Determination for instance to make sure every customer receives the high standard of service and



advice we're famous for and that no-one ends up making an unsuitable purchase.

Balance in the range of products we stock, balance in our attitudes and balance in our recommendations.

And hard work - well, no-one ever did anything worthwhile without a little bit of hard work did they?

So if like the many people who voted for us, these are the qualities you look for in a dealer, make sure you visit us soon. We're sure that if you do, you'll want to keep coming back. After all, we are something of a hard act to follow!



Dealer Awards  
1988  
REGIONAL WINNER



DEALER  
Awards  
REGIONAL WINNER  
1990



DEALER AWARDS  
1989  
NATIONAL WINNER



## The Audio File

27 HOCKERILL ST, BISHOP'S STORTFORD, HERTS. TEL: 0279 506576. 2 FOUNDRY WK, MARKET HILL, ST. IVES, CAMBS. TEL: 0480 66123.

Audio Lab • Acoustic Energy • Arcam • Audio Innovations • B & W • Beyer • Bose • Boston • Castle • Creek • Cyrus • Deltec • Denon • Dual • Epos • Exposure • Foundation • Goldring • Heybrook • JPW • Kef • Linn • Marantz • Maxell • Meridian • Mission • Monitor Audio • Mordaunt Short • Musical Fidelity • Naim • Nakamichi • Proac • QED • Quad • Rega • Rogers • Roksan • Rotel • Royd • Ruark • Sennheiser • Snell • Sony ES • Sound Organisation • Tannoy • Wharfedale • Yamaha.

Nobody believes a reviewer is an omnipotent deity, but when asked for their advice on what to buy, some reviewers might think they are being seen as such. They are not. That is a fundamental and sad misunderstanding of the journalist concerned.

As you'd expect, people commonly ask us for advice and quite often they want to know quite specifically what items to buy. This is quite normal. After all, it is the basis of our job as reviewers to be able to provide informed opinion and good advice. For peculiarly convoluted reasons, some motivated by a particular logic, some by insidious commercial pressures, an attitude has arisen amongst a small caucus of reviewers that such direct advice is invalid and cannot be given. Worse, the logic - or should I say the attitude - extends to turning blame back onto the questioner: go and make up your own mind. Don't be so foolish as to ask me!

### Expert

I'd willingly and eagerly ask an expert for his advice; I do so with the car for example and enjoy listening to someone who really knows about it explain the ins and outs of certain mechanical details. I love expert knowledge, because it can be valuable. If this were not so, people wouldn't need to specialise in their jobs. Aircraft could be designed by doctors - in their spare time perhaps. Once this was possible; Leonardo da Vinci pondered on human anatomy and on machines that could fly, apart from being a fine artist and painter. He wasn't unique in doing so at that time. Now, those ideas and abilities have been extended in human terms by specialisation. People have to be so called "experts". In being so however, they are not infallible. Infallibility isn't implied nor is it, for humans, possible.

There is nothing novel or new in these simple, basic observations. What is new is the attitude that, having gained, been taught or given access to specialist knowledge useful to others, no obligation or responsibility can then be accepted for sharing it or passing it on. Some sort of rarefied "if you can't do what I do, or know what I know, then tough" attitude is adopted instead. The flimsy wrapping disguising the unhelpful stance is one of apparent honesty. "My views are personal: they can be of no use to you."

As a pure and simple abstraction, this may be correct. But the real world is a rather more complex and impure place where notional simplicities like

this have little or no practical value. Reviewers have, or should have, all the means at their disposal to reach intelligent basic conclusions about products. It is sometimes said that these conclusions differ so much that lack of consensus is proven. In truth there is enormous consensus, much of it tacit, some of it active. There is disagreement about the precise value and status of certain products, but statistically they represent a small proportion of what is available. With such consensus, there's an enormous pool of useful information available to be passed on. Any refusal to do so by a reviewer is best regarded with suspicion.

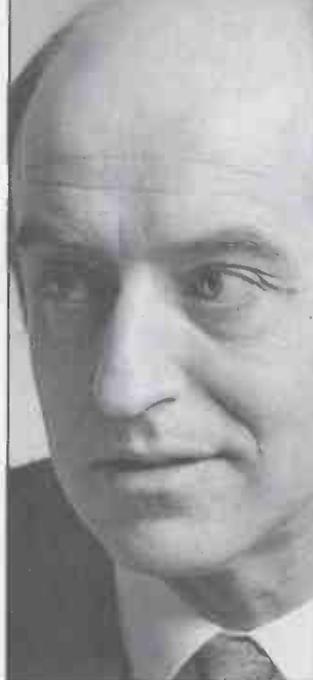
### Tacit

At this point it is best if I leave generalities and move on to specific examples. First, tacit consensus. Whole swathes of so called "hi-fi" products never make it into the hi-fi magazines. Much of it is mass produced in the East and it is steadfastly ignored. When I take a walk past the Edgware Road or Tottenham Court Road hi-fi shops in London, I am always taken aback by the amount of equipment I have never seen or heard about. I brush it off as inconsequential to Hi-Fi World (over which I have some reservations), and in doing so am reaching a tacit consensus with other reviewers, not necessarily seen or shared by many readers. If reviewers suddenly started telling me that a Dixons rack system with Jamo loudspeakers sounded better, in their view, than, say an integrated NAD system, then yes, we would be looking at a potentially serious lack of consensus amongst reviewers. It hasn't happened yet, even though one or two space cadets do believe that putting a clip on a waterpipe or some cream onto the cats nose so alters electrostatic charge fields in the local universe that this is a possibility.

That's tacit consensus. Even though sales of rack systems and such like far outnumber those for specialist hi-fi products, demonstrating that the public at large don't share the views of hi-fi reviewers, the latter continue to hold their stance with remarkably little internal questioning or doubt.

### Active

Then there is active consensus amongst reviewers. Having excluded at least 70% of total product available as "not hi-fi", we are left with a remaining 30% or so. Over much of this, there is plenty of consensus as to what is



suffered by his questioner. That reviewers are deities is so bizarre a delusion, so ridiculous a concept, it could only be suffered by a reviewer. I would diagnose a case awaiting treatment.

There is broad agreement also, I find, upon the way a reviewer can usefully convey his or her views clearly and honestly. Assuming, as we must, a good background of proven ability and wide experience, it isn't impossible to convey some reasonable impression to readers of personal preferences in terms of sound quality. If this were impossible, then subjective reviewing could

Reflections from  
Noel Keywood

# kaleidoscope

basically good. It is so much a part of every reviewer's vocabulary however, that most don't realise the information isn't commonly available to one and all outside their own small world. Linn and Rega turntables; NAD, Arcam, Pioneer amplifiers; Mordaunt Short, Celestion, and Goodmans loudspeakers are all well regarded generally. There might be some argument as to which is best - a somewhat spurious notion that is negated by the vagaries of taste - but there is little argument over their basic merit of a recognised group of hi-fi products. Again, when people ask reviewers for their opinions, or ask them "what is best", merely identifying this upper layer of cream will often be of immense value to the questioner. Trying to brush off such questions with the reply "make up your own mind" is as absurd as it is stupid.

### Disagreement

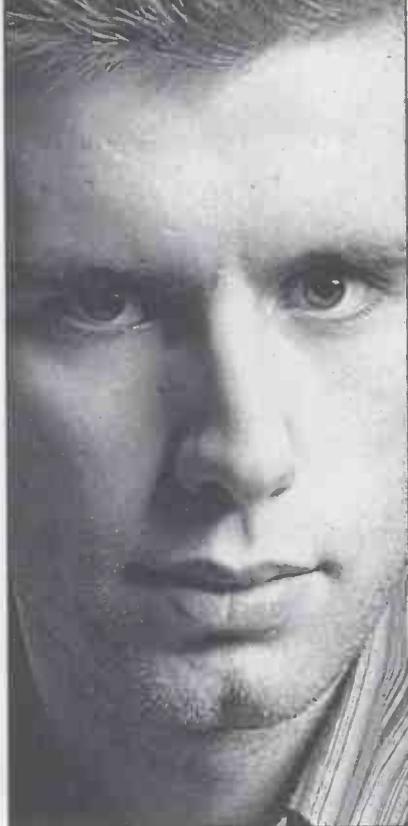
There is disagreement amongst reviewers of course, mostly over a statistically small group of products occupying the upper echelons of hi-fi, or some obscure corner of it. This does reflect differing tastes and expectations. But it is a difficulty both understood and accepted by most people I speak to. Few expect reviewers to totally agree amongst themselves; there aren't many precedents for human consensus in other areas of far greater importance, why should it be expected in hi-fi? I strongly suspect this is a problem of perspective suffered by the reviewer, not a misunderstanding

not exist. It does, however imperfectly, and it is possible to explain and describe personal preferences. A large majority of readers fully understand that any final judgement is qualified by such conditions. Perhaps most importantly of all though, readers are themselves intelligent and perceptive enough to judge what is being said.

### Beware

When a review ends with the suggestion that you "make up your own mind", beware! Is the writer really confident of his or her ability to discern good from bad at a broad level? I see many reviews signed off like this nowadays. I believe they come from people who know they don't know - hence the final get out, the final veiled admission. Have they studied their subject in any controlled, directed and diligent manner, or are their views just dressed up bar room gossip?

Expect of a reviewer the ability to describe a product so well, you feel there is no need to see it for yourself. This is possible. Expect a reviewer to be able to describe, in broad outline and in a manner you understand, how a product sounds. This too is possible. And finally expect a reviewer to state clearly and without equivocation whether the product represents, to him or her, good value in the broadest sense - and why. As one editor would say impatiently to vacillating reviewers - but would you buy it? Every reviewer should be able to answer this question, for the sake of the reader ●



Danny Haikin  
delivers

# desperate dan

A recent telephone conversation with one of our readers has forced me to have a serious think about the role of a hi-fi magazine. The said conversation began with a request for some advice on which hi-fi components would be suitable to use with his amplifier. Soon into this conversation it became apparent that I was not being asked for advice but was actually required to tell the person what he should purchase. This, I find worrying.

A Hi-fi reviewer is not some sort of omnipotent deity whose every word is an absolute truth; he/she (as hi-fi reviewers are sadly nearly all male and to avoid clumsiness, I shall herein adopt the masculine throughout) is a normal person (sometimes), with normal hearing and subjective tastes. The main thing that distinguishes a reviewer is experience. Through extensive listening and a professional need for lucidity, a reviewer should gain and portray consistency.

Even the most casual glance through the various hi-fi publications will reveal that there are no two reviewers using the same hi-fi system. Moreover, I have heard certain

systems which have been recommended by other reviewers which I have enjoyed and some that I haven't liked one little bit. This does not make either of us wrong and similarly, assuming we are both being consistent and honest, does not really matter.

## Taste

There are many different ways to reproduce music. I find myself drawn to some of them; I find others utterly absurd. My taste is reflected in the hi-fi that I use and recommend. I would hope that persons with similar taste would agree with my conclusions. A problem is thus created: how can I describe my taste in precise enough terms to allow another person full insight. I can't. And, neither can anybody else.

It is, in part, a semantic problem. If a reviewer described why he liked the sound of a hi-fi or the taste of a particular wine, what words would be used? In the former: good imaging, dynamic, transparent; in the latter, rosy, fruity and full of body. The problem is the same with both descriptions: it is impossible to adequately describe a sensa-

tion. There is not a sentence in the world that can prepare a person for the taste of a glass of wine, and similarly for the sound of a hi-fi system.

When you next read a hi-fi review, bear this in mind. You are actually witness to two processes. First, there is the reviewer's own taste and standards; secondly, his ability to meaningfully reflect this in clear prose. As I have shown, the ambiguities concerned in the latter case alone are reason enough to degrade a reviewer from omniscience to merely informed critic. And, there is still the question of actual taste...

## Opinion

The breadth of opinion represented by this magazine alone is immense. Part of the rationale behind Hi-Fi World was to achieve this, and avoid dogma. Even the magazines which claim to be buying guides are made up of diverse people who naturally disagree. The very notion of a buying guide for a subjective purchase is inconsistent with itself.

But, where does this leave you, the reader? If the whole thing is a matter of taste, why bother reading about somebody else's taste? Well, a

reviewer does have a distinct role and advantage. Through the extensive listening that any hi-fi reviewer must undertake, a degree of personal expertise should be gained. This expertise does not bless the reviewer with an ability to sense other people's taste, but rather gives the ability to know his own tastes in depth. Thus, a reviewer should know what type of sound gives him pleasure and be able to equate this with full confidence. He is not capable of receiving more pleasure or blessed with the ability to hear things that others don't. He simply knows what he is looking for and is capable of recognizing it.

So then, why do we all disagree? Assuming that all hi-fi reviewers are as consistent as I have described, do we disagree because we have different tastes? Surely there must be some consensus. There is next to none. I cannot think of a single product that all of the reviewers would unreservedly recommend. Even products which have received the highest possible accolades are felt to be merely average or even seriously flawed in different quarters.

## Pleasure

It is because of this that I offered no specific recommendation. All I could really say is that these are the hi-fi products which have brought me the most pleasure and why. It is then up to the recipients of this advice to test my judgments and make their own opinions. If you consistently agree with the judgment of a particular reviewer then all well and good. If you never agree, then ignore his advice. Remember, even though a reviewer may not choose to prefix all of his comments with "I think" or "In my opinion" - which stylistically looks very poor - it is by definition an opinion. It is an informed opinion, not an objective fact about reality.

If anybody reading this would buy a piece of hi-fi solely because another person liked it, they are betraying their own individuality. When I recommend a product, what is unstated but implicit in intention, is that I am recommending that you should hear it for yourself ●

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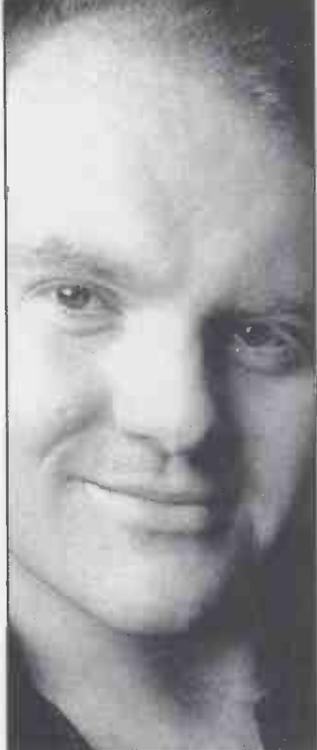
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Feedback from  
Alan Sircom

# sircom's circuits

Question: Why hi-fi? This is not a zenlike unanswerable question, but purely why hi-fi? Ignore the engineering, the physics and the advertising, hi-fi is supposed to be about music.

In a number of cases, the manufacturers and the general public alike lose direction. When people get involved with the equipment, over the music, I become worried. I admit that this is a very easy trap to fall into; it is difficult for a reviewer to hold a rational conversation with his or her hi-fi enthusiast friends without it degenerating into equipmentspeak. I can appreciate the tales that doctors have of being harassed in public places by people desperate to show off their operation scars. This is only to be expected as we are, supposedly, in possession of knowledge that would be difficult to amass outside of the industry (see Danny's column).

The thing that disturbs me is that seldom do I get involved with conversations

about music. For an industry that is supposed to be about the accurate reproduction of music, some people involved within it are remarkably devoid of musical appreciation. The epitome of this lack of musical interest is, in my opinion, the "Audiophile Recording". Some recordings are superb, both in terms of musical content and recording quality. These recordings, such as Sheffield Labs recording of Thelma Houston & Pressure Cooker's "I've Got The Music In Me" can amaze and impress.

## Polymers

For the most part, however, I find Audiophile Recordings remind me of those early colour television documentaries, broadcast in the late 1960s, such as "The Fascinating World of Polymers", or "Stained Glass And You". These programmes were basically designed as test transmissions for colour and featured fifty minutes of intense, vivid primary colours and naff music, with an extremely interested voice extolling the virtues of "Polypropylene" in a Transatlantic accent. At the time, I found the colours fascinated my childhood eye. Adults, however, found the programmes boring in the extreme.

The analogy is that although the recording may be bright and vivid, the music content is generally dull. Elevator music is turgid, no matter how well recorded. Maybe this is a sign of growing old, but I can no longer take the saccharine quality of these recordings. I suspect that many people also share my dislike for these records. The prospect of listening to an hour of light, meaningless music, that is too bland to be considered for use as incidental music for "The Krypton Factor" does not fill me with the will to live.

Indeed, up to a point, I question the quality of many "good" recordings. A number of virtuoso recordings sound like they were made from within the instrument itself. Listening to a violin or a guitar live, although the finger movements and squeaks are noticeable, on some recordings they become larger than life. The initial reaction is to say that it is a good recording because one can hear every

mistake the performer makes. If one listens to the 1960s recordings of Julian Bream playing guitar, the imperfections are there, but not in an unnatural, overblown sense.

## Joy

It comes as such a breath of fresh air when a reviewer can sit down and talk music with somebody, whether connected to the industry or not. These sessions inevitably become protracted, swapping names of good recordings, how to look for good pressings and so on. The joy of these sessions is that they usually end with a new area of exploration within a field of music that was previously considered a non-starter. Over the past month, I have been introduced to the varied joys of Sonny Rollins, early Elvis Presley, The Four Brothers and Planxty.

This is where the hi-fi should start to come in. The appreciation of music should be enhanced by a good hi-fi system. Hi-fi is only a means to an end; we should not let ourselves become bogged down by the means.

On saying this, the hi-fi itself should take pride of place in the process of listening. If it doesn't, listening to music loses its enthusiastic position and becomes merely another domestic diversion. With my current Audio Innovations system awaiting review, the combination of glowing valves and large, monolithic loudspeakers announce, in glorious Technicolor, that you are about to Listen To Music. If, on walking into a living room, you are confronted by a pair of loudspeakers that live behind the sofa, you can be sure that the person places no more emphasis on listening to music than watching television.

## Superior

In many ways, recorded music is superior to a live event. While I still prefer live music above any recording in existence, having a diverse collection of recordings can be far superior to a live act in many ways. Imagine that a live concert takes place. You buy tickets weeks in advance, only to find that the soloist has got influenza and is off or playing poorly. Or, you do not feel like the seven-hour Stockhausen concert because of your

headache, your partner's romantic problems, or the person sitting next to you who has halitosis and B.O! Where else, other than your own living room, can you call up Miles Davis, Vladimir Ashkenazy, Bob Dylan and Zodiac Mindwarp to play an impromptu concert? The atmosphere and drama of a live event is lost on most recordings, but it can also be lost just as easily at a live event if you, as a listener, are not in the mood.

One reservation which I feel must be made here concerns hi-fi products that I feel are tailored for particular types of music. This has good and bad points. Musical tastes change, develop and mature over the years; one could easily out-grow a piece of equipment. On saying this, some people have musical tastes that remain steadfast throughout their lives. For these, a tailored system could be a perfect answer. For myself, I would find it difficult to live with a system that excelled in playing one genre to the detriment of all others.

## Audiophile

Earlier in my monologue, I expressed a profound dislike for "audiophile" recordings. If you feel that there is something valid that can be got from these recordings, which is not in hi-fi terms, then I stand corrected. For my part, however, I stand by what I have written earlier. The mental picture of an archetypal audiophile is that of a person obsessed with the equipment, with a record collection that consists of test discs and organ music, for the bass response.

My system has not reached dizzy heights just yet. At the moment, the bulk of my listening is done through a modified Systemdeck, although I also possess a smallish Linn/Naim system and I am currently experimenting with Pinkness! But to me, the equipment is secondary to the record collection itself. I would like to say that I'd far rather have a £300 midi system and 2,000 records, than have a £2,000 hi-fi and 300 records, but I do not think that I could live with such a compromise anymore. But, if I had that £2,000 system and was looking for an upgrade, it would have to be more music ●



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## tape tussle

**Cassette decks around  
£200 tussle with  
each other for a place  
in the market.**

**Noel Keyword tests six  
to find the strongest.**

Ranging from £170 to £200, the six cassette decks grouped together here all sit in a fairly tight price band. Yet, there were some curious ambiguities. Some had little of note to offer at the price whilst others were jammed with facilities. I was surprised at these disparities: normally manufacturers don't let their products drift away from the competition in terms of facilities or performance. To do so invites disaster, especially under the spotlight of a comparative review like this one, where differences are picked out clearly by measurement.

What this price bracket once provided was a refined single capstan deck with sensible facilities like variable bias, but not much else. The idea was to get better

performance out of the standard £150 package. In this group I detect "standard packages" priced up into the next band and offering mediocre value, accompanied by higher quality decks priced down to be more competitive, but it does mean there is a definite best buy, of which I will say more in the conclusion.

Single capstan transports can be made to work well, before dual capstans become necessary at a higher price level, in order to (hopefully) get better performance. The capstan is a shaft that pulls the tape along by sandwiching it against a rubber pinch roller as it rotates. The idea is to get the thing spinning at a very steady speed to stop all sorts of nasty effects colouring the sound. Akai and Technics both resort to direct drive motors to achieve this - and with some success too. Lovers of piano should in particular be aware of this problem. A bad deck will make the music wander in pitch, cause notes to sound cracked or even change the tuning of the piano during a performance. Sometimes these effects can be quite upsetting.

Hiss levels are much the same these days, being tape dependent. This is why hiss is not an issue in this review. Dolby noise reduction reduces hiss significantly, but I feel the Dolby C system affects music quality in particular. I always record with the simpler and less intrusive Dolby B system, being prepared to tolerate some slight background hiss. Some classical works of very wide dynamic range and with extended low level passages really do demand the use of Dolby C however.

Hiss can be lessened by recording to a higher level. The indicated peak (0VU) level on displays is, these days, a conservative limit. Most record heads and tapes will accept more before distorting, according to their upper overload limits. I test these limits for each tape type, with each machine. Differences are not great but they are good indicators of head quality. Generally, music peaks can be pushed to +4dB with metal tape, +1dB with chrome and +2dB or a bit more with ferrics.

Metal tape gives much cleaner and less confused treble, but it will sound sharp and nasty if a treble peak exists due to mismatching. For this reason, I like to see decks possess variable bias that works with metal tape. Currently, chrome tapes are sounding messy, but they do have very low hiss. I keep away from them, including famous TDK SA, at present. Most people I speak to have found TDK AR ferric tape to be the wonder that tests show it is. TDK say sales are high and rising. Having an enormous overload headroom, it suffers little distortion and always sounds incredibly smooth, relaxed and yet dynamic. On some decks it can sound a trifle too dull or warm though. I recommend TDK MA or That's MR-X PRO metal tapes for top quality recordings, and TDK AR for good quality everyday use.

Finally, I ought to explain the presence of the dubbing deck. We put a wild card into our CD player group test last month - a multiplay unit - and everybody felt it offered a useful comparison. I constantly get asked about twin cassette decks and they are very popular. We all felt it would be useful to compare a dubbing deck with conventional rivals in this group test.

## Measured Performance

Akai have turned to direct drive to minimise wow and drift. The capstan is effectively an extension of the motor spindle and the motor itself has a frequency generating servo for speed control. The speed stability analysis tells most of the story about performance—and a good one it is too. The best feature, due primarily to direct drive, is low basic speed drift. A low value of around 0.1% and wow of just 0.06% was measured. Flutter measured 0.1%, which again is low. Put them all together and you get a final total, weighted wow and flutter figure of just 0.04%, which is exceptionally good for a single capstan transport and very good even by dual capstan standards.

The GX head is assisted by Dolby HX Pro which, by modulating bias, improves treble overload whilst recording. The MOL figures for Akai's GX head proved excellent for ferric, chrome and metal tapes, putting it right up with the best decks around, including all its rivals. With critical metal tape, for example, it piled on +4.5dB at 300Hz and -2dB at 10kHz. Frequency response measurements show that the GX head has a reasonably flat basic response characteristic between 60Hz and 19kHz.

Variable bias is fitted, and it works with all three tape types. Tests showed it has enough adjustment range - even with metals - to accommodate all types currently available.

Replay frequency response reached 20kHz, allowing prerecorded tapes to be reproduced clearly, without muffling.

### REPLAY (Pre-recorded tapes)

frequency response (-2dB) 30Hz - 20kHz

speed accuracy +0.3%

hiss (70uS, Dolby out) -60dB

### RECORDING (blank tapes)

frequency response (IEC Primary Refs.)

ferric (IECI) 22Hz - 18kHz

chrome (IECII) 22Hz - 18kHz

metal (IECIV) 22Hz - 19kHz

separation (1kHz) -50dB

distortion (315Hz) 0.5%

hiss (70uS, Dolby out) -54dB

speed variations (DIN total) 0.04%

modulation noise (1-3kHz) -39dB

flutter energy (3-3.13kHz) -32dB

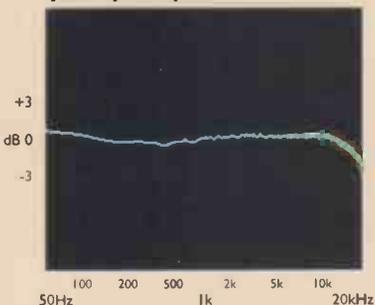
MOL/SAT (IEC Primary Refs.) 315/10k

IECI (ferric) +4.5dB/-7dB

IECII (chrome) +4dB/-3dB

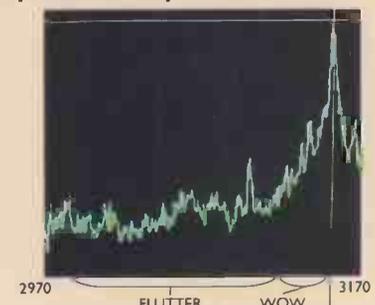
IECIV (metal) +4.5dB/-2dB

### Frequency Response



Flat frequency response with metal tape

### Speed Stability



Negligible wow and flutter from a speed stable transport



## AKAI GX-52

The GX-52 is well built and cleanly styled. Akai haven't cluttered up the front panel with spurious legends and markings, but there is a fair selection of facilities all the same. The most unusual of them soon becomes apparent: it is a powered cassette door. On-board logic accepts commands like fast wind or even record, closing the door as part of the operating sequence. Since this eliminates door closing as an operation it makes the deck easier to use. Akai have long provided automatic tape type sensing even on their budget models, so it was no surprise to see it fitted to the GX-52, eliminating the chore of manual selection. A bright blue legend lights up on the display panel to confirm identification: METAL, CR02 (chrome) or NORM (normal/ferric).

Other potentially useful features for those who use prerecorded tapes are a programme search system that relies on four second (minimum) gaps between songs (as such systems normally do) and a tape counter that reads elapsed time in minutes and seconds. The search system can be programmed to skip any specified number of tracks and I found it worked well enough. Like all these things, you have to learn its modus operandi but having done so it was easy enough to use. To supplement this, the deck can be set to play repeatedly between selected start and stop points.

If you want to use the GX-52 as a musical alarm clock, connect it up to a timed switch and it will either start playing or recording when power comes on.

I noted that Akai have fitted a back illuminated cassette compartment so users can see at a glance roughly how much tape is left. All the main controls are sited over at the right of the fascia and needed just a light touch for operation. The GX-52 was easy to use, quiet and fast in all its operations.

There could well be some grading of importance of the functions through use of sized controls; a headphone volume knob identical to a bias control and right next to it is hardly a good idea, since bias is carefully preset but volume continually adjusted. They need to be differentiated visually, since twiddling bias by mistake whilst recording would significantly upset recording quality.

### Sound Quality

The GX-52 stood out in just about every respect. My prerecorded tape from Decca of Ashkenazy performing various Chopin works, had a glorious performance I and showed within seconds how good the Akai transport was. The sweetness and purity of notes was outstanding. There was a lovely sense of assurance in the way notes were sustained with apparent alacrity. This deck is a superb choice for those who listen intently to piano and find the impurities of tone so common with cassette to be offensive. I knew immediately, before measurement, that the Akai was performing superbly in this area, allowing the full range of expression in a performance to come through. Additionally, it displayed clarity and very solid, dry bass. So the GX-52 replays prerecorded tapes exceptionally well.

There were no disappointments with recordings either. That's MR-X PRO produced a recording very close to the original. Superb transients, fast and clean, imparted a fine sense of pace and precision. I noticed that there was no sign of bass softness or wallowing; the bottom end sounded dry and tight. Fine clarity across the mid-band allowed harmonising vocalists to come through without muddle. I was most impressed by this performance.

TDK SA chrome bias tape predictably displayed some flattening of treble and high frequency confusion. This is as much a property of the tape as the recorder.

TDK AR sounded a bit enclosed at normal bias. I had to reduce bias by -12% to get matters right. Then AR shone as it so often does, giving a beautifully relaxed performance with strong, clear treble - quite unusual for ferric tape. This was another superb recording from the Akai.

### Summary

As I have found before, the GX-52 offers a superb performance all round. It plays prerecorded tapes with a clarity and stability unusual at the price. It also makes excellent recordings on metal and ferric tapes in particular. They reached a standard above that of most competitive models and approaching that of Nakamichis'.

## HARMAN KARDON TD-4200

The TD-4200 is a new cassette deck from Harman Kardon, lying bottom in an extensive range. Styled in the same vein as Marantz and Nakamichi cassette decks, it has a convex ledge running the width of the fascia, which is purely cosmetic. Harman manage to integrate this feature into the overall scheme of things well, not allowing the cassette to become totally obscured, for example. The upper section of the cassette door is tinted, but the tape can still be seen behind it, even though back lighting is not used as it is on the Sony TC-K520. The Harman looks cleanly styled and finished, a feature that is likely to win it some friends when jostling with its competitors on the shop shelf.

A dark tinted curved window in the ledge carries both a record level display and a tape counter that reads approximate elapsed time. Both have pin sharp, pale blue fluorescent numerals and symbols. The record level display is fast acting and covers a wide range; it proved easily legible. Automatic tape type selection removes some extra button pushing, a legend on the display panel clearly showing what sort of tape has been inserted (Type I for ferric, Type II for chrome and Type IV for metal).

The visual simplicity of the TD-4200 is due partly to the absence of spurious legends and partly to the fact that there are few facilities. Whilst Harman don't sink to using a mechanical tape counter, they do omit Dolby HX PRO. Luckily, high frequency head overload performance proved so good, it wasn't necessary. No form of memory stop exists, which is an inconvenience. Viable bias for tape tuning has been included, albeit for ferric and chrome tapes only. Ideally, a small amount of adjustment should be provided for metals, since they vary significantly and yet, being expensive, should give optimum performance. Without tuning this becomes unlikely. Harman are not alone in their omission; other decks in the group lack variable metal bias as well.

The solenoid controlled transport clanked strongly at times, but I found its clearly laid out control buttons easy to find and use. Overall, the TD-4200 comes across as a neatly and cleanly styled deck that is easy to use, if simple in terms of facilities.

### Sound Quality

Recording quality with That's MR-X PRO was good in terms of basic tonal balance. Metal tapes often sound bright on decks that are factory set and non adjustable, but not in this case. In fact, there was some slight cuppiness and warmth to vocals, due to slow treble fall. Also noticed immediately was wallowing and indistinct bass. Otherwise, the TD-4200 worked well with That's MR-X PRO, giving a recording of good quality. The same could not be said for TDK MA metal tape though. It sounded obviously warm and bass was floppier. Piano did, on occasions, sound shaky, but this was an intermittent effect. Otherwise, note purity was good, but there was some temporal vagueness all the same. The Harman was only competent in this area although it would not offend anyone who listened intently.

There was a peculiar type of brightness with TDK SA chrome tape; upper treble was missing but lower treble (around 8kHz) was emphasised (normal bias). This gave a bright sound, without wispieness or sharpness. In spite of this effect, vocals sounded a bit veiled and indistinct, even though recording level was peaked at +1 dB or so. Overall, performance with chrome tapes was not especially impressive.

Using normal bias with TDK AR ferric tape resulted in a wallowing and grunting bass, made noticeable by a suppressed upper treble. Reducing bias to brighten the sound helped significantly, but I was aware of a certain crudeness of presentation that, for want of a better description, I have to say was "cassette like". A Sheffield Labs Nakamichi reference recording on metal tape clearly revealed soft bass again, on replay only. Played on our reference Nakamichi ZX-9, the bass line was firm in quality and, being from a synthesiser, well timed. Both properties evaporated with the Harman. However, normal prerecorded tapes, that peak at a much lower level played well, sounding bright and clear. I was aware of temporal vagueness and confusion with Ashkenazy playing Chopin; again the Nakamichi showed how clean and well defined in the time domain this recording can sound.

### Summary

Although very neatly styled and visually attractive, the TD-4200 is at heart a simple package. It works well, but lacks distinguishing features in terms of performance or facilities.

### Measured Performance

Replay frequency response, which affects pre-recorded tapes, reached 14kHz before rolling away. Ideally, it could have held up a bit better than this, to 16kHz or even 18kHz, but there was little sign of dullness with most prerecorded tapes used on this deck during listening tests. Speed measured -0.4% slow, but I was not aware of any difference in terms of tempo. The replay amplifiers were quiet, hiss being low and hum negligible.

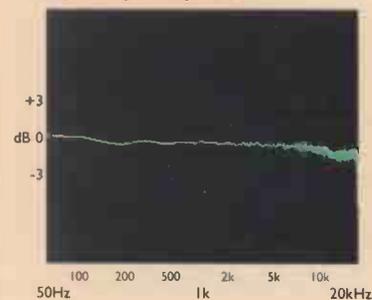
Speed stability of the transport was good in most areas, but random drift did make itself known. The analysis below shows this as a wide and ragged peak at right. This is the test tone wandering in frequency; ideally it should be tall and thin. Lack of capstan wow was responsible for good note purity, and low flutter aids clarity and smoothness.

The TD-4200 has a frequency response that reaches 19kHz with metal tape, seen below. The slight but noticeable fall in treble (with TDK AC-712 factory alignment tape) is balanced out by use of That's MR-X PRO. Chrome and ferric tape could be tuned with variable bias to reach 18kHz or thereabouts. Bass output fell away below 15Hz.

Head overload figures were respectable with all three tape types. Lack of Dolby HX PRO affected treble overload little. Combined with low hiss, this gave the TD-4200 wide dynamic range.

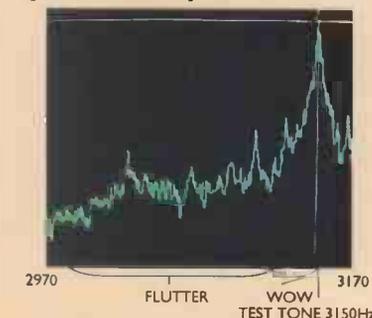
<b>REPLAY (Pre-recorded tapes)</b>	
frequency response (-2dB) 30Hz - 14kHz	
speed accuracy	-0.4%
hiss (70uS, Dolby out)	-61dB
<b>RECORDING (blank tapes)</b>	
frequency response (IEC Primary Refs.)	
ferric (IECI)	15Hz - 14kHz
chrome (IECII)	15Hz - 17kHz
metal (IECIV)	15Hz - 19kHz
separation (1kHz)	-51dB
distortion (315Hz)	0.7%
hiss (70uS, Dolby out)	-54dB
speed variations (DIN total)	0.08%
modulation noise (1-3kHz)	-40dB
flutter energy (3-3.13kHz)	-26dB
<b>MOL/SAT (IEC Primary Refs.)</b>	
IECI (ferric)	+3dB/-5dB
IECII (chrome)	+2dB/-4dB
IECIV (metal)	+2.5dB/+0.5dB

### Frequency Response



Flat frequency response with metal tape, reaching 19kHz

### Speed Stability



Some random drift, widening peak at right, but low capstan wow and flutter.

## Measured Performance

Sony's head has a very flat frequency response. The analysis below shows it reaches right up to 18kHz before output drops away suddenly, probably due to head gap limitations. This result is with metal factory alignment tape AC-712, equivalent to TDK MA. Increasing the bias got rid of the slight upward tilt, which in practice got rid of some latent brightness in recordings. Ferric and chrome tapes tuned flat also. Low frequency response extended down to 12Hz, without too many peaks or dips.

The head also showed itself able to handle reasonably healthy recording levels before overloading. Mid-band overload panned out at +3dB with That's MR-X PRO, which is pretty good, especially since the treble overload threshold was healthy as well. Bias was set high with ferrics, causing early treble overload (-11dB SAT10k). Chromes overloaded early (+1.7dB) in the mid band, as usual.

Hiss levels were very low and there was no hum. Equalisation in the replay amplifiers and head azimuth were both correct, resulting in a flat replay frequency response that extended right up to 17kHz. This ensures pre-recorded tapes do not sound muffled.

The transport held basic speed well; it had little drift. Both wow and flutter were reasonably low. The analysis shows that the transport behaved itself.

The TC-K520 measured well in all areas; it has no major weaknesses.

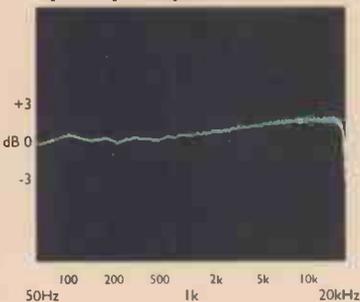
### REPLAY (Pre-recorded tapes)

frequency response (-2dB) 30Hz - 17kHz  
speed accuracy +0.7%  
hiss (70uS, Dolby out) -59dB

### RECORDING (blank tapes)

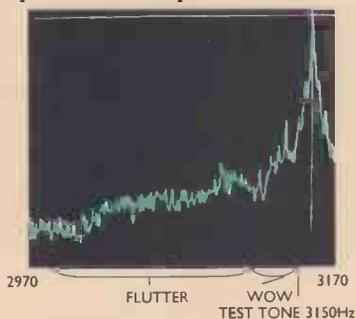
frequency response (IEC Primary Refs.)  
ferric (IECI) 12Hz - 9kHz  
chrome (IECII) 12Hz - 12kHz  
metal (IECIV) 12Hz - 19kHz  
separation (1kHz) -51dB  
distortion (315Hz) 0.8%  
hiss (70uS, Dolby out) -56dB  
speed variations (DIN total) 0.1%  
modulation noise (1-3kHz) -39dB  
flutter energy (3-3.13kHz) -32dB  
MOL/SAT (IEC Primary Refs.) 315/10k  
IECI (ferric) +4dB/-11dB  
IECII (chrome) +1.7dB/-6dB  
IECIV (metal) +2.5dB/0dB

### Frequency Response

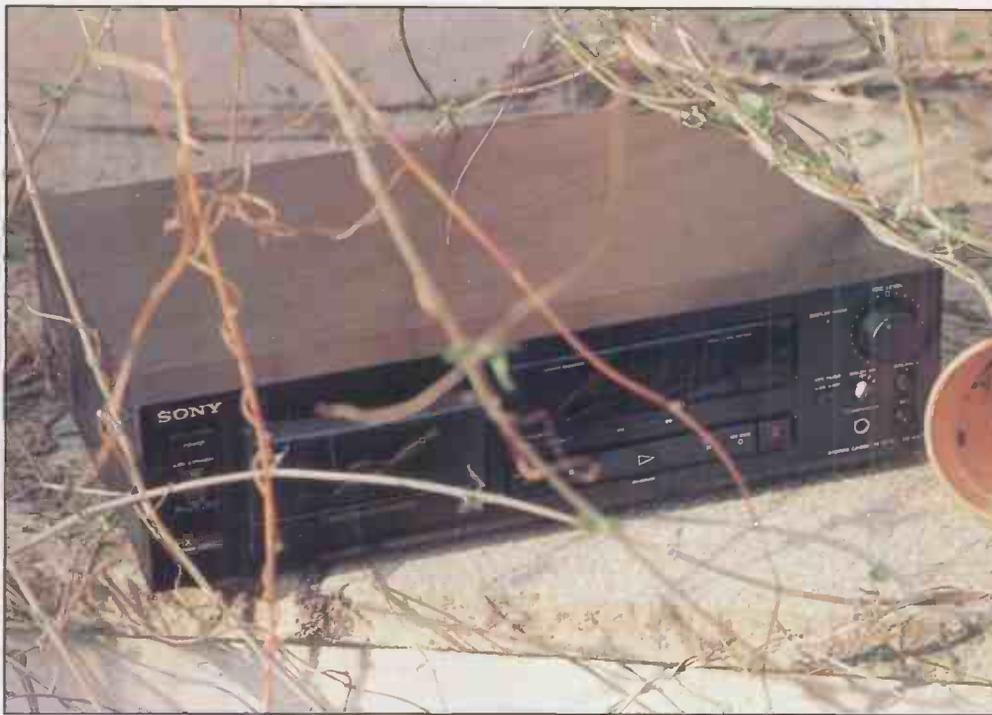


Almost flat response with TDK metal tape at normal bias

### Speed Stability



No flutter peaks and little drift, shown by sharpness of peak at right



## SONY TC-K520

Although the TC-K520 costs £170, which is hardly a king's ransom, it is solidly built and very well finished. Judged on appearance and build quality alone, I would have said it was an expensive model - one that was worth at least £250. Sony have managed to add many extras too, whilst at the same time staying clear of real trivia. Most surprising at the price is a powered cassette door. Press the Open button and it opens automatically, accompanied by the whim of a servo motor. Pop in a cassette and press the button again - and it whirrs closed. I wouldn't call it a vital facility, but it does add to convenience, because the door also closes when any function button like Play is pressed. It effectively eliminates the need to shut the door by hand.

Sony fit a bright blue fluorescent display panel with four digit tape counter, long record level indicators, legends that show what tape type has been inserted and automatic tape type selection. There is a zero (memory) stop, Dolby noise reduction, Dolby HX PRO to raise treble overload when recording, and variable bias for tape tuning. Sony's handbook says this last function has "minimal" effect upon metal tape; tests showed they're right but the effect was still large enough to be useful. Metal tapes such as That's MR-X PRO and TDK MA both tuned flat at maximum bias. Adjustment range was large enough with ferrics and chromes to yield flat frequency response also, so the deck tunes in to tapes well.

A bright green light behind the cassette makes the amount of tape left easy to judge. Like most cassette decks these days, there's no mic inputs, but a headphone output is provided, albeit without volume control.

I found this deck easy to use. It has a solenoid controlled transport that emits metallic clanks, but the buttons have a short, positive feel to their action. The uncluttered front panel makes everything easy to find, as do the lack of spurious legends.

### Sound Quality

Generally I didn't notice the speed instability of this deck. It took a random form over the long term, rather than being cyclical and regular. Only when a sudden event corresponded with a sustained note did the outcome become discernable. For example, a Decca pre-recorded tape of Ashkenazy playing Chopin's Scherzo No 2, OP31, quite obviously suffered "cracked" notes, due to random pitch changes; note purity was poor. Recordings made on the deck suffered equally with piano. Some may not appreciate this small weakness. Otherwise, prerecorded tapes were reproduced well, with strong dynamics and clean treble. I found the Sony enjoyable to listen to in this role.

Recording quality with That's MR-X PRO metal tape (max. bias, +4dB on peaks) was superb. Transients were preserved, giving a sense of speed and precision. Dynamic contrasts were also delivered without hindrance, making for a strong, clear sound. Tonal balance was correct.

TDK SA chrome proved far less successful, graininess and splashy treble being evident, even when peaking at just +1dB.

I hoped TDK AR ferric would work its usual magic - but not this time. Even peaking at +1dB and with bias reduced, treble overload and erasure was evident, leading to congestion on vocals and a peculiarly enclosed or dark sound. I would rate this as satisfactory, but no more. The problem was due solely to early treble saturation, reflected in the -11dB SAT10k result.

### Summary

The Sony played prerecorded tapes well, those centred on a piano performance excepted. Recording quality on metal tape was excellent, but on ferrics and chromes it proved average.

## MARANTZ SD-40

The SD-40 combines large size with small operating buttons. As I have said before, ergonomically it is no treat. I found myself fumbling to operate this deck, due to its small and cramped controls. Quite why such an impractical format has been adopted is difficult to understand.

The cassette door has a small window through which a tape is barely visible. Marantz join Nakamichi in this, so they are in good company. It makes quick visual checks of tape remaining impossible. Reliance on the tape counter is therefore more essential, but this is a simple, unlit, three digit mechanical affair. One benefit of mechanical counters, however, is that they do not lose their count when the deck is switched off. No memory or zero stop system has been provided, nor any form of music search. Marantz do fit automatic tape type selection, however, which makes life easier for users by avoiding the possibility of selection error. Gnat sized pin points of light indicate what sort of tape has been inserted; not being a gnat I found them difficult to read.

To the right of these indicators lies an intense blue fluorescent record level display that runs into red sectors past 0VU. It looks cramped but in fact has as much range and resolution as most of its rivals. It is in matters like this that the styling of the SD-40 seems so inept, often framing facilities badly so they look smaller or less attractive than they might. Few decks at this price have a really large record level display, or one of high resolution, so the SD-40 is not alone - it just hasn't been visually sculpted to best advantage.

Variable bias is included in the package, but it does not work with metal tape, as is common. Dolby B and C type noise reduction systems reduce hiss, but Dolby HX PRO has not been included.

### Sound Quality

There was no sign of hum or motor whirr at the start of tapes. However, sustained piano notes sounded impure. There was some slow pitch wandering, which made performances sound temporally vague. I did not find the effect annoying, but it robs music of precise timing. Deep bass was weak and there was some warmth due to upper treble loss. Altogether, the SD-40 sounded acceptable but it was not especially engaging to listen to.

Recordings made on TDK MA metal tape, peaking at around +2dB, displayed some brightness, but it was not unpleasant. Again, deep bass output was weak, robbing the sound of weight. Clarity across the mid-band was fine. A good if not exceptional performance.

TDK SA chrome bias tape sounded thin and unnatural at normal bias. Increasing it by two thirds brought the sound into balance, but some dulling of transients and lack of precision remained. I noticed some messiness on vocals too.

TDK AR ferric tape proved to be a saviour for the SD-40, as it so often does for other decks. It gave firm, clear treble and fast transients, musical dynamics also being preserved well.

The SD-40 returned a generally mediocre performance in terms of sound quality, both with recordings and when replaying pre-recorded tapes. However, its sins were ones of omission rather than commission, allowing it to pass muster without drawing significant criticism.

### Summary

Marantz have had to cost cut strongly with this deck and it has had an affect. Overall, results were mediocre in all areas, both in recording and replaying pre-recorded tapes. This is not to say that the SD-40 displayed any major flaws subjectively, so much as it just didn't shine.

### Measured Performance

The frequency response analysis below, with TDK AC-712 factory alignment tape, clearly shows the overall rise toward high frequencies, which gives the SD-40 a bright sound. It also shows that below 100Hz bass begins to roll off, resulting in a bass light sound. Variable bias equalised ferric and chrome tapes well, allowing output to reach 18kHz. Marantz fit a good head to this deck, something the overload figures confirm. With That's MR-X PRO metal tape, the mid-band/treble ceilings (MOL315/SAT10k) were high at +3dB/+3dB. Mid-band overload could have been higher with ferric tape in particular. Recording level should not be taken much past 0VU with the SD-40, which limits dynamic range a bit.

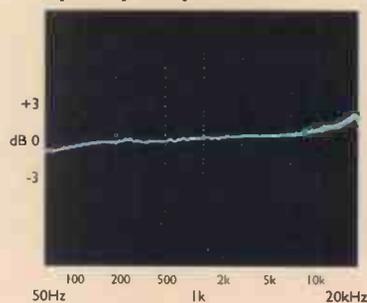
If anything subverted the aim of high fidelity in this deck, it was the transport. Whilst it didn't wreak havoc, the speed stability analysis clearly shows how the transport wandered in basic speed, imparting vague pitch to notes. Note how wide and ragged the peak at right is, due to random drift. This is a poor performance at the price and it carries its own cost in terms of loss of fidelity.

<b>REPLAY (Pre-recorded tapes)</b>	
frequency response (-2dB)	30Hz - 19kHz
speed accuracy	+1.6%
hiss (70uS, Dolby out)	-61dB

<b>RECORDING (blank tapes) frequency response (IEC Primary Refs.)</b>	
ferric (IECI)	40Hz - 18kHz
chrome (IECII)	40Hz - 19kHz
metal (IECIV)	40Hz - 20kHz
separation (1kHz)	-52dB
hiss (70uS, Dolby out)	-56dB
speed variations (DIN total)	0.14%
modulation noise (1-3kHz)	-40dB
flutter energy (3-3.13kHz)	-23dB

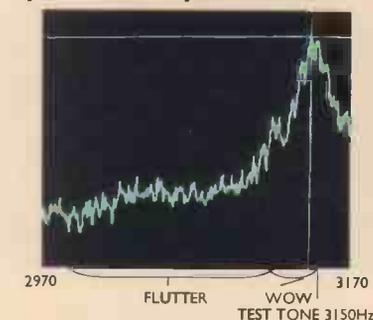
<b>MOL/SAT (IEC Primary Refs.) 315/10k</b>	
IECI (ferric)	+1.5dB/-5dB
IECII (chrome)	+1.7dB/-4dB
IECIV (metal)	+2dB/+2dB

### Frequency Response



Treble lift gives a bright sound

### Speed Stability



Significant speed drift can be seen as a wide and ragged peak

## Measured Performance

The CT-W630R measured extremely well; almost too well. Both transports displayed unusually low amounts of drift and wow, some flutter disturbing the picture. This can be seen as spikiness in the speed stability analysis below. Note how sharp the main test tone spike at right is though, indicative of low drift (0.05%) and wow (0.05%). I would doubt that all samples could turn in this sort of performance; the transports could not be consistently so good at the price.

Both transports gave near perfect results in both forward and reverse directions. Replay frequency response was flat to around 16kHz on both transports, in both directions, so whichever deck a tape is played on - and in whichever direction it will not sound dull.

The record head proved to be a good one on Deck II. Bias was set too low, giving a treble overload threshold higher than that in the mid-band, but overall performance remained creditable with That's MR-X PRO metal tape. Frequency response was flat to 15kHz, after which treble output rose, adding some brightness to metal recordings (see Frequency Response analysis). With low hiss and hum, the CT-W630R review sample measured unusually well.

### REPLAY (Prerecorded tapes)

frequency response (-2dB)	30Hz - 17kHz
speed accuracy	+0.5%
hiss (70us, Dolby out)	-58dB

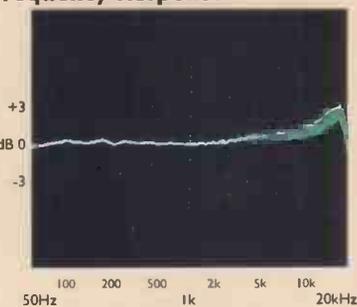
### RECORDING (blank tapes)

frequency response (IEC Primary Refs.)	
ferric (IECI)	35Hz - 16kHz
chrome (IECII)	35Hz - 15kHz
metal (IECIV)	35Hz - 13kHz
separation (1kHz)	-48dB
distortion (300Hz)	1%
hiss (chrome, Dolby out)	-54dB
speed variations (DIN total)	0.08%
modulation noise (1-3kHz)	-39dB
flutter energy (3-3.13kHz)	-22dB

### MOL/SAT (IEC Primary Refs.) 315/10k

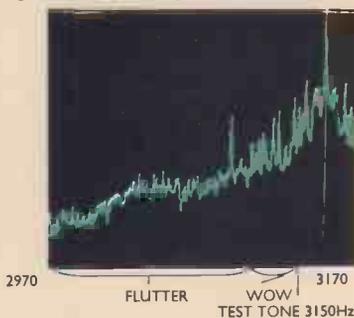
IECI (ferric)	+4dB/ -4dB
IECII (chrome)	+0.5dB/ -2dB
IECIV (metal)	+1.5dB/ +3dB

## Frequency Response



Low bias results in treble lift with metal tape

## Speed Stability



Low drift and wow are indicated by sharpness of the test tone spike at right



## PIONEER CT-W630R

We threw this twin cassette deck from Pioneer into the group, costing just £200. Dubbing decks like the CT-W630R are very popular, but I suspect their popularity lies with those who have to have "everything", just in case some obscure need arises. The extra transport in particular is an expensive item, so dubbing decks have to suffer a compromise somewhere - it would be unrealistic to expect otherwise. Having everything carries a price. I am still surprised at just how much Pioneer offer, all the same: both transports are auto-reverse.

Pioneer do a good job in minimising the problems. Dubbing decks were once so poor they threatened to pass into extinction. Manufacturers now seem to have realised they must reach certain minimum standards and the CT-W830R does so, which is quite a feat at the price.

The left hand transport will only play tapes, it cannot record. It is the right hand transport (Deck II) that both plays and records. To dub, a tape is played in Deck I and the copy is recorded in Deck II. This process can be carried out at normal speed, or double speed with some loss of quality.

Pioneer go to some lengths to fit all essentials. Automatic tape type selection graces both transports, which makes life easier. Dolby B and C noise reduction systems work with both transports and Deck II has Dolby HX PRO, to improve treble quality with recordings. It proved very effective too. Microphone inputs are included. Auto-reverse is utilised for Relay Playback, meaning one tape starts playing when the other finishes. The machine will auto-reverse dub, to copy both sides of a tape, providing both tapes start playing forward (left spool to right spool). It will stop at the end of side B of either original or copy, no matter what reverse mode is selected. Of course, it will auto-reverse record from an external source as well, so a tape does not have to be manually turned over at the end of one side. A rotating head platform is used on both transports; when the end stops wear, azimuth error increases. This reduces treble and causes dullness when

playing pre-recorded tape or recordings made on the machine in the other direction (sorry this sounds so complex!).

Only Deck II has a tape counter and it is a tiny mechanical device, that is barely readable. The record level display has just a few LEDs. These are the most obvious drawbacks.

## Sound Quality

Waiting for Ashkenazy to play, before any music was heard, I noticed a growling background hum. The growl was almost certainly from motor modulation of basic mains hum. There was some slight softening of treble on both transports when playing pre-recorded tapes, but they still sounded reasonably clear and stable.

Recordings with TDK MA metal tape were a bit bright and thin - there was a brittle sheen and some real sharpness at times. Higher coercivity tapes like That's MR-X PRO were not acceptable at all, being far too bright.

TDK SA chrome also sounded bright, but in a different manner. It was less incisive in its treble, but also more splashy and muddled - as chrome usually is.

As is so often the case, TDK AR ferric tape saved the day. It offered a duller balance, but the added warmth didn't go amiss and there was a fine sense of ease and clarity to recordings. TDK AD sounded a bit brighter, if a bit more strained.

Copying was very successful. I detected little degradation in quality, results being determined primarily by the match of the blank cassette into Deck II. I do suspect, however, that the Japanese deliberately make dubbers sound bright to compensate for various losses, including azimuth error, that lessen treble.

## Summary

Our review sample measured unusually well; I would hope that this high standard can be maintained in retail samples. Sound quality was good in terms of basic pitch stability and overall clarity, but tonal balance of recordings was awry except with ferric tapes. Pre-recorded tapes replayed well on both transports. Copies sounded very clear. The Pioneer really was more successful at copying than it was at making originals.

## TECHNICS RS-B665

A strong feature of the RS-B665 is its quartz direct drive transport. This gives the deck unusually stable speed, tests showed (see Measured Performance). It is an unusual feature on a deck costing less than £200, but it proved effective in improving performance. Technics have also gone on to fit a host of functions; some useful, some questionably so. Automatic tape type selection with advisory legends is thoroughly useful in preventing recording errors and just making life easier. A large fluorescent display gives clear indication of recording level and it carries a big, four digit tape counter too. This has a useful zero stop. Meter range can be switched to concentrate on peaks as an alternative to full range display. I would appreciate this more if the RS-B665 had the recording range of a Nakamichi (which it doesn't).

I sense there is a battle of the doors going on in Japan. I know they think that the way the cassette door opens is crucial in forming peoples perception of the product. It has to open smoothly. Sony and Akai both power their doors, but Technics damp theirs so it crawls open slowly. It was a shade too slow for my liking.

Microphone sockets adorn the RS-B665; it is almost unique in having them. There is a headphone socket with volume control and both Dolby B and C of course. Dolby HX PRO has been fitted to raise treble overload headroom when recording.

I found the push buttons and controls worked smoothly. Somehow I felt I could tell this was a budget deck masquerading as something it is not, in spite of having prior knowledge. Technics finish their products well however, and the RS-B665 was no exception. A final touch - not to be missed out these days - is variable bias for tape tuning. However, it does not work at all with metal tape.

### Sound Quality

I remember reviewing this deck some time ago; then, as now, I was puzzled at the gap between measured performance and sound quality. The RS-B665 measures well, but it just doesn't match up subjectively. I strongly suspect early head overload at low frequencies is a contributory factor. Playing a well recorded James Newton Howard tape from Sheffield Labs (Nakamichi reference recording) revealed plummy bass, indicative of severe head overload. Tests do confirm this likelihood. Transferring the tape to our Nakamichi ZX-9 reference recorder showed that plummy bass wasn't a feature of the recording; it was being introduced by the Technics. Otherwise, although muddling was evident, treble was well reproduced and there was little muffling. So generally the RS-B665 worked well with pre-recorded tapes.

Recording quality was disappointing. TDK MA metal tape sounded thin and bright. Some muddling due to overload was evident too (+4dB peaks). The sound was pitch solid and imaging very sharp, but tonally however, I did not find the overall result especially pleasant.

TDK SA overloaded early, losing transient edges, slowing the sound and removing its precision. Reducing bias only added a wispy form of treble.

TDK AD should have given the best results, but it was running into compression and dullness even when peaking at just a few dB above 0VU.

The stable transport did ensure piano was perfectly stable in pitch terms; there was never a moment of uncertainty.

### Summary

Although the RS-B665 measures well and seems a bargain, I found its sound quality is peculiarly mediocre. Early head overload at low frequencies and resulting distortion may be the cause. This is a good deck, but I had hoped for more.

### Measured Performance

Drift on the RS-B665 was very low: just 0.03%. This had reduced irregular wow to a very low level. However, some capstan wow, a regular cyclic effect, tainted the picture slightly. It can be seen in the speed stability analysis as spikes or shoulders either side of the main test tone spike at right. These are 6Hz sidebands, caused by frequency modulation. The transport has little flutter.

In subjective terms, the transport will sound pitch solid, but capstan wow may slightly pollute notes with a modulation. Lack of flutter suggests good clarity and lack of that papery "cassette sound". A good transport means a lot with cassette decks.

It doesn't mean everything of course. I was disappointed that variable bias did not work at all with metal tape and that bias was set too low, resulting in rising treble with TDK AC-712, a Japanese factory alignment tape similar to TDK MA (see Frequency Response below). The +3dB peak at 16kHz imparts brightness to recordings. The head would have given more balanced overload figures also. had bias been higher. Ferrics and chromes could be matched in and gave good results.

The deck was well set up for prerecorded tapes and had no other weaknesses.

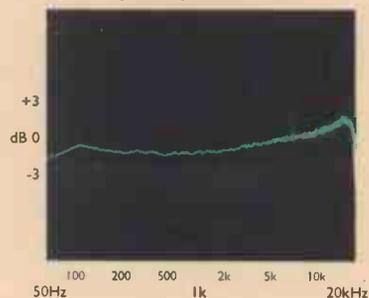
#### REPLAY (Pre-recorded tapes)

frequency response (-2dB)	30Hz - 16kHz
speed accuracy	+0.5%
hiss (70uS, Dolby out)	-58dB

#### RECORDING (blank tapes)

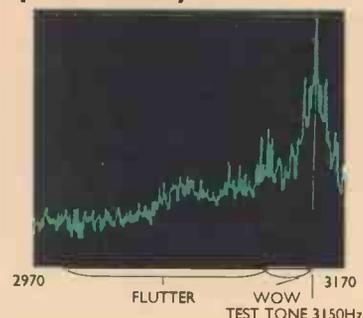
frequency response (IEC Primary Refs.)	
ferric (IECI)	25Hz - 12kHz
chrome (IECII)	25Hz - 10kHz
metal (IECIV)	25Hz - 10kHz
separation (1kHz)	-53dB
distortion (315Hz)	1%
hiss (70uS, Dolby out)	-55dB
speed variations (DIN total)	0.08%
modulation noise (1-3kHz)	-40dB
flutter energy (3-3.13kHz)	-29dB
MOL/SAT (IEC Primary Refs.)	315/10k
IECI (ferric)	+4dB/-8.5dB
IECII (chrome)	+0.5dB/-4dB
IECIV (metal)	+1dB/+0.5dB

### Frequency Response



Rising treble with metal tape gives bright sound

### Speed Stability



Very little drift or flutter; some capstan wow "shoulders"



The Akai GX-52 (left) is an expensive deck being sold at a very competitive price. It performed beautifully.

The Technics RS-B665 (below) is a feature laden deck of good performance and reasonable price.

## CONCLUSION

I am a trifle disappointed to find nothing new and exciting amongst the group of decks tested here. Some are old campaigners: I have tested both the Akai GX-52 and the Technics RS-B665 some time ago. Longer model life cycles are more sensible in my view. The fact that they are "old" is no drawback in itself and this report clearly shows that old is every bit as good as new - or perhaps better. The disappointment is that nothing has changed much in deck engineering over the past few years. Perhaps the manufacturers have lost interest in this ageing medium.

The big surprise for me is Sony's TC-K520, priced at £170, which is right at the bottom of our price band. It offers a good standard of performance, an array of useful facilities and even a powered cassette door. I was perfectly happy with this deck: it possessed no major weaknesses and offered fine recording quality on metal tape, but with some compromise on ferric and chrome tapes. Pre-recorded tapes played well also, lacking the dull, muffled sound that was once so common to them. I am not sure what the significance of Sony's pricing policy is with the TC-K520 but I sense there is still a story or a message behind it. Perhaps they are worrying about losing the Sony reputation for quality, since few prestigious hi-fi separates carry the Sony name these days. Is the TC-K520 a trooper in the fight back?

Someone that needs to fight back before it becomes too late is Marantz. The SD-40 was another disappointment in so many ways. I can accept poor styling, bad ergonomics and every other drawback if the basic requirements of high fidelity are met in a serious and diligent manner. Unfortunately, all the external and highly visible limitations of this deck are mirrored in both its internal design and parts quality. Marantz fit a good head, on which I compliment them. Little else manages to match its quality however. The transport didn't know what it was doing - and it had me wondering too! The final result was not a total disaster for the SD-40 had been set up quite well, but it wasn't exactly impressive either.



I felt that the new Harman Kardon TD-4200 was similar in broad outline to the Marantz, as it is also designed as a no-frills cassette deck. Harman's style and finish is visually attractive - much more so than the Marantz. In performance terms, the Harman was competent, rather than outstanding. There was nothing exceptional to lift it above the masses other than appearance. Out in high streets around the world, this may well be enough to guarantee success. In an informed and discriminating environment I fear it may suffer at the cogs of competitors who are engaged in price cutting.

I am slightly perplexed by Technics RS-B665. Last time I tested this deck it struck me as a fine contender for top model in its price category. Yet when I listened to it, the Technics failed to fulfill my expectations. Recordings lacked the dynamics and freedom from muddle expected at the price. The problem reappeared in this test: an apparently fine set of measurements were subverted by mediocre sound quality from recordings. I suspect that the problem lies in early low frequency head overload; recording levels must be kept down if sound quality is to be preserved. Music peaks should go no higher than the marked 0VU level. This

limitation dampens my enthusiasm, but the RS-B665 is a large and comprehensively equipped package that is otherwise very well engineered. As such it does have considerable merit.

The Pioneer dubbing deck made me squirm, as all twin cassette decks do. They seem to rattle and clank, almost all are covered in trivial buttons and legends and usually don't work properly. Having been so dismissive, I have to admit that this all-singing, all-dancing auto-reverse double deck did perform unusually well. For those who think a cassette deck should be able to perform cartwheels across the room, in addition to playing music, the CT-W630R is as good a choice as any.

Finally comes the Akai. I do have slight reservations about its higher price: this deck once cost £250 but has now been reduced to £200. However, I feel the price gap is fully justified by its performance. The GX-52 really does offer superb results and I recommend that serious listeners consider it a starting point for cassette decks in terms of price and performance. It is appropriate that Akai should have continued its life, for this deck is an excellent design that I can strongly recommend ●

# how to set recording level

After testing six cassette decks, Noel Keyword reveals a few secrets

On my hands and knees for the fifth time, carefully adjusting record level whilst watching the blue display bounce up and down, it struck me that little ever gets said about this mystic process. Yet cassette tapes vary in the way they behave and therefore in the way they should be used. Perhaps it is surprising that so little is said about how a tape should be recorded.

It is important to set recording levels correctly for best results. But just where they should be set depends upon the tape and the machine. It even depends upon the type of programme being recorded and the preferences and sensitivities of the person making the recording. Although tape as a subject has its own arcane and complex language, I will keep the following explanation simple.

## PEAK RECORDING LEVEL

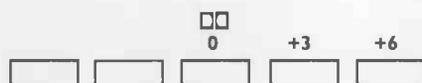
I am told by TDK that most people record up to the indicated maximum on their recorders. BASF also long pursued an argument based on this view. It seems perfectly understandable to me, even though in truth it does not necessarily give optimised results. Believe it or not, tapes are not formulated to give their best when recorded to the indicated maximum on a cassette recorder. Before explaining how different formulations should be treated, let me first discuss where peak record level is set - and why.

Broadly speaking, there are two points at which manufacturers place peak record level, identified as 0VU, 0dB, 0, or just by red (or sometimes orange) indicators. It is best to know which one your recorder is set to and the key to this is a funny little sign which you may have wondered about: the Dolby symbol. It represents a standard level of magnetic strength on tape. Budget decks usually have 0VU set below Dolby flux (-3dB or so), as shown below because their heads are not capable of going any higher before causing distortion.



**Fig 1** - Budget or mid-priced recorders usually have 0VU set below Dolby level, indicated by the Dolby sign

More expensive recorders (costing at least £200) commonly have 0VU set higher, right at Dolby level, as shown below. They should have heads capable of recording up to and beyond this level without distortion.

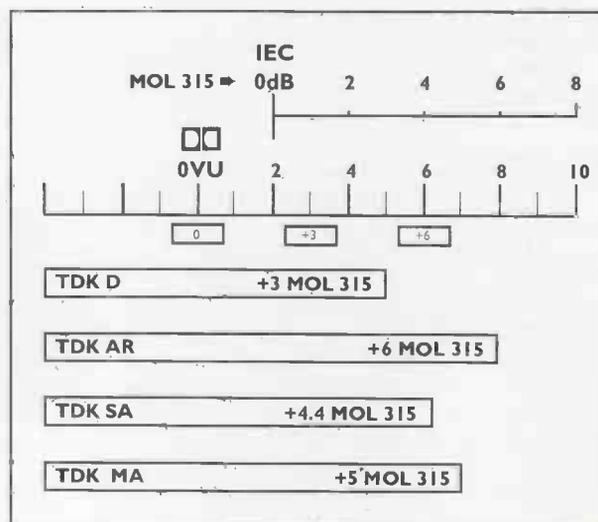


**Fig 2** - High performance recorders have 0VU set at the Dolby sign

The significance of this is that when talking about how much signal a tape can take before it starts to overload, I have to use a fixed reference point that you can also recognise and identify on your own recorder. It is known as Dolby flux and is usually identified by the Dolby symbol. If you don't have a little Dolby sign on the level display of your recorder, then 0VU is almost certainly set below (-3dB or so) Dolby.

**Fig 3** - Maximum mid-band (315Hz) recording level for various TDK tapes against a typical cassette record-level indicator.

At top is the IEC scale used when measuring tapes and cassette decks for peak recording ability. This enables MOLs and SATs published with reports in Hi-Fi World to be related to a recording level scale.



## MAXIMUM RECORDING LEVEL OF TAPES

It is often said or implied that ferric tapes accept least signal, chromes a little more and metals a lot more. This is now an out-dated generalisation. Using TDK tapes to illustrate the current situation, because they are representative, maximum recording level for various types is shown in Fig 3.

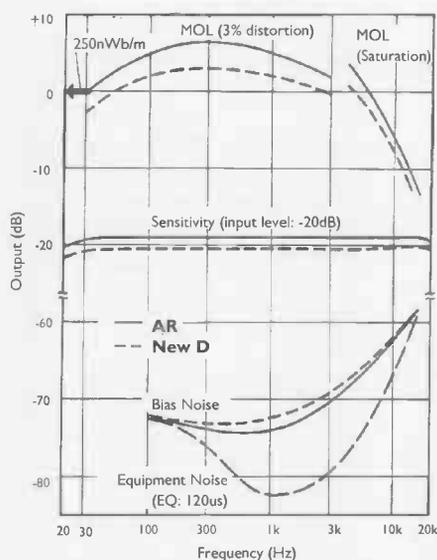
The chart in Fig 3 illustrates a number of useful generalisations and provides a rule of thumb recording level guide. Here are some conclusions to be drawn from it:

(all prices quoted by TDK and apply to C90s)

Budget ferric TDK D (£0.89 upward) is worst. It accepts less signal than the other tapes before overloading, so you get what you pay for. This applies to all its rivals, including Maxell UR, Sony HF, Thats RX and Fuji DR-IX, most of which accept even less signal than D.

The best tape is - amazingly - TDK AR, which is an inexpensive ferric (£1.13 upward). Many people tell me they find

AR gives superb results and is excellent for everyday use. I would concur. AR is a unique tape; other manufacturers have yet to equal it. However, it does have typical ferric drawbacks, notably hiss and low treble overload. On some decks this latter property will be heard as a lack of sparkle or an over warm sound. (See Fig 4 for technical details).



**Fig 4 - Performance graphs of TDK D and AR. The MOL curve for AR (unbroken line) shows its high overload limit.**

TDK SA chrome bias tape appears to be of doubtful worth, costing more (£1.50 upwards) than AR ferric. However, what this chart doesn't show is that it possesses much less hiss (-5dB).

On most domestic recorders, SA and its rivals cannot be recorded to the high level shown on this chart (compiled using a Nakamichi ZX-9). Around +3 is a wise maximum on the record level display of an ordinary recorder.

So why spend £2.45 (or upwards) on TDK MA metal tape, when AR can be recorded to a higher level and SA nearly equals it? MA accepts much stronger treble than both and it has less hiss than AR. In practice, it usually gives a clearer, cleaner sound with faster transients than SA or AR. I do now prefer to use a good metal like MA for best results. The trouble is in practice, metals often don't match in too well, having a treble peak. This can make metal recordings sound sharp, tonally thin and quite nasty. This is not the fault of the tape, but of the recorder.

## GENERAL RULES

Although the above conclusions apply to TDK tapes, they can be used generally. With the exception of AR, the tapes are fairly representative of products in their class. General rules I would list are -

### ● BUDGET FERRICS

(£1 max for C-90)

Don't push recording level too far above 0VU with budget ferrics, because they'll start to sound muddled and treble in particular will become very confused. To play safe, let the highest musical peaks hit only +3 maximum.

### ● SUPER FERRICS

(around £1.20 for C-90)

These are push-able. Let the highest peaks hit +5 or so and be prepared to experiment, since overload limits vary between brands and types.

### ● BUDGET CHROMES

(around £1.40 for a C-90)

Watch out, because on most domestic decks no more than +3 or so is advisable on musical peaks with these; they overload early. Low hiss should compensate.

### ● GOOD CHROMES

(around £1.50 for a C-90)

They will take just a little more stick than budget types: try +4 or so. Again, low hiss should compensate.

### ● SUPER CHROMES

(around £1.80 for a C-90)

These vary a lot between brands. Be prepared to experiment, but note that none accept really high recording levels (+4 max). Low hiss is usually their main strength.

### ● NORMAL METALS

(£2.50 for a C-90)

If the cassette deck can manage it, try allowing music peaks to hit +6. You will be well into the red. Discrete head Nakamichis can hit +10.

### ● PREMIUM METALS

(Funny money)

Only decks that use a very high level of bias can properly exploit them. For professionals only.

## CHOOSING A TAPE

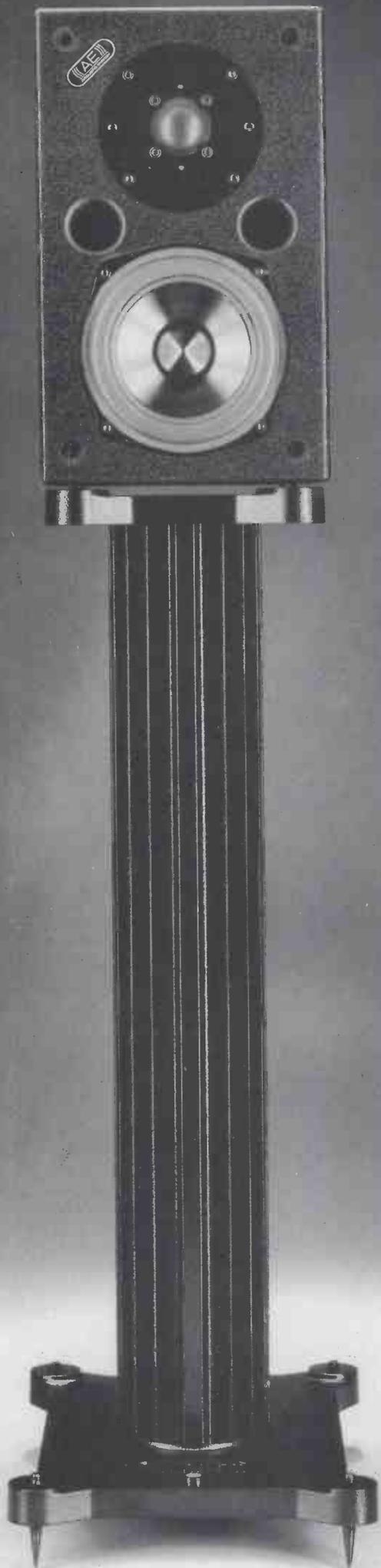
Classical music and Rock music have differing requirements best served by particular tapes.

The most obvious difference between them is overall music level or dynamic range. Classical works that have extended low level passages really do demand wide dynamic range, whilst being less sensitive to high frequency overload than Rock (strong in high frequency transients). For this purpose, choose low noise chromes like TDK SA or SA-X. BASF chromes can be good value also, especially when well worn because they polish up to give exceptionally low modulation noise. You'll notice this as a smoothness on strings.

TDK AR is a unique tape; other manufacturers have yet to equal it. However, it does have typical ferric drawbacks, notably hiss and low treble overload.

Much Rock music has continuous high levels that swamp out hiss. Good ferrics offer value for money here, but be prepared to accept lack of transient attack and general muddling in the treble. I prefer metals for Rock, providing they match in well. Unfortunately, most Japanese decks are adjusted for a bright sound with metal tape, which can often be unpleasantly sharp too. Since "dull" metals able to compensate don't exist, use of metal tape may be unattractive. With a sharp sounding cassette deck try That's MG-X or Maxell MX, by the way. These are least bright.

Finally, be prepared to experiment. When gauging the maximum record level you feel is acceptable, listen for general muddling and dirtiness - a sign of mid-band overload. Plummy bass is a sign of bass overload. Confused, splashy or slightly dulled treble is a sign of high frequency overload. My guidelines are fairly conservative ones of course; I record to a level that avoids distortion and compression. You might feel that a certain amount of degradation is acceptable, in which case push levels up a bit ●



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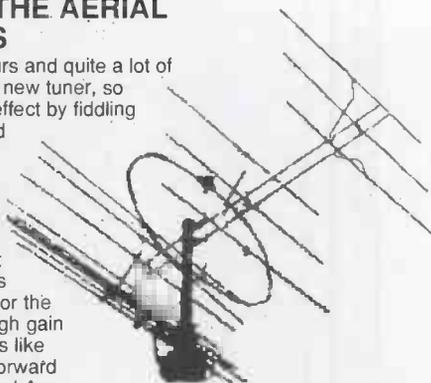
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# The trend that demands a new aerial concept

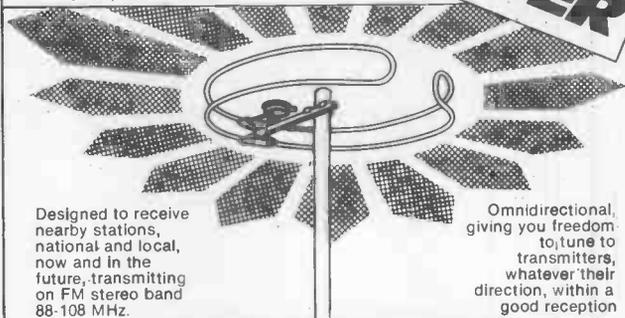
## But which aerial is best suited . . . and why?

First consideration is bandwidth. To fit all the new stations in, more and more transmissions will be using the top end of the VHF/FM frequency band, right up to 108 MHz. So you will certainly need an aerial capable of giving optimum performance over all this extended FM radio band. Even now there are FM stereo transmissions coming from several stations within good reception range of you. Soon there will be even more. And while a conventional aerial is aimed straight at a single transmitter, deliberately designed not to pick up any other signals, radio choice calls for an aerial that will get good reception from any direction.

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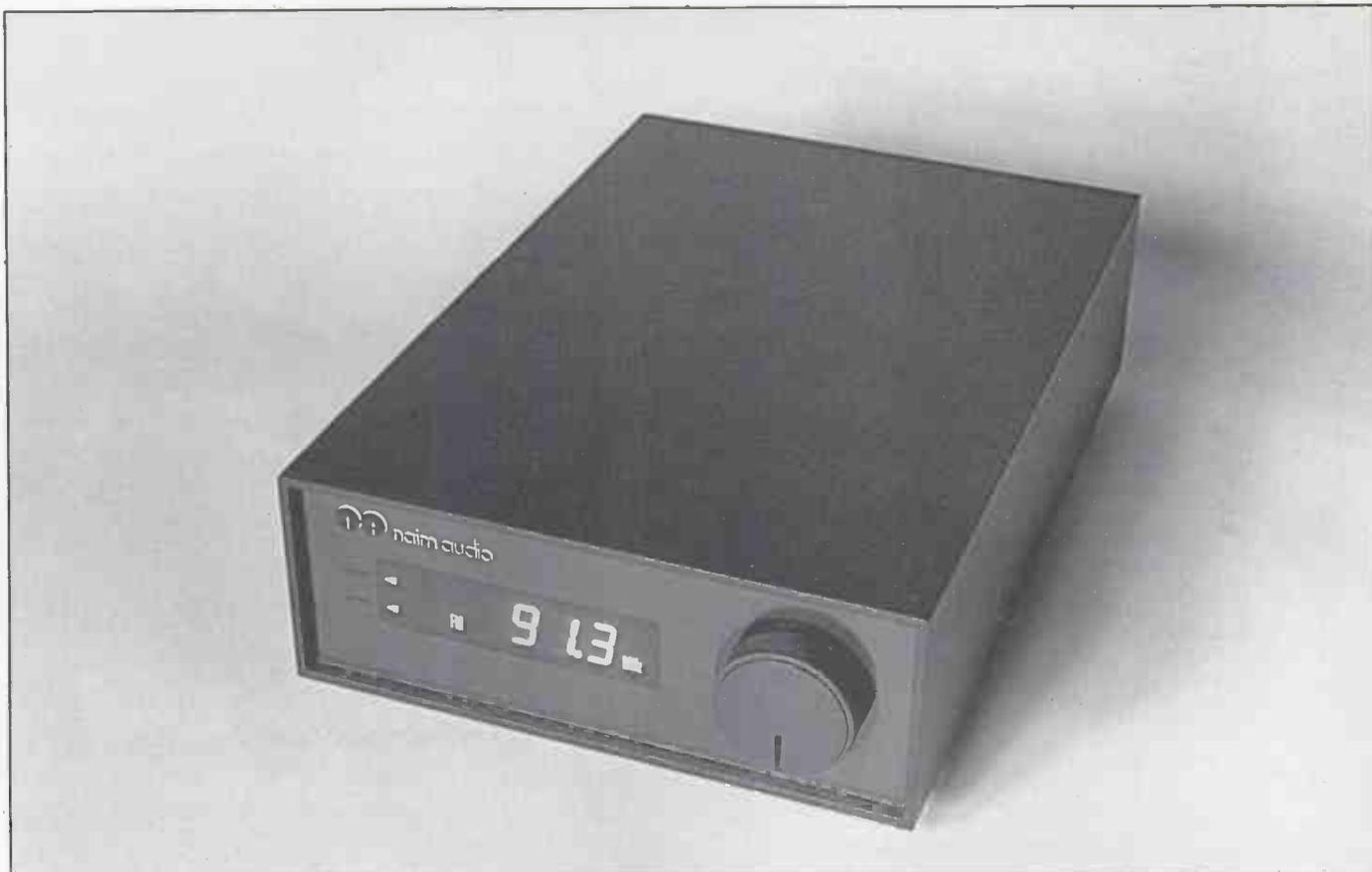
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# reception of quality

**Naim's NAT 02 tuner  
delivers superb sound  
quality - but demands a  
good aerial**

Here's a tuner that demands a good aerial, even though it costs £799. As such I am going to use it as an illustration of what a tuner needs from an aerial, as well as describing what it can deliver in return.

It might seem contradictory that such an expensive tuner should rely heavily on the performance of the aerial, but it isn't. To deliver good sound quality tuners must actually sacrifice RF performance, since there's a trade off between the two. Making the aerial take a larger role is one way out of this dilemma.

Naim have abandoned the usual design approach for tuners, which is a carry over from radio and communi-

cation receiver design. The NAT 02 has been designed to perform as a hi-fi tuner alone; it is not meant to pick up weak or distant stations. It won't discriminate very well between closely spaced stations either. All these things are traditional yardsticks of radio performance, usually applied to hi-fi tuners as well. Naim have thrown out the rule book with the NAT 02, designing it for optimum sound quality, at the expense of RF performance.

## Simple

There is little I can tell you about the tuner itself, it is so simple. Built into the usual extruded alloy Naim style case, it's very solidly made and well finished. The rocker style power switch is on the rear. Flick this on and a large, green LED frequency display lights up. It is accompanied by an attractive back-lit green Naim Audio legend, the letters FM and, if tuned to a station, two green arrows. One points to a dark black Signal legend and the other to a similar Stereo legend. Being black on grey, both are difficult to read.

The NAT 02 is not a knob twiddlers delight. It has no manual controls, except for the tuning knob. You cannot select mono mode to cut out the decoder and there are no station pre-sets. It has low level inter-station noise muting, which suppresses most but not all noise. There are some large thumps as it tunes into and out of stations. These are its foibles, ones that stand out nowadays

because they have been banished from most current designs.

One of the reasons they have become rare however is that dedicated VHF/FM radio chips (integrated circuits) from Hitachi, Motorola and the like incorporate natty circuitry to eliminate such nasties. And here we get a glimpse of another altogether more insidious but less visible problem: common usage of parts. If everyone uses the same chips, such foibles may well disappear but they may also get the same sound. The connection isn't guaranteed, but it is likely. Because the NAT 02 possesses Naim designed and manufactured circuits, including the tuner head, it is removed from this problem.

The manner in which Naim have made this tuner operate is interesting. Brightness of the frequency display intensifies when it hits a station. By this unusual method the tuner warns of the existence of stations, even weak ones down to a few microvolts. However, the noise muting shuts out any signal weaker than approximately four microvolts (very weak), so weak stations are not available by design! There's no way around this, because muting cannot be switched out. However, a good aerial will ensure all major broadcast stations come in at well above four microvolts, even in fringe areas, as the scale of signal strength shows (Fig 1).

## Hiss

Naim do not let hiss rise above -60dB or so, in stereo or mono

mode, so the O2 never sounds hissy. Whilst conventional tuners usually stay in stereo unless manually switched to mono, the O2 switches to mono automatically below one hundred microvolts, at which point the stereo beacon extinguishes, Fig 1 shows.

Below forty microvolts the Signal beacon goes out, meaning in effect don't bother, the signal is too weak! Whereas other tuners are switchable, the O2 is fixed, so owners are faced with a fait accompli here. What Naim are saying, in effect, is that the O2 is a hi-fi tuner designed to give good sound quality from strong, clean signals. It is not a high performance radio or communication receiver designed to capture weak, hissy signals.

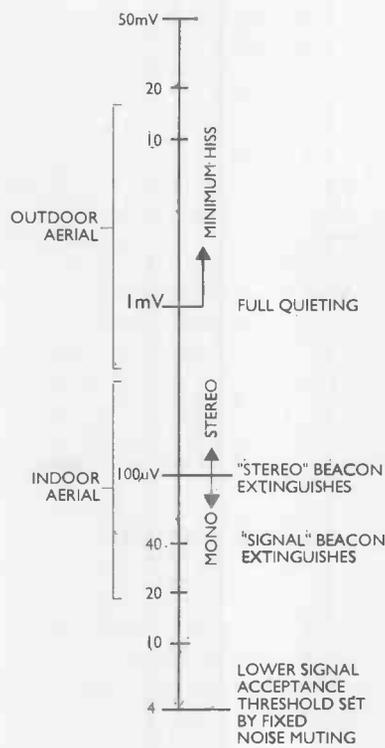
So much for the lights. Now on to the signal dependent performance. The O2 does not select well between closely spaced stations. However, its limits of performance would only be approached if a weak station very close to a powerful one was wanted. It is a rare situation in the UK, although with the advent of pirates and community stations, not a non-existent one. The O2 is not meant for such work. A good aerial aimed at the local transmitter will bring in national/local stations spaced far enough apart for selectivity not to be a problem.

With Radio 4 live studio speech I was aware of superb background silence and the stunning sense of being there

### Stereo

Most people will want stereo and here in particular the NAT O2 demands a good aerial. It must have more than one hundred microvolts to stay in stereo mode. Weak stations commonly sink below this with indoor aerials.

Then there is the problem of hiss on stereo. A large majority of tuners need at least one millivolt to reach a condition known as full quieting, where hiss sinks to a minimum. For real clarity and background silence, this condition must be met and invariably it means use of an outdoor aerial. Only when a transmitter is close by, within a few miles at most, may anything less be acceptable. The O2 needs exactly one millivolt, whereupon hiss sinks to a minimum



Approximate threshold levels on the NAT O2 and their relationship to typical aerial signal strengths.

of -73dB, at which level it cannot easily be heard.

Needless to say, I used the NAT O2 with a large outdoor array that delivers more than one millivolt of signal from all the major stations. It showed itself to be a superbly neutral sounding tuner, with no hint of emphases or tonal aberrations. Nor is there any sign of the upper mid-range harshness that characterises many tuners. The O2 has a soft, smooth and almost warm treble quality. With Radio 4 live studio speech I was aware of superb background silence and the stunning sense of being there - almost too close to events - that comes with a good tuner matched to a proper aerial.

The background silence was initially disturbed by an aberration that made me hit the ceiling, then ponder and finally pounce. I heard a heterodyne whistle and birdies - a problem that quality tuners must not suffer. Something told me it was coming from nearby equipment, but the computers were too far away. Realising Bitstream works at radio frequencies (30MHz), I pounced on our Deltac PDM-I SII Compact Disc convertor (7350 chip), switched it off - and the whistle disappeared!

The NAT O2 gave a fine demonstration of sound quality. It is smoother, more neutral and gentle on the ear than most. It does demand a good aerial, but this is little to expect I feel. **NK**

### Measured Performance

Frequency response measured very flat, as the analysis below clearly shows. The upper treble limit was 14kHz (-1dB), before output is rolled off by a 19kHz pilot tone filter.

At any tune position, distortion measured around 0.1% at 50% modulation. This is very low. Distortion components are shown in the spectrum analysis below, comprising second and third only.

Full quieting was reached at 1mV, hiss sinking to a low level of -73dB.

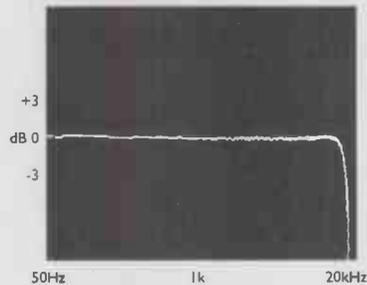
Pilot and sub-carrier suppression was good, but alternate channel selectivity was mediocre at 64db. The tuner jumps quickly to a strong adjacent channel signal, so it will not effectively work in such conditions. Since hiss never rises above -60dB or so, conventional sensitivity tests (-50dB hiss) cannot be applied.

The O2 measures very well in the areas that matter for good sound quality.

### Test Results

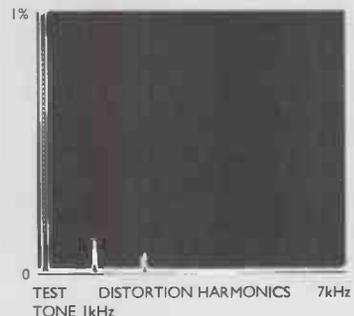
Frequency response (-1dB) 5Hz - 14kHz	
Stereo separation (1kHz)	-32dB
Distortion (50% mod.)	0.1%
Hiss (CCIR)	-73dB
Signal for minimum hiss	1mV
Sensitivity (-50dB hiss)	not measurable
Selectivity	
alternate channel (0.4MHz)	64dB
adjacent channel (0.2MHz)	N/M
Signal strength meter	
sector No.	lights at
frequency display intensifies	4uV
Signal legend illuminates	40uV
Stereo legend illuminates	100uV
Output level	250mV

### Frequency Response



Flat frequency response up to 14kHz

### Distortion



Negligible distortion of around 0.1% on stereo

For understandable reasons, aerials get neglected. If tuner specifications are to be believed, they are hardly needed - which is a major misunderstanding. And then there's the hassle and expense of getting one put up. Some enthusiasts may be able to install their own, but most will be obliged to let someone else take the risk, since roofs aren't usually pleasant or safe places to be. This is a pity, because from my experience, a good aerial provides a pretty astonishing improvement in sound quality from any hi-fi tuner.

# choosing an aerial

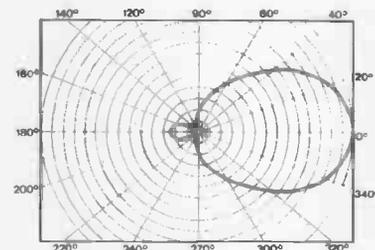
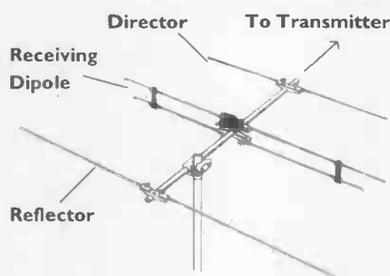
It is probably best to think of the aerial as the very front end of the radio reception chain, performing the same role as a pickup cartridge or CD player. Whilst it is neither seen nor accessible, it comes before the tuner in this chain and it is absolutely crucial to its performance. The importance of this was demonstrated to me when I heard the radical improvement to sound quality a proper aerial makes. I had been using a super sensitive Hitachi FT-5500 tuner with some sort of indoor arrangement that, to me at the time, sounded adequate and produced a reasonable deflection on the signal strength meter (about 0.4mV or so). Then Ron Smith (Ron Smith Aerials) installed a massive two-part mast on my chimney pot and attached a huge array to the top.

The effect of this surprised me. Naturally, I was expecting hiss to disappear, but I wasn't prepared for the huge improvement in fidelity that came about. Where previously, the tuner had provided good quality music and speech, suddenly it gave an almost embarrassingly frank insight into the broadcasting studio's. People would cough, make funny croaking sounds, drop things, shuffle papers and generally sound as if, as a stranger, they were a bit too close! Then someone would run a tape machine and suddenly there was hiss, hum, edits and what have you. Radio almost became too intense and varied to listen to. Before, it had merely offered unchallenging background entertainment but, knowing no better, I had never felt unhappy about it.

Since then I have installed my own aerials, not because I enjoy clambering around my roof (which thankfully is flat) but to learn about the problems and measure the results. For me, with my lack of experience, it is quite a lengthy and difficult job, running the downlead being a particular hassle. The typical all-in price of around £65 for a normal installation (Aerial Services Ltd quote, London area, March 1991, see box for more details), really is good value I feel. But more on getting an installer later. First, here's a short list of the basic functions of an aerial. You might be surprised at just how much it does do.

## Gain and Directivity

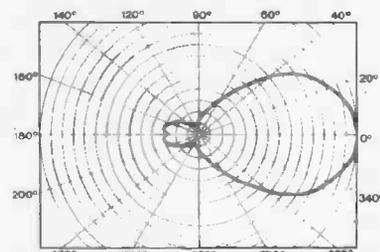
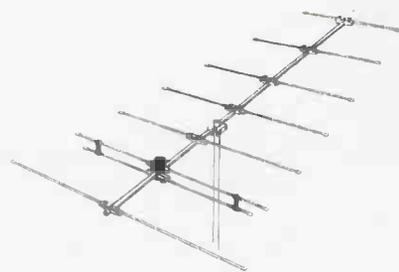
A good aerial performs an enormous service to any tuner. It amplifies (relative to a dipole) stations coming from the direction in which it is pointed, whilst rejecting stations from other directions, cutting out interference.



**Directional Characteristics**

**Fig 1** - The Antiference FM-1083 is a simple three element array, with director, reflector and dipole elements. Meant for good reception areas, it is directional, suppressing signals from either side and from behind.

The bigger the aerial, the more sensitive it becomes in the direction of capture. Whilst the Antiference FM-1083 shown above gives +4.5dB more forward gain than a basic dipole aerial, the bigger FM-1087 shown below gives +8dB gain, or around x1.5 more signal than the FM-1083. It is meant for distant or fringe reception areas.

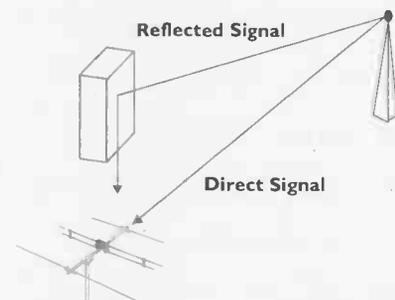


**Directional Characteristics**

**Fig 2** - The Antiference FM-1087 is a seven element array comprising five directors in front of the receiving dipole and one reflector behind it. It is more sensitive and a bit more directional than the FM-1083.

## Multipath Reception

Urban areas in particular can suffer from multipath reception, which causes distortion. Signals reflected off tall buildings arrive just after the main signal, confusing the tuner.



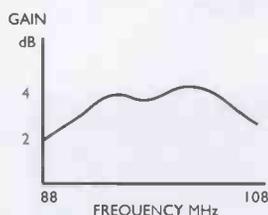
**Fig 3** - Multipath. The reflected signal arrives after the direct signal, causing distortion.

The solution is to carefully align a highly directional array to minimise reflective pickup and the multipath distortion that arises from it. If the resultant signal is then too strong, an attenuator can be used. In especially bad cases, a high gain aerial may be pointed at another more distant transmitter. This is the case in Brighton for example, where installers often point aerials at the Isle of Wight thirty miles away, rather than at the local transmitter one mile away!

## Bandwidth

Aerials are tuned to be most sensitive to a specific band of frequencies. For VHF/FM, the wanted band is known

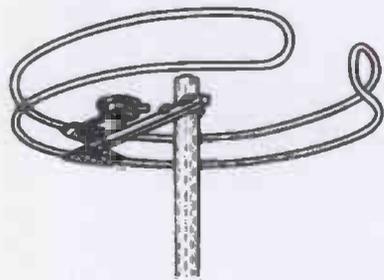
as Band II and stretches from 88MHz to 108MHz. Signals at other frequencies are suppressed, as shown below, lessening various types of spurious responses to them that can occur within tuners.



**Fig 4** - VHF/FM aeriels are tuned to accept signals in Band II only, and reject signals outside of it. This improves inherent tuner selectivity, lessening spurious responses.

### All Round Reception

Nowadays, with small, low powered community and local stations scattered around, many listeners may not want a directional aerial pointing at the local transmitter. In this case a simple dipole may prove satisfactory. It picks up equally from front and rear.



**Fig 5** - The curved dipole of the Antiference all rounder picks up stations from every direction.

The dipole does not pick up stations at either side of it. For true all round reception, Antiference make a curved dipole known as the Allrounder which is not directional at all (see Fig 5). Alternatively, a straight dipole standing vertically is non-directional and can be used. It will work well with circularly polarised signals, which most are now, in order to be compatible with car aeriels.

Be aware that all-round aeriels are not sensitive. To get even a reasonable signal from weak "pirates" or community stations, such aeriels must be sited as high as possible. Even then, the signal will be weak. If you are desperate to get a stronger signal from such stations, the only solution is to use a high gain aerial on a rotator, possibly coupled to a masthead amplifier. Expect to pay a few hundred for this and don't be surprised if the chimney pot flies away in a gale, nor if the local burglar decides to pay a visit to see what you've got at the bottom end! ●

## FINDING AN AERIAL INSTALLER and TYPICAL COSTS

Because reception conditions vary between areas and because particular difficulties can exist in some (like the shadow behind Lotts Road power station. London, for example), it is usually best to get a local installer. They should know all about local difficulties and how to overcome them. Travel costs will be minimal too of course.

The easiest way to find an installer is through the Yellow Pages commercial phone directory. Look under "Television and Radio aerial services".

Alternatively, contact -  
**CONFEDERATION OF AERIAL INDUSTRIES LTD.,**  
Suite 106,  
Grosvenor Gardens House,  
Grosvenor Gardens,  
London SW1W 0BS.

Tel: 071-828-0625

They can provide details of over 350 members around the UK.

### Searching the Yellow Pages

Here's my experience. I picked up the Yellow Pages one Saturday morning and, incognito, called -

**AERIAL SERVICES LTD.,**  
300 High Road  
Willesden, London NW10  
Tel: 081-459-7723

(they are also at  
38 Vauxhall Bridge Road,  
London SW1.  
Tel: 071-821-0126)

I have done this before and know Aerial Services Ltd are pretty together. They immediately told me a typical installation would cost £60-£70 all in (March 1991). Next day service was assured and no extra charges were made within the London area, defined by them as within the M25. The aerial installed would be an Antiference FMI083, three element type.

When I asked about the possible need for something bigger I was assured this would be satisfactory within the London area, so they did not try and talk the price up. However, balancing this, there are areas where more directivity in particular might be needed to avoid reflections off nearby buildings. They do not install rotators and the like, but they can fit double screened, low loss downleads if requested, at a

small extra cost.

This example gives you some idea of prices and what to expect. My next example represents the other end of the scale.

Ron Smith designs and installs his own aeriels. Naim recommend them, as do others. Ron Smith Aerials can and are prepared to install huge arrays, masts, amplifiers rotators and what have you. They are having a new catalogue printed, which features their new Orion range of VHF/FM aeriels. Again I phoned incognito -

**R. SMITH AERIALS,**  
98 Ash Road,  
Luton,  
Bedfordshire.  
Tel: 0582-36561

Enquiring about installation in the London area I was quoted £30/ hour travelling charges from Luton and told that two hours would be needed. Another hour would be added for installation and then materials were extra.

In the Luton area, there were no travelling charges and a typical installation charge would be around £70 all in, depending upon materials required. Installation time would usually be around one hour. This makes R.Smith prices similar to those of Aerial Services Ltd.

Finally - a tip. If, like me, you are fussy and want to be assured of a perfect job, make sure the installer has a Field Strength Meter. It measures signal strength and in my view such a meter is essential. As they cost a few hundred pounds, there's no excuse for not having one. I notice Ron Smith makes an assurance over this in his catalogue. Anything less than 1mV (one millivolt) of signal from the major national stations is less than ideal, since most tuners do not reach full quieting below this level. However, in some difficult areas, less may have to be accepted.

It would be wise to enquire about measurement capability on the telephone at the outset. You may then like to have the performance of your aerial demonstrated to you after the installation has been completed. Again, I suggest you mention this beforehand, because it lets the installer know what you expect and therefore what sort of performance target he must aim for ●

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I may have been the only hi-fi reviewer in the business who didn't think the Audio Technica AT-F5 moving coil cartridge was a milestone in the history of cartridges. I will probably be the only one to have similar feelings towards its replacement, the AT-OC5.

Priced at £119.95, the AT-OC5 is slightly more expensive than its predecessor, but it has been significantly improved I am told. It now features a cartridge body of similar design to Audio Technica's more expensive models, which it is claimed eliminates many fundamental resonances. Its generator system, inherited from the top of the range ART1, uses Neodymium Iron magnets - as opposed to the AT-F5's samarium cobalt - which supply one third more magnetic power.

Neodymium is a new magnetic material of very high strength that has found its way into headphones and loudspeakers (e.g. KEF Uni-Q) to date. In cartridges it promises increased output and greater dynamic range as a consequence.

### Moving Coil

Being a moving coil cartridge, the fixed magnet of the AT-OC5 must have its flux concentrated down around the miniature moving coils bonded to the stylus cantilever. A Vanadium-Permender yoke performs this task. Each of the twin coils sits at the top of an aluminium cantilever. They are wound with yet another ultra high purity copper of large crystal structure, called PC OCC6N, claimed to be particularly suitable for this purpose.

At the bottom end of the cantilever Audio Technica fit the OC-5 with a biradial nude diamond stylus having 0.2 mil x 0.7mil tip radius dimensions. The former radius is "seen" by the groove wall and is very small, in order to trace fine detail accurately. Such a radius demands a low-ish tracking force, which in turn militates for high compliance. The OC5 has both: it tracks at 1.5gms and has a compliant cantilever hinge. This lets the stylus wiggle freely at low frequencies in particular, giving the cartridge good tracking ability on heavy bass excursions. Such is the specialisation in materials and construction of a modern moving coil cartridge. Audio Technica are very conversant with such matters and always offer a product of advanced design.

### Compatible

The AT-OC5 is not an awkward or incompatible cartridge. At 8gms any arm can accommodate its weight. The Neodymium magnets ensure a relatively high output - as moving coils go - of 0.4mV. This in turn makes it match most moving coil inputs - even crude ones on budget amps. A strong signal effectively lessens the audibility of hiss, which is often a problem on moving coil inputs.

Before I discuss the sound quality of this cartridge, there are a couple of

general points that need to be mentioned. If you are considering the purchase of a moving coil cartridge, you must have an appropriate system to use it with. That the OC5 is inexpensive as moving coils go does not detract from this requirement. It demands a very good turntable, arm and amplifier - it is as critical in this respect as any moving coil. Much as its low price will prove tempting, I would strongly urge mid-price system owners to stick with moving magnets which, by default, are far more suitable. My initial listening tests underlined this point very strongly. In a typical mid-price system (Linn Axis turntable, Arcam Delta 60

made the song quite difficult to follow. My attention was drawn to the guitar - the accompaniment - and not towards the whole performance as an entity.

### Up Tempo

Similarly, on a more up-tempo piece James' 12in single of "Come Home" - I found the OC-5 became quite overpowering. The drum sound appeared so hard hitting that subtleties such as key changes and weird melodies right at the back of the mix were difficult to detect. I got the overall impression that it was



and Heybrook HB-1 s) the OC5 really didn't work at all well. It sounded uncontrolled, larger than life and it barely reproduced any bass. The problem in this sort of system is two fold: a mid-price turntable - even a good one like the Axis - cannot really cope with the extra energy that a moving coil cartridge generates; moving coil inputs on most integrated amplifiers are similarly not really up to the job either. The end result is typically a worse performance than that gained from a good moving magnet, often irrespective of the quality of moving coil in question.

In a far more appropriate system (Linn Lingo LP12/ Ittok LVIII, Naim 72/Hi Cap/140 and Royd Sintra) the OC-5 was considerably more successful. However, even in a system of this calibre, the cartridge had, in my opinion, a very noticeable problem that I could not come to terms with.

To start positively, Audio Technica's OC-5 is a very lively and sharp sounding cartridge. In this respect it emulates, to some extent, the sheer brilliance of a more established and expensive moving coil cartridges. By reproducing a greater quantity of bass than the AT-F5 it replaces, the cartridge is intrinsically quite weighty sounding. I found it forward in presentation - which is an observation, not criticism or praise. A wide and deep sound stage was generated.

My problem with fully appreciating the OC5 was, in simple terms, obstructed by the fact that I found it tizzy. This wasn't just a tonal aberration, but something more fundamental. I noticed on Chris Issak's single "Wicked game" that acoustic guitar sounded out of context and unnaturally highlighted. This may be a matter of taste, but for me it

# unmoved by coils

**Audio Technica have introduced a new, moving coil cartridge, the OC-5.**

**Danny Haikin assesses its merits**

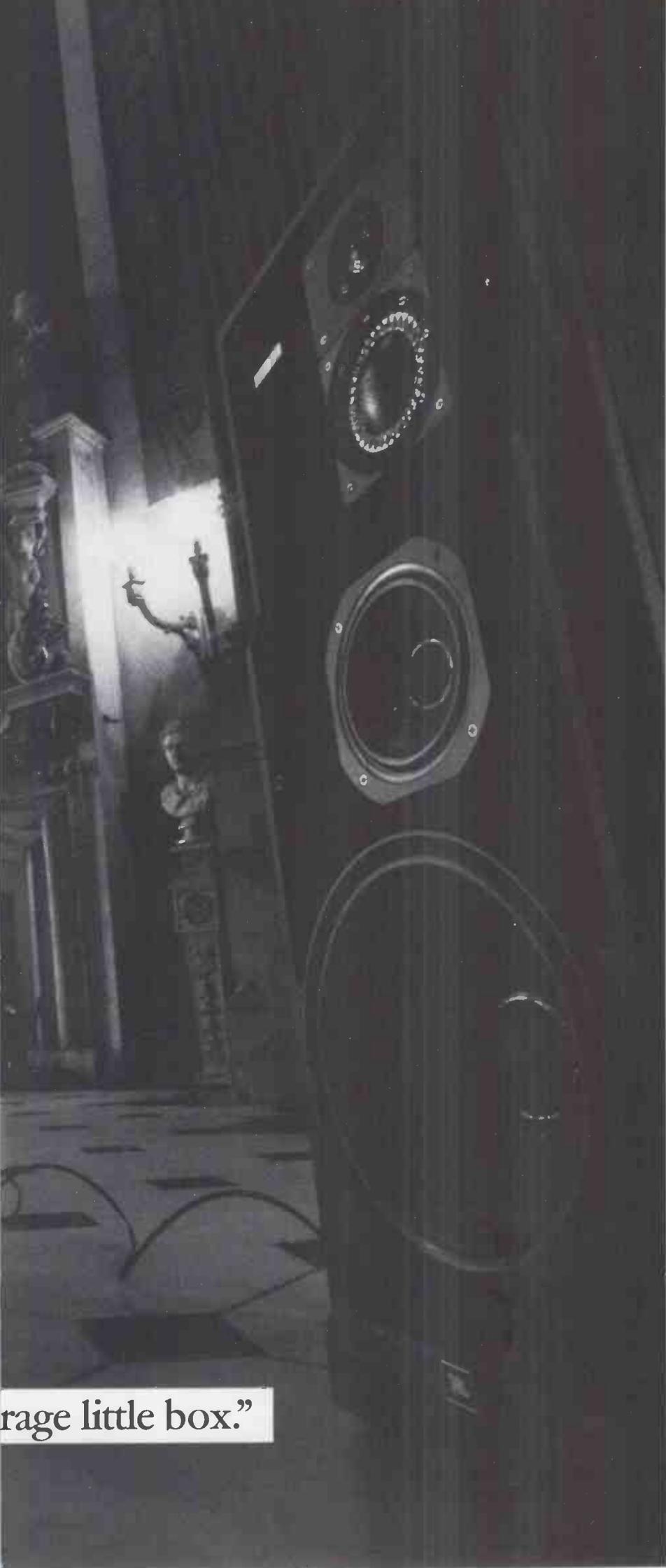
trying to turn the song into an American thrash number of some description.

Although a humble moving magnet, Linn's K-9 cartridge, for me, restored something missing: James! The difference was really quite striking. In sonic terms the performance I heard using the K9 was worse in some ways and better in others, but not transformed. However, with the K9 it was quite obviously James: James' type melodies, James type playing and precision. With the OC5 it sounded like a reasonable cover. And, whilst moving magnets are typically considered bright and brash I found the K-9 much easier on the ear.

As you will have gathered, the AT-OC5 was not my sort of cartridge. There may be people who appreciate its vivacity and sharpness - the thing I find bothersome - and it may inject some life into very drab sounding systems. Whilst I sympathise with people that find moving magnet cartridges unacceptable, I do not believe that the AT-OC5, or some other inexpensive moving coils I have heard, are in general a more acceptable compromise ●



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# new currency



**The new P180 power amplifier from Musical Fidelity  
delivers a large punch from a small case.**

**Alan Sircom gets to grips with it**

My experiences with big power amplifiers have usually been disturbing. Designed to drive even the most difficult of loudspeakers, they have a tendency to look like props from a 1950s Science Fiction film (to prove this point, in the famous film "Forbidden Planet", the race of extinct super-intelligent beings were known as "The Krell"). Almost everybody who has been involved with large power amplifiers, either in demonstrating, installing or reviewing them, has nightmare tales of injured backs and bowing floors.

With the new P180 however, priced at £799, Musical Fidelity have reconsidered the basic layout of the power amplifier and such tales may disappear into the past, to live among the historical stories of steam radio. Weighty power supplies have vanished from the main chassis, to live in an external housing. Additionally, rows of paralleled MOSFETs (Hitachi) are mounted on small individual

heatsinks, eliminating the need for one, large main heat sink. As such, the physical weight of the power amplifier has been considerably reduced and the size has been "distributed", as it were, into two cases, rather than one. The new power amplifier is capable of fitting into the same casing as the MX and MVX-2 pre-amplifiers. In addition to the obvious aesthetic advantages, there is a considerable saving on the cost of custom case manufacture. This is one of the reasons why the P180 is so much cheaper than it's arc-welding brethren.

The P180 has not been designed as a cost-cutting exercise, but as the first step in reducing the size and weight of muscular amplifiers to manageable proportions. The power supply has been designed to be tucked away, one restriction being that it must remain accessible, since the main power switch sits on its rear face. Connection to the main

amplifier is through a single umbilical chord, attached to the power supply and 1.8m long.

It is only in opening the P180 that one can see the banks of heatsinks, lying in ordered rows like upturned metal octopuses. Sitting in the eye of each octopus is an Hitachi MOSFET, five pairs to a channel in stereo mode. I do not feel it is a good idea to open the P180 however, as this could be constituted as tampering and invalidating your guarantee. In addition, the kind of current that is rolling around this machine could quite easily invalidate you as well! As suggested in the note supplied with the amplifier, and as Noel noted in the Measured Performance section, these heatsinks are not large enough for the amplifier to be used at disco levels for long. I would suggest that your ears would peg out long before the amplifier melted.

## Caution

As with all power amplifiers, it is wise to exercise a little caution when connecting the various items together. I have found that it is best to have everything plugged in, checked and double checked, before switching on. In particular, items at the start of the signal chain should be switched on first and the power amps last, to prevent switch on thumps threatening the loudspeakers. I found it isn't very clever to see just how powerful the P180 is by wicking the volume up a bit: the Magneplanar MG1.4 loudspeakers cried out in pain. Thankfully, their fuses gave up their lives in order to prevent devastation.

After sorting out this problem I realised that I had to be a little careful with the P180, especially if I ever want to review a pair of loudspeakers again!

As far as features go, the P180 is minimalist in the extreme. There is an On/Off switch on the rear of the power supply, a Stereo/Mono button on the rear of the amplifier and a matching Stereo/Mono LED on the front panel. That's it!

## Current

The mono option parallels the channels in order to offer twice as much current drive for low impedance loads. This is quite different from bridged operation, where the channels operate in push-pull to double voltage swing, without affecting maximum current delivery. Ordinary power figures, defined by voltage clipping therefore don't indicate the benefit of mono operation with the P180s. Only current measurements do this, but they are not common.

I used two P180 power amplifiers, each connected in mono mode, within our review system. They were

assessed in both stereo and mono operation. As a point of reference, I was also given an MX pre-amplifier. This is a well-known Musical Fidelity pre-amplifier, considered to be good value. It proved excellent for our purposes. Three large Italian cakes were also delivered by Anthony Michaelson, Musical Fidelity's founder at the same time. To ensure that we could not be accused of being bribable, I ate all the cakes before testing the amplifier.

In use, the P180 behaves like all the big power amplifiers currently on the market. Put another way, it is extremely difficult to be critical of a component that does its job without leaving any trace or signature on the music it is amplifying. As with the bigger Musical Fidelity amplifiers, Krells, Thresholds and so on, the P180 simply amplifies music, with plenty of power in reserve. It does not instill its own character on the passages that are being played, but portrays the pieces with authority and accuracy.

### Grip

I used the amplifiers in both stereo and mono over several weeks. The feelings that I have for a P180 working in Stereo mode are amplified (sorry, I couldn't help it!) when used in Mono. The grip on the music becomes even more authoritative. This becomes especially noticeable with powerful rock tracks. As an example, "Dazed and Confused" from a Compact Disc of Led Zeppelin's first album took on far more importance in dual-mono operation. There was a greater sense of presence, John Bonhams's drumming became even more forceful and a more defined sense of stereo prevailed. This is not to say that single stereo operation is lacking in grunt, but the addition of another P180 makes the system "grunter" in the extreme.

In terms of system matching, no matter what is partnered with the P180, it seldom gets flustered or runs out of steam. The criticisms that I have toward this amplifier are those that I would happily level at any amplifier of this breed. The P180s have, in either stereo or mono operation, bags of power, grunt, balls and so on. What they lack, in my opinion, is some of the elusive subtleties that add an air of refinement. It is so often smaller amplifiers that do well here, Musical Fidelity's own A1 being a good example.

This blemish becomes especially noticeable in the mid-range. For example, on my version of Rachmaninov's Symphonic Dances, some of the interplay between strings and woodwind was missing. This was not a major loss; certainly no more than

the amount of information that goes missing after a night of serious drinking. But it was, I felt, still missing. On saying this, I was also aware that no small amplifier could hope to approach the P180 in terms of the grip it had on the timpani on this record, so there is a balance to be struck it seems.

Over the past few weeks, I have come to enjoy the P180 power

amplifier a great deal. I still feel that, like all such powerhouses, it can be a bit too powerful, rushing into the music with guns blazing, but on the whole I feel that it gives amplifiers such as the bigger Musical Fidelities, Sumos and Krells of this world quite a run for their money. In a market where £1,000 is considered cheap for a power amplifier, the P180 is a bargain ●

### Measured Performance

The design rationale behind this amplifier was to supply welding current from a box one man could lift. Suffering from the folly of making an amplifier so large (the A-470) that it took many men to get it off the ground, Musical Fidelity embarked upon an alternative route to reach the same end. The result is the P180 power amplifier tested here. It has no fewer than five pairs of fully complementary output MOSFETs per channel, each mounted on its own small heatsink.

The first thing to note about this arrangement is that such heatsinks are fine for music use, but have no reserves for continuous disco (overload) use and such like. I am not saying that the P180 won't continuously run heavy loads at loud volume, but it will have a lower thermal limit than some heavily finned monsters.

An outboard power supply is used, which makes for a more compact and lighter main chassis. A rear push button switch will mono the two channels to increase power output. In stereo form the P180 produces 90 watts into a normal eight ohm load and 144 watts into a four ohm load. However, all this misses the point of the P180, because it is voltage limiting under such conditions. It has been designed to supply heavy current, meaning its true strengths can only be judged by drive into low loads. The idea is that the amplifier should supply high transient currents, on the grounds that it is current that does all the work in driving a loudspeaker and, therefore, effective current delivery matters most.

Running an amplifier at full output into two ohms, in order to check current delivery, is guaranteed to be a temporary exercise terminated by smoke and possibly flames. I used a 400Hz tone burst to avoid this; it effectively makes the amplifier deliver full output for a short period only. Under these conditions the P180 delivered 200 watts, driving a respectably heavy current of ten amps. In mono mode, which is how we used the amplifier, output rose to 320 watts and current to twelve amps (rms). You can see this in the tone burst oscillogram below. The Magneplanar MG 1.4 loudspeakers reach down to two ohms and are an acknowledged difficult load, but the P180s in bridged mode shrugged this off.

Distortion was low, even at high frequencies. Into a normal eight ohm load, at a few watts, just 0.01% second harmonic distortion was produced. At high frequencies (10kHz) this rose to just 0.03%. Under difficult conditions, like

full output or into four ohms, distortion never rose above 0.1%. Bridged mode increased distortion very slightly, but its impact was not significant.

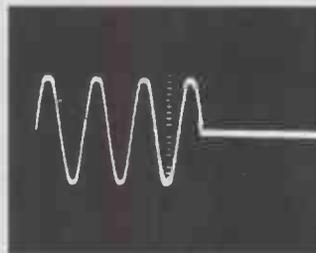
The P180 has been designed to drive heavy transient currents into the most demanding loads and it does this very effectively. It is able to drive and control very difficult loudspeakers with ease. And unlike the massive A-470 it can even be lifted by one person easily.

Power output	90 watts	8 ohms
	144 watts	4 ohms

Note: Mono mode increases current delivery into low loads. Max. current into 2 ohms increases from 10 amps to 12 amps rms. Power output into high impedance loads (4 ohms and above) does not change.

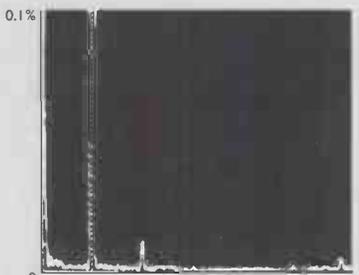
Frequency response	7Hz - 50kHz
Separation	70dB
Noise	-110dB
Sensitivity	600mV
DC offset	a/4mV
Distortion	0.02%

### Pulsed Current



Into 2 ohms the P180 could swing 36V peak with a tone burst, shown here. This amounts to 18 amps peak (12A rms).

### Distortion



Distortion measured 0.01% at 1kHz, second harmonic being dominant as this analysis shows.



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During my early teenage years, one piece of hi-fi equipment brought me more pleasure than virtually anything else at the time. It was a Rega Planar 3 turntable which to this day remains an almost perfect blend of sound quality, style and long term durability. I was naturally very enthused by the prospect of a Rega amplifier. There are in fact two: the Elex, at £289, and the Elicit at £720.

## THE ELEX

The Elex is a true minimalist amplifier. It has a volume control and a rotary input selector which accommodates phono (moving magnets only), CD, tuner, aux and tape. There is no tape monitor facility - something which is increasingly useful. All inputs are nickel plated phono sockets and speaker connections are via 4mm only flush mounted sockets. No headphone socket is provided.

From our photograph, you may be able to see that both of the Rega amplifiers are quite unusual looking; in real life they really look quite whacky. The fluted volume and selector controls give the Elex a distinctive futuristic look carried through to the unusual looking fins which act as a heat sink on the top covers. Overall I found I liked the styling; Rega appear to be one of the few manufacturers that realise a hi-fi system also has to take its place as a piece of furniture. Ergonomically, the only point I found bothersome was the close proximity of the selector knob to the volume knob. Because of this my large fingers found it slightly awkward getting a firm grip.

## Sound Quality

I expected to be bowled over by the sound of these amplifiers. I cannot however report that I was.

In a full Rega system, and with Linn and Compact Disc front ends, I consistently felt that both of the amplifiers were good, but neither unreservedly so.

Although the Elex was always comfortable and relaxing to listen to, it seemed unable to convey enough excitement or control. I thought at first that this may have been to do with its presentation, which was maybe not to my taste, but it was more fundamental. On complex pieces of classical music, the Elex was powerful enough and filled the room with sound, but it was not as precise as I would have liked. It seemed to cover the music in a layer of warmth which reduced its significance.

As a comparison, I used Pioneer A400 and Onix OA21 amplifiers. Whereas the Elex was not staggeringly detailed, but was relaxing and smooth, the A400 made music very tense and aggressive. It did this without any gain in detail, so I was quickly drawn back to the Elex. This was with a Compact Disc player; the difference widened with an LP source. However, the Onix - another very minimalist design - gave me a noticeably clearer picture of what was taking place. Changes in tempo and pitch were clearer and instruments easier to follow. As I said earlier, the Elex suffers from being middle of the road: it does nothing badly and has plenty of drive but, particularly for a minimalist design, needs to be exceptional to be competitive. This it is not.

# cast in a new mould

**Clamshell castings enclose  
the new Rega amplifiers.**

**Danny Haikin prizes them  
open and peers inside.**



## THE ELICIT

With its illuminated touch panels the Elicit is quite an impressive sight. Its facilities are more comprehensive than those on the Elex, including a moving coil disc stage, tape monitoring, mono switching and a mute facility. All are worthy additions. The Elicit's touch button input controls are nice, but they are very awkward to use with finger nails any longer than 1mm. The styling of the Elicit is exceptional. It uses the same cast alloy case as the Elex, complete with top and bottom cooling fins. Only the front and rear panels differ. So, like the Elex, it feels - and is - both incredibly strong and robust. Rega apply a black paint finish.

### Sound Quality

The Elicit is naturally a lot better than the Elex. It drove every loudspeaker I could find with consummate ease and has none of the problems which I found inherent in the Elex. It was able to respond suitably to fast changes in tempo and displayed the emotional feel behind a wide range of music.

Exciting music was exciting without becoming brash and it handled delicacy all at the same time. In hi-fi terms it goes down and up a lot further than the Elex. Its moving coil stage worked very well, and it made the best of what CD has to offer. I was very impressed with every aspect of the Elicit, until I realised its price. It is a real shame that this amplifier is not cheaper as it is one of the best integrated models available. At its price (£720), I fear that good pre/power combinations still out-perform it.

## SUMMARY

Overall both of these amplifiers should be auditioned. The Elex because, despite my criticisms, it is a very well finished product and offers a lot more power than most good amplifiers at its price; the Elicit because it is unquestionably very good. I cannot reconcile its high price, apart from pointing out that most of its price competitors come in two boxes.

## TECHNICAL PERFORMANCE

### THE ELEX

I nurtured a residual fear that the Rega amplifiers might be a bit "unconventional" in measured performance, since this is a gathering trend in the UK amongst smaller manufacturers. Happily, I was wrong. Rega have not required reviewers and buyers to swallow their own reasoning on "the way things should be", in an attempt to dismiss embarrassing facts using some dubious new theory. The Elex is a reasonably powerful amplifier of low distortion (i.e. less than 0.1% under all conditions) and conventional electronic layout. It is only the case that is radically different, being a two piece die casting. It is enormously strong and acts as a heatsink too.

The Elex is beautifully made inside. A single large board carries large quantities of discrete transistors. There are five ICs, all of the Texas Instruments TL-071/2 designed high speed, FET input operational amplifier. I must say that I steer clear of these things after being warned by a certain experienced and knowledgeable amplifier manufacturer. The NE5532 is a better choice, I am told. One large toroidal transformer supplies power. The Elex is a masterpiece of electronic and mechanical craftsmanship inside; I was very impressed.

Power output measured 36 watts into a conventional eight ohm load. This is enough to get reasonably high volume out of most loudspeakers, but not enough to go very loud without clipping. It is a normal starting point in power output terms for a bottom of the range model. I was heartened to see almost no drop in output volts with a low four ohm load. Power nearly doubled, reaching 64 watts. The Elex obviously has a chunky toroidal mains transformer with excellent load regulation - an expensive item. Rega have obviously decided that good regulation is an important factor, an outlook becoming progressively more popular in the UK. Usually, this

The Elex has one toroidal mains transformer and a simpler circuit board than the Elicit. Illuminated LEDs act as voltage references, as in the Elex.



enables an amplifier to give strong bass and fast dynamics. Poorly regulated designs can sound weedy in comparison.

The tuner, tape and aux. inputs are sensitive (220mV). The CD input has been desensitized (380mV) so that volume doesn't have to be readjusted for it, since CD output is higher. These inputs have a surprisingly extended treble response: it reaches 155kHz. Bass rolls of below 20Hz. I would like to have seen a bit more downward extension, since CD reaches 4Hz and many CDs do possess subsonic information. However, not so many amplifiers match CD in this respect at present.

Distortion levels remained steady from low output to full output, measuring 0.04% at 1kHz and 0.05% at 10kHz. The lack of change with increasing frequency is a good sign too, suggesting no fall in feedback. The spectrum analysis below shows both second and third harmonics exist, with some small amounts of higher orders. The spectrum is fairly benign and levels low, making me confident the Elex is well engineered and should not be coloured by distortion at all.

Since Rega started out making turntables, and since their arm is a superb design of low-ish mass, I was intrigued to see what approach they would adopt to the problem of warps. The answer is a positive one: cut them out. Gain through the disc stage drops rapidly below 40Hz, indicating that Rega have been happy to adopt the IEC low frequency time constant designed to ensure warp signals (5Hz-12Hz) do not pass through an amplifier. I believe this perceptibly lightens bass, whilst acknowledging that warp signals can be a problem. A switchable filter is the ideal solution, but the Elex is too basic for such additions.

There was very little hiss or hum on the disc input, but it is not especially sensitive (3mV). The overload ceiling proved high at 125mV. No extra distortion was generated by the disc stages.

The Elex measures very well, being able to deliver a lot of current if required, with little distortion. Unlike so many UK designs, it has no peculiarities or weak points, except that there is no tape monitor button. Off tape monitoring from a three head deck is therefore impossible.

### THE ELICIT

Although packaged into a slimline case identical to that of the lesser Elex, the Elicit turns out considerably more power. A clue lies in its greater weight: there are two toroidal mains transformers inside - one per channel. It has the same excellent regulation of that of the Elex - there was little voltage drop with load reduction. I measured 66 watts into a normal eight ohm load, which is representative of most loudspeakers. Lower loads are handled with ease, suggesting the Elicit can deliver heavy transient currents. It produced no less than 110 watts into a four ohm load.

The CD input has a lower sensitivity than tuner, tape or aux., so volume does not have to be readjusted when switching between them. Like the Elex, the Elicit has an extended high frequency response

through these inputs, but low frequencies are curtailed. This is an unusual way of going about things. Most designers band limit or leave the window wide open. Personally, I am happier seeing output rolled off above 20kHz but kept alive down to 5Hz or so. Usually, but not always, band limited amplifiers sound clean and relaxed, but a bit warm or smooth. Wideband types often sound very clear, but can exhibit grainy or coloured treble. These are only generalisations.

Distortion did not rise above 0.1% and in the mid-band it hovered around 0.02%. There was some increase in distortion with power and frequency, but it was not great. This suggests that there is little fall off in feedback at high frequencies, which is a good sign. Rega fit both Moving Magnet and Moving Coil stages to the Elicit. Selection has to be made internally, using DIP switches. The amplifier is opened by removing rubber bungs from

the feet to expose four allen screws. These clamp the top cover to the base. The MM stage has normal 3mV sensitivity, the MC stage accepts low output moving coils, being sensitive at 0.26mV. The input load is 100 ohms for MC.

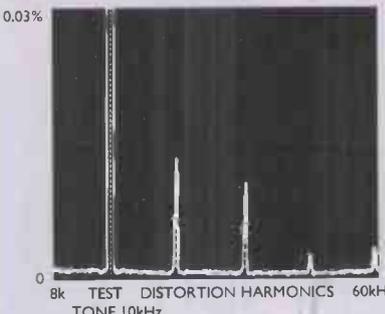
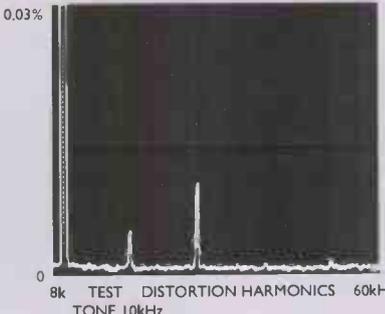
Frequency response of the disc stages has been rolled off below 40Hz to eliminate warp signals. This is a fairly drastic measure; I would like to have seen an override switch to improve low frequency output in the absence of warps. There was little hiss or hum on MM, and remarkably little hiss on MC. The Elicit has one of the quietest moving coil inputs I have measured for a long time, yet it is also very sensitive and has a high overload margin. This is a serious MC stage, rather than a simple bolt on addition ●



The Elicit has twin toroidal mains transformers seen at left. To the right of these lie four black reservoir capacitors. The neatly laid out circuit board carries many illuminated LEDs, acting as voltage references.

ELEX			ELICIT		
Power	36 watts		Power	66 watts	
CD/tuner/aux			CD/tuner/aux		
Frequency response	20Hz-155kHz		Frequency response	25Hz - 120kHz	
Separation	-79dB		Separation	-76dB	
Noise	-92dB		Noise	-87dB	
Distortion	0.04%		Distortion	0.02%	
Sensitivity	220mV		Sensitivity	200mV	
dc offset	8/8mV		dc offset	16/6mV	
Disc	MM	MC	Disc	MM	MC
Frequency response	40Hz-71kHz	none	response	25Hz-120kHz	25Hz-110kHz
Separation	-60dB		Separation	-76dB	-64dB
Noise	-80dB		Noise	-78dB	-74dB
Distortion	0.05%		Distortion	0.02%	0.02%
Sensitivity	3mV		Sensitivity	3mV	0.25mV
Overload	125mV		Overload	140mV	14mV

Distortion		Distortion	
	0.03%		0.02%
8k TEST DISTORTION HARMONICS 60kHz TONE 10kHz		8k TEST DISTORTION HARMONICS 60kHz TONE 10kHz	
Distortion at high frequencies, shown here, measured just 0.06%.		The Elicit produced a bit less distortion than the Elex - 0.04% at high frequencies.	

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A LITTLE EXCESSIVE?**



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"This is the stuff of big amplifiers. The B1 is perfectly capable of emulating £1000 power stations."

What Hi-Fi Magazine

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**MUSICAL FIDELITY**



# A class innovation

**Audio Innovations**  
**Series 500 Class A**  
**valve amplifier delights**  
**Alan Sircom**

Valves summon up an image of 1950s technology, along with Bakelite radios and Ford Prefects. Now, with our Surface Mount Technology, injection moulded plastics and turbocharged supermini cars, we have moved on from those dark days when Muffin the Mule was not a punishable offence. So why in the technological 1990s, would anybody consider producing a valve amplifier?

Audio Innovations consider a valve amplifier not just a valid alternative to solid state designs, but in many respects superior to their silicon cousins. To this end they produce a range of valve amplifiers, both

integrated and pre/power designs, of which the £969 Series 500 integrated reviewed here sits at about mid-point in their range.

Unlike so many British designers, Audio Innovations have styled their amplifiers distinctively. The Series 500, along with Audio Innovations pre/power combinations, have their valves arranged into a semi circle on the front half of the amplifier. This, combined with a perspex top plate, throws the valves into sharp repose. It is not a look that would suit everyone; exposed valves are an attractive prospect to both adults and children alike. Unfortunately, exposed valves are also dangerous when children are around.

Safety aside, the Series 500 is an elegant product, but one that runs very hot. Rated at 25 watts, it is a pure Class A design and as such soon rises to egg-frying levels of heat dissipation. After about ten minutes of use, the unit starts to warm the room up a fair bit. This in itself is a good bonus during the winter months, but in summer it is not so clever. In fact, this is not such a major problem, as it seems only to affect smaller rooms.

The sight of the glowing bottles makes up for any unwanted heat. Others have likened their appearance to the Manhattan skyline. I have never been to Manhattan, but it looks a lot more interesting than the back streets of Shepherds Bush. In all, the Series 500, with its two pairs of large EL34

output driver valves and its attendant semi-circle of smaller ECC83 valves, looks like it should have been a prop from Blade Runner.

## System Matching

'Due to the nature of valve amplification, careful system matching is in order. With solid state equipment, there is far less likelihood of system mismatching. With an amplifier of the Series 500s lineage, one has to be very careful about choice of loudspeakers. In addition to using the loudspeakers that Audio by Design (the parent company behind Audio Innovations) recommend, such as Audio Innovations new models (these are reworked Snell Acoustics loudspeakers) or JPW AP2s, we used a number of current, or near current loudspeakers to see what happens. I'm sure that there are a fair number of other models that work well, but only one pair we tried seemed to have a happy co-existence with the Series 500.

As with most valve amplification, the Series 500 lacks control in the bass, in comparison to a solid state amplifier. With some loudspeakers, this does not appear important, but others will sound overblown and bloated. In some cases, this even got to a point where the bass drivers were hitting their end stops at moderate levels.

It must be noted that the Series 500 is very system fussy. It is an accurate window for source compo-

### Technical Performance

In their day, powerful valve amplifiers were rated at 20 watts. Nowadays, 50-200 watts is attained, mainly by use of large and expensive output transformers. The Series 500 amplifier lies in the former category, producing 24 watts, or around 20 watts if one were to adopt rigid performance criteria.

Valve amplifiers fall off in performance at spectrum extremes, producing more bass and treble distortion than in the mid-band. The soft bass Alan Sircom talks about in his review is usually attributed to transformer distortion (0.7% at 40Hz and full output, -1dB, with this amplifier) and poor damping factor. Treble distortion was higher than that from transistor amplifiers, measuring no less than 1.5% at 10kHz and full output (-1dB). All this sounds dauntingly bad, but what you have to bear in mind is that, run within its limits, this only tinges musical peaks. At average music levels of a few watts, distortion measures around 0.1% and comprises second harmonic only, as the distortion spectrum analysis shows. Second harmonic is subjectively benign, only changing timbre. This effect just becomes audible at levels above 1% or thereabouts. So looked at carefully, the so called distortion problem of valve amplifiers is not severe.

Back in the fifties, loudspeakers were generally more sensitive than they are today. The emergence of cheap power from transistor amplifiers allowed loudspeaker designers to trade efficiency for performance. Consequently, inefficient loudspeakers have become the norm - and they don't suit valve amplifiers. This makes speaker selection difficult for valve aficionados. The best choice is an efficient horn, because they need little power and are highly damped. Unfortunately, horns are large, intrusive looking devices, making them unpopular. Apart from rarities like the Tannoy Westminster, Lowther TPI and such like, I can think of few matching horns. However, Audio by Design - parent company of Audio Innovations - make their own loudspeaker that suits valve amplifiers (see the review).

Goodmans loudspeakers are very efficient, I find from measuring them. It strikes me that they would be a good match too. Since the current models we have heard, namely M100, 500 and Maxims, all sound pretty impressive in their own right, they form an interesting modern option.

The Series 500 model amplifier we reviewed measured well and was right up to the highest standards reached by valve amplifiers. The CD input had a flat frequency response between 23Hz-22kHz. Hiss was very low at -89dB, comparing well with

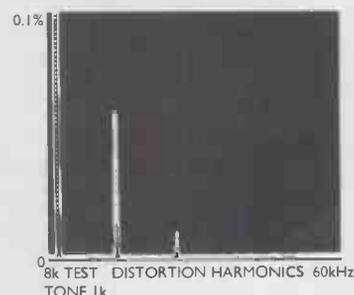
solid state amplifiers (typically -90dB). In spite of this, sensitivity was very high at 170mV.

The disc input was unusual in being very sensitive, measuring 1.2mV. This is just enough for a high output moving coil cartridge, but it is really intended for low output moving magnet designs. The overload ceiling was high, as usual with valve amplifiers, at 150mV. Hiss was very low at -69dB, so the phono stage is very quiet. Disc frequency response extended from 8Hz to 18kHz. There was a +1.8dB peak at 20Hz however, which will add just a small amount of extra bottom end wellie. This is the only point of design I would query. Passing warp information through the output tranny is not a good idea, since low frequency information induces extra distortion. Adoption of the IEC sub-sonic time constant, even though it perceptibly weakens deep bass, would help maintain quality by rolling off signal below 40Hz.

This apart, the Series 500 amplifier measures well by modern standards, output distortion notwithstanding.

Power	24 watts
CD/tuner/aux	
Frequency response	23Hz - 22kHz
Separation	-49dB
Noise	-89dB
Distortion (1kHz, 3W)	0.1%
Sensitivity	170mV
dc offset	none
Disc	MM MC
Frequency response	8Hz-18kHz none
Separation	-41dB
Noise	-69dB
Distortion	0.1%
Sensitivity	1.2mV
Overload	150mV

#### Distortion



Delivering 3 watts at 10kHz, the Series 500 produced 0.3% distortion. This analysis shows it was benign second harmonic.

nents; if one uses a poor quality source, it will show it up with unrelenting candor. Partnered correctly, however, the Series 500 is capable of producing a sweet, lucid sound that is difficult to achieve with transistor amplifiers.

After carrying out our own investigation as to which loudspeakers work best with the amplifier, we attempted to use Peter Qvortrup's (Audio Innovations Director) recommendations. The amplifier then became part of a complete Audio By Design system. This consisted of a Systemdeck IIX turntable (complete with Audio By Design acrylic platter), Helius Scorpio arm, Goldring 1020 cartridge, AudioNote ANB cable and Audio Innovations Model J loudspeakers on Pirate stands. This set up was capable of sounding full and rich without being noticeably 'hi-fi'. It still does not sound as tight in the bass as is common nowadays, but I have yet to hear a transistorised integrated amplifier that doesn't get in the way of the music in some respect either. This becomes particularly apparent on older recordings. Subtle areas of a recording, that usually become swamped in the melee of sound, develop with a presence that does not manifest itself in lesser pieces of equipment. The system, taken as a whole, sounds so right, so very correct that a transistorised amplifier seems somehow raucous by comparison.

I accept that many people will dispute my views toward solid state amplifiers, stating in defense that valve amplification is inaccurate and euphonic. I accept that valve amplification is a compromise, but I also believe that solid state amplification is a compromise, except in a different direction. This is not to say that solid state amplification is any less musical, but my tastes obviously lie with valves. We are all different - you may dislike their sound.

If one is looking at updating a system already possessing good quality source components, then the Audio Innovations Series 500 amplifier can be soundly recommended, as long as it is matched with appropriate loudspeakers. It is not a panacea, as it will possibly make a bad system sound worse, particularly in the bass which could become flabby and slow sounding. If properly partnered with a well-matched system, the Series 500 is a delight, being intensely listenable, detailed and clear. If you already own a pair of Snell loudspeakers and are in the market for an amplifier at this price, it would be a good idea to give this one a thorough listening, as the partnership is little short of magical. And talking about 1950s technology - does anyone have an old Ford Prefect for sale???



# bitstream boxer

**Arcam's Black Box 3  
convertor offers  
Bitstream quality from  
Compact Disc. Noel  
Keywood encounters a  
muscular performer.**

When separate digital convertors were a concept virtually untried, Arcam released their original Black Box. It seemed like a brave or foolhardy thing to do at the time; luckily it worked. Now, the digital convertor has taken its place firmly at the top of the CD quality hierarchy and, all around them, Arcam have to face capable competitors.

This latest incarnation of the Black Box carries a Philips Bitstream chip and is dubbed Black Box 3. It has to be able to demonstrate that an independent convertor offers advantages over less expensive and more compact CD players, in addition to holding the competition at bay. The original Black Box showed itself to be smoother and easier to listen to than the one-piece players all around it. I remember that it injected some sense of life and atmosphere into music, sounding a bit more balanced and less aberrant tonally than the first convertor I came across, Cambridge Audio's CD-1. For me, the argument in favour of separate convertors was made by products like the CD-1 and the Black Box. They were the pioneers and, to a large extent, the stimulus that provoked a thriving UK specialisation to appear - high quality Compact Disc reproducing equipment.

## Low Distortion

The first Black Box relied on Philips TDA-1541A chips, placing them in a more beneficial and sympathetic electronic environment than was the norm at the

time. Black Box 3 uses Philips SAA-7321 Bitstream chips to achieve low distortion, removing the slightly coarse edge that can afflict Compact Disc. Arcam have remained faithful to Philips, like all other UK manufacturers, except NAD. But the '7321 they use is becoming antiquated by current standards. The SAA-7350 has

‘The original Black Box showed itself to be smoother and easier to listen to than the one-piece players all around it.

replaced it and, in turn, this interim design is being replaced right now by a new mega-chip, the TDA1547. Philips have decided to out-pedal the Japanese - and they are doing it with astonishing rapidity. Heaven knows how this change of attitude came about (some call it Jan Timmer), but it has come about and the repercussions are of wide consequence.

One is that manufacturers are obliged to keep up - and it should be small but prestigious ones like Arcam that do so.

They must have the speed and flexibility, not to mention the design expertise, to react quickly and effectively in order to take advantage of this unusual but potentially advantageous situation. It is in this area that Black Box 3 now looks, on paper, to be slipping past the "sell by" date. It is a factor that could work against it, irrespective of the excellence of support circuits. Compact Disc technology is being pushed forward rapidly by Philips.

### Aluminium

Black Box 3 is well built, being housed in the strong aluminium case that Arcam use widely across their product range. It has a charcoal black satin paint finish and four short action, rectangular push buttons on the front panel. Two are for input selection, the choice being between optical or electrical inputs for the digital signal from a transport. Both 44.1kHz from CD players and 48kHz sampling rates from DAT recorders are accepted, internal switching being carried out automatically. I used both sources during listening tests: an Arcam Delta 170 transport and a Denon DTR-2000 DAT recorder. There is a phase reversal button and a power switch on the fascia also.

Digital signals can be transmitted by light. A benefit is that total electrical isolation becomes possible between the transmitter and receiver, eliminating recirculating earth currents. Seemingly attractive, this has provoked the use of optical linking. And in use optical nearly always gives a subtly softer and more mellifluous sound than electrical linking. However, it is now being said that this is due to minor degradations in current optical links. Black Box 3 offers the option of using electrical linking as an alternative. It gives a more detailed and explicit sound, but also one that is harder in its presentation and arguably less easy to relax with over a period of time. Having made such a general observation however I can say that the Black Box 3 follows Arcam's general philosophy of offering an easy sound from Compact Disc. Even when using electrical connection it could not be accused of having a remorseless or unpleasant presentation.

The rear panel carries a feedthrough digital output, plus two audio outputs. One, marked Aux., gives an attenuated version of the standard CD output. Inside, Black Box 3 has power supply protection fuses, completely independent digital and analogue power supplies and two high quality, fibreglass circuit boards. Arcam build and finish their products well; Black Box 3 is no exception. Furthermore, this company provides excellent back up service.

### Arcam Sound

Much of what I know about the Arcam sound was dished up by Black Box 3. Basically smooth and warm in overall presentation and balance, it has been designed not to offend in the way that CD can - by its hardness or brashness of presentation. I noticed especially muscular bass with excellent downward extension; it underpinned the sound with an articulate rhythm backing and the threat of something mightier waiting in the wings. Sub-sonic events from Grace Jones "Slave to the Rhythm" CD gained extra power and slam, drawing my attention to this area. I couldn't describe the BB3 as sounding weedy, flat, or emasculated: it offers all the opposites.

Whilst treble detailing and time domain differentiation were fine, there appeared to be some loss of upper mid range sheen, making for a laid back sound that some could find, perhaps, overly warm and enveloping. String sections would swell as an amorphous entity, rather than as a group of individual instruments playing together. Over this I had some slight reservations, but whether they are fully justified in light of the BB3's price, I am uncertain. Deltec's PDMI-II converter, costing £595, has conditioned me to higher expectations. It was in sharpness of imaging and strength of embodiment that the BB3 was a trifle wanting against such a reference. However, against its price competitors, of which there are few, the BB3 does deliver a fine sound. I found it easy to relax with and yet engaging all the same. No trace of harshness exists, banished completely by a company that specialises in achieving ●

### Measured Performance

Frequency response follows the pattern expected from Arcam, displaying progressive high frequency loss, as the analysis below shows. This helps give the Black Box 3 its distinctive softness and warmth, contributing also to the amenable nature of its presentation.

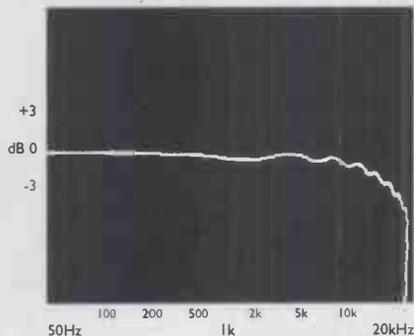
The promise of Bitstream was low distortion and this the Black Box 3 achieves. The distortion figures are as low as Philips own for their CD-840 Bitstream player and the spectrum analysis below clearly shows a lack of high order and inharmonic "digital" components of the sort that are aurally offensive. This is a good performance, up to expectations for Bitstream.

Noise was higher than that for sixteen bit, but this is an academic problem of early Bitstream. I say "academic" because at -94dB (IEC A wtd.) noise cannot be heard at all.

I did like the lack of spurious output from this convertor. There was little in the way of inter-modulation against the sampling frequency, or out of band high frequency components above 21kHz. This bodes well for a clean sound.

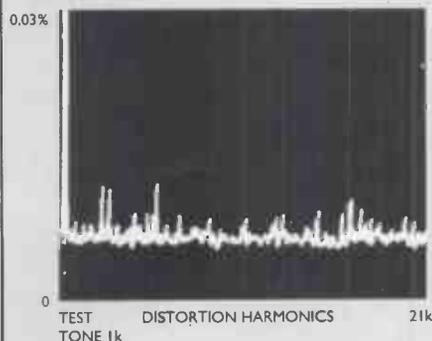
Frequency response (-1 dB)	4Hz - 20.4kHz	
Distortion (1kHz)	Left	Right
-6dB	.005	.007
-30dB	.03	.03
-60dB	0.7	0.7
-90dB	34	34
-90db		
dithered	3	4
10kHz	0.09	0.09
Separation	Left	Right
1kHz	-97dB	-97dB
20kHz	-89dB	-91dB
Noise (IEC A wtd.)		-94dB
pre-emphasis		-98dB
Dynamic range (EIAJ)		105dB
Output		2.3V

### Frequency Response



Falling upper treble helps give a warm sound

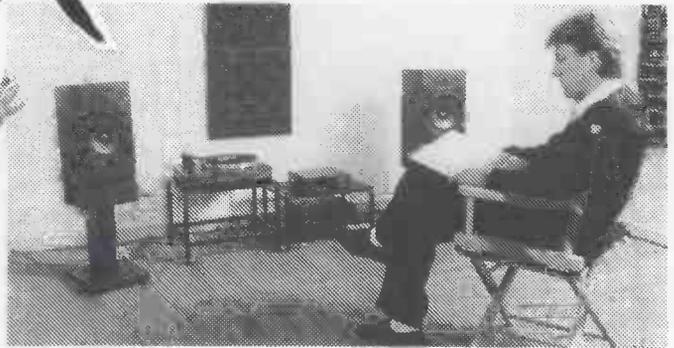
### Distortion



Negligible distortion from Bitstream ensures a smooth sound



# Get the music in you at audio excellence!

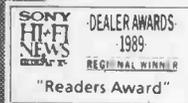


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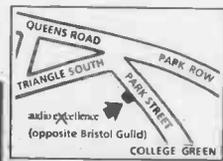


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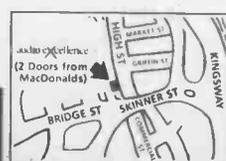
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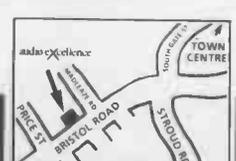
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Loudspeaker systems that involve sub-woofers and satellites generally look as if they have been designed for the bedroom of a teenager. Most come wrapped in the finest vinyl, with no regard for a more adult environment. Pentachord loudspeakers are different. They have been designed to blend into a living room with ease. Diminutive size combined with well finished wood cabinets of an attractive light hue makes them a far more appealing prospect than most conventional loudspeakers, or the current crop of satellite/sub-woofer rivals.

Pentachord loudspeakers are the work of one man, Oliver Brook. He has designed and built his small, solid wood cabinets around a pair of minute full range Bandor drive units. Using two of them coupled in series eliminates the need for a crossover network. When first auditioned in early prototype form, the only appreciable problems that people noted was a lack of low bass and a reluctance to play at any volume, Oliver Brook told us. To overcome these criticisms, Pentachord added a sub-woofer unit, fed by its own active crossover specifically designed for this system by Karl Akhenatem. The entire package retails at £990. Without the sub-woofer the satellites retail at £499 and their dedicated stands, made for Pentachord by Partington cost £60.

### Integration

One of the biggest problems of incorporating a sub-woofer into an existing loudspeaker system is the apparent lack of integration that is usually apparent between the two. In most cases the sub-woofer sounds as if it has been an afterthought, there being a great divide between the end of the useful frequency range of the satellites and the start of the sub-woofer's. In the Pentachord system, the sub-woofer appears to have integrated with the existing loudspeakers beautifully, with no obvious gaps at frequency extremes.

This is due, in part, to the miniature loudspeaker being engineered without the "mid-bass hump" that is common in smaller loudspeakers. This hump is intended to give the impression of a fast bass, but can make the system sound overblown if used with a sub-woofer. As the Pentachord has no such hump, the effective integration of the two units subjectively appears much more successful.

### Construction

The unique shape of the miniature loudspeaker - a pentagon - is not purely an aesthetic device. One of the reasons behind using such a shape is to reduce the front baffle area of the loudspeaker, improving the dispersion of the sound in order to help create an accurate stereo image. Being made of solid wood, instead of MDF, Pentachord suggest that their loudspeakers suffer from unwanted resonances less than most loudspeakers on the market.

The Low Bass speaker (or sub-woofer) also uses a six inch Bandor unit

which helps increase the speed of the bass, as opposed to conventional designs that have a tendency to sound sluggish. The cabinet is manufactured from veneered MDF to match the satellites and is supplied with both spikes and castors, although spikes are preferred by the manufacturer. In use, I found the low bass speaker made quite a good plant pot stand, although the plant wobbles sometimes, especially when somebody hits a kettle drum. With its trailing speaker lead, the Low Bass is a little difficult to use as a coffee table, but it does possess the great advantage of stirring coffee automatically.

### Seamless

On firing up the Pentachord loudspeaker system, the initial impression that one gets is of a seamless performance at low volumes, well suited to classical music. Bandor units are not happy playing at high volumes and this is more than apparent in the Pentachord loudspeakers. At anything more than polite levels, especially in a big room, the loudspeaker's lucid, transparent sound soon begins to harden. It then becomes progressively harsher until it begins to break up completely.

Balancing this is the sound of the Pentachords at average listening levels. Everyone on Hi-Fi World agreed the nature of their presentation was very listenable indeed. With particular reference to the Pentachords imaging properties, the loudspeakers are up there with the very best. They may not image like the best panels or have the dynamics of boxes such as Acoustic Energy but they are a fine compromise nevertheless. We appreciated their strongly projected sound stage, replete with clear, sharp images of vocalists and instruments. The manner in which this sound stage was constructed seemed quite unlike that from most cabinet loudspeakers: it had an engagingly lifelike quality dramatic enough to demand attention.

Aside from their inability to handle high volumes, the only other reservation that I have about the Pentachord system is with regard to the idea of a single sub-woofer. Although many people believe that deep bass is not directional, I still maintain that the upper parts of the sub-woofer's frequency range are a valid part of the stereo soundstage. In the case of the Pentachord system, I found this anomaly particularly noticeable with baritone voices, where the upper parts of the voice are in one section of the soundstage and the bass parts are in another.

In all, I found the Pentachord loudspeakers involving and detailed, if a little quiet. The closest analogy I could find to them was the Quad Electrostatic. Especially when used without the sub-woofer, the Pentachord loudspeakers share many of the electrostatic characteristics, but without the room-dominating size of the Quads. Their imagery is precise, both in terms of soundstage width and depth. They do



# satellite delight

**We thought the little Pentachord  
satellite loudspeakers were pretty.**

**Alan Sircom liked their sound as well**

not appear to be greatly troubled by complex passages of music, providing that the volume level is not too high.

In many ways, the Pentachords are one of the more refined loudspeakers available today. Where they fall down is with rock music, unfortunately, running out of steam when the music gets dirty. This loudspeaker system is somewhat more Mozart than Motorhead!

I have reservations about the sub-woofer, but these are aimed more at the theory behind mono bass systems in general, rather than this system itself.

In use, I found these loudspeakers to be amongst the most refined and integrated sub-woofer/satellite systems on the market today. As an unobtrusive, attractive and good sounding package, the Pentachord system is well worth seeking out. It possesses some unique strengths ●



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

SPEAKERS All system prices include the Dual CS503/1	AMPS	Goodmans Maxim II Widale Delta 3D.2 JPW Minim Gate GS210	Celestion 3 JPW Sonata M/Short MS 3.10 W/Dale Diamond 4 Mission 760 Royd A7	Celestion DL4 II Tannoy E11 JPW Sonata+ M/Short MS3.20 Widale 410	Monitor Audio R7 (Add £15) Nad 8225e Celestion 5	Hibrook P15 Celestion DL6 II Tannoy M15 Wharfedale 505.2 Monitor Audio R9 M/Short MS 3.30	Castle Warwick KEF C45 Celestion DL8 II Arcam Alpha	Castle Durham Heybrook HB1/3 Tannoy M20 (BIK) Tannoy DC 2000 (Add £70) Rogers LSA4
Rotel RA820AX	284.95	299.95	319.95	339.95	369.95	379.95	419.95	
Rotel RA820BX4	319.95	334.95	349.95	369.95	399.95	409.95	449.95	
Dual CV15600	284.95	299.95	319.95	339.95	369.95	379.95	419.95	
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Rotel RA840BX4	369.95	399.95	409.95	419.95	444.95	449.95	499.95	
Harman HK6100	299.95	379.95	399.95	419.95	369.95	389.95	434.95	
Rotel RA810A	259.95	309.95	329.95	349.95	339.95	349.95	399.95	
QED A240CD II	334.95	279.95	299.95	309.95	419.95	439.95	474.95	
Yamaha AX330	249.95	279.95	299.95	309.95	329.95	339.95	379.95	
NAD 3240	329.95	354.95	379.95	399.95	409.95	429.95	459.95	
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Nad 322SPE	329.95	344.95	384.95	384.95	384.95	419.95	424.95	
Nad 3020 i	349.95	369.95	369.95	369.95	384.95	369.95	409.95	
Marantz PM1 30SE	339.95	349.95	314.95	309.95	334.95	354.95	364.95	
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Musical Fidelity B1	274.95	289.95	349.95	349.95	369.95	349.95	369.95	
	309.95	329.95	309.95	309.95	319.95	409.95	419.95	
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 Denon DCD860  
 Denon DCD960  
 Marantz CD40  
 Marantz CD41  
 Marantz CD50SE  
 Marantz CD60SE  
 Nad 5420  
 Nad 5425  
 Nad 5440  
 Philips CD624  
 Philips CD634
- add £40  
 add £70  
 add £115  
 add £160  
 add £50  
 add £95  
 add £140  
 add £170  
 add £50  
 add £75  
 add £160  
 add £65  
 add £115
- Philips CD850**  
 Philips CD610II  
 Pioneer PD6500  
 Rotel RCD855  
 Rotel RCD865  
 Sony CDP790  
 Technics SLPQ200AK  
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 Nad 5120  
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# US open

**Continuing from last month's  
Box v Panel debate,  
Alan Sircom establishes  
sporting contact with the  
Magneplanar MG1.4 open  
panel loudspeakers.**

Magneplanar MG1.4 panel loudspeakers and their brethren do not conform to conventional views on loudspeaker design. Externally, Maggies are designed to blend into a domestic environment more easily than a large box, with their ungainly stands and spikes. Internally, the planar-magnetic driver is claimed to be unique to Magneplanar loudspeakers. It was developed by James Winey, Magneplanar's founder who started this company in the late 1960s.

Priced at £1190, the MG1.4s stand as the second cheapest in Magneplanar's range. Being an American loudspeaker, the Maggies suffer some considerable importation costs, that take into account carriage charges, exchange rate fluctuations and such like. As such they effectively become an up-market loudspeaker in the UK, instead of the mid-price model they are in the States. This is a shame, as I am sure that the British market would benefit from lower priced panel loud-

speakers. As it is however, the MG1.4s are designed to be one stage above the "my first panel" SMGa loudspeakers in Magneplanar's range, by adding more surface area to the bass diaphragm. Not unexpectedly, this improves bass quality, offering "deeper, smoother bass" the manufacturers say.

## Drive

Magneplanar claim that both models are easy to drive. The sensitivity of the MG1.4 is quoted as 87dB at 1 watt/1 metre, which is quite good. Impedance is on the low side however, the nominal value being five ohms according to Magneplanar. Aware of rumours that Maggies are "difficult" to drive, we made our own tests and found them unfounded (see separate box). The low-ish impedance value infers that some current should be available from an amplifier, but since most half-decent amplifiers can cope with a four ohm load, this should not be a problem. I still feel that it would be a good idea to partner the Maggies with an amplifier that is a bit butch, just to be on the safe side.

In appearance terms, Maggies are unlike any other loudspeaker on the market that I am aware of. Standing almost five feet high by two feet wide the 1.4s look like screens or room dividers. Magneplanar themselves suggest that they can be moved from the listening position into a hiding place when not in use. As these loudspeakers are not particularly heavy or spiked, this is an easy operation and will probably save many marriages from ending in divorce. It has been said that the English and the Americans have everything in common except language. Language and room size would be more accurate, as I feel that the Maggies are a little big for many British living rooms. On saying this, they are no less imposing than big KEFs or Linn Isobariks - that cannot be easily hidden!

## Differences

Technically, the Magneplanar driver differs in many respects from ribbon and electrostatic loudspeakers. Whereas ribbon units move a strip of metal foil and electrostatics a sheet of Mylar, electromagnetic loudspeakers have a grid of wire bonded into the Mylar through which passes the audio signal. This reacts against a static magnetic field, set up by rows of magnets, driving the diaphragm in sympathy with the signal. This arrangement results in a lightweight diaphragm that can move quickly in response to fast signals. It is a desirable characteristic that results in more accurate reproduction of the original signal. Historically, this has been considered a goal to aim for in the quest for better sound reproduction, Magneplanar pursuing one interesting approach with their panels, quite different from electrostatic drive. Externally however, differences between Magneplanars and other panel loudspeakers do not appear too noticeable to the layman.

In setting up the Maggies for assess-

ment, it soon became apparent just how room dependent they are. Previously, reviewers have noted the amount of time that is needed to get the MG1.4s to run at their best; we had to completely re-design the listening room to accommodate the loudspeakers adequately! Our room, 16ft x 12ft, I feel is a little too small for loudspeakers the size of Maggies. After much swearing and lifting, we finally got the room rearranged to a layout where the Maggies, the hi-fi system and myself could work together in harmony.

As a general rule, open panel loudspeakers should be at least three feet in front of a rear wall, so rear radiation is reflected back late and attenuated. They can, however, be close to side walls. As the Magneplanars are so room dependent (like all panel loudspeakers), placement will vary from room to room. In the same vein, you'll notice that I have made no mention of the angle of toe-in for these loudspeakers. Again, I have found this to vary from room to room and from person to person. The beauty of the Maggies is that they are very easy to re-position; the MG1.4s are quite light, not too cumbersome and there are no spikes to damage floors, carpets or feet.

### Listening

Because of the rebuilding of the listening room, extensive listening on vinyl proved difficult, so the bulk of the test was performed using an up market Denon DCD-3520 Compact Disc player. In terms of amplification, the MG1.4s were partnered with a pair of Musical Fidelity's new powerhouse amplifiers (the P180 - featured elsewhere in this issue), each set into mono mode to better deliver high currents. We wanted to be absolutely sure the MG1.4s were properly driven, being slightly fearful of their reputation as a difficult load.

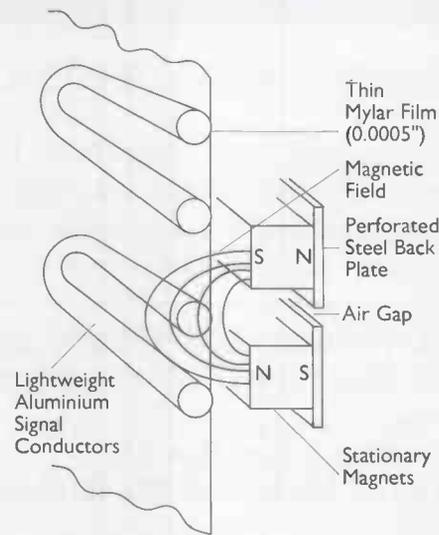
My usual feelings toward panels (very detailed - no "grunt") were tested to the full by the Magneplanars. Going for the traditional weak points of panels straight away, in order to get the measure of them at one extreme, I reached for The Cult's "Electric" Compact Disc, smiling to myself in the certain knowledge that no panel loudspeaker can stand up to the "grunge" test this disc represents. In itself, this is being quite restrained; in the past I've used such nasties as Zodiac Mindwarp and the Love Reaction, Danzig and Einstürzender Neubart. Any loudspeaker that can pass this test is more than able to play any type of music with naked aggression.

To their credit, the Maggies did well here. Everything sounded big and powerful, with a reasonable image. I felt this wasn't at all panel-like, in fact. One of the most noticeable features of the Maggies was huge image size. From the start of the first track I noticed that everything was almost too large. My partner in crime, Danny Haikin, commented that somebody was playing a six foot tambourine in the mix, whereas I was astounded that the drum kit appeared bigger than the room

we were listening in! Perhaps this is why panel loudspeakers need large rooms.

After still more hours spent moving the Maggies around, still more swearing and still more lifting I tried again. This time I managed to reduce the image to merely big, instead of huge. In this final instance, I felt that I was happy enough to make accurate judgments on these loudspeakers.

Unlike many panels, the Maggies are capable of producing good volume levels. With groups like The Cult, Jane's Addiction and so on, the loudspeaker does need to be capable of playing at high



**Here's how the Magneplanar drive unit works. The music signal passes through lightweight aluminium wires bonded to a thin, light Mylar diaphragm. This creates a changing magnetic field that reacts against a fixed field established by rows of permanent magnets. They are held stationary by a perforated steel backplate sitting behind the diaphragm. The diaphragm is driven by the interaction of the fields, moving in sympathy with the music signal.**

volumes. Certain classical pieces need to have the facility of handling a dramatic crescendo. This has been one of the major failings of panel loudspeakers, to my mind. I found it refreshing to find a pair of panel loudspeakers that overcome this obstacle. However, I still maintain that panel loudspeakers are better suited to classical music than rock. The dry, seamless character of the Maggies lends itself toward classical program, whereas rock enjoys the punch of box loudspeakers. In addition, the MG1.4s, like so many panel loudspeakers, are a little bass-shy, which I find becomes particularly noticeable on rap and loud rock tracks.

On playing Gershwin (an obvious choice for a pair of American loudspeakers) the Maggies sounded far more delicate. The soundstage takes on an ethereal quality with strings that is difficult for box loudspeakers to approach. Some have criticised this soundstaging, suggest-

ing that it is illusory and that it is more of an effect than a valid part of the music. To others, usually panel owners (our editor included), this delicate image is all important.

Compared to other panel loudspeakers, the MG1.4s are a little indistinct and vague in terms of sound staging. Their imagery, although good, is not as sharp as I have come to expect from panels. In some respects, I feel that this is due to their being mid priced loudspeakers in the States. Rather than opting to produce revealing loudspeakers, Magneplanar have realised that they may be partnered with less than perfect equipment and, as such, the MG1.4s could easily be too analytical in some systems. In Europe, where the cost of importation moves the MG1.4s into a different league, this consideration is largely superfluous.

To conclude, the Magneplanar MG1.4 loudspeakers do not suffer too badly from the price hike of importation. They create a relaxed, easy sound that is well-rounded and open, without being overtly detailed. If you have a living room shaped like a corridor and are keen to hear just what panel loudspeakers can do, the MG1.4s are a great place to start ●

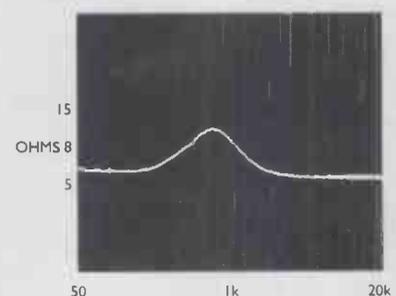
### Difficult to drive?

Legend has it that electro-magnetic planar drivers, such as that used in the MG1.4, exhibit a load impedance of just a few ohms. If true this would cause an amplifier to deliver massive current, severely loading its internal power supply. It is not a phenomenon that would cause damage, but it may well sort out the wheat from the chaff, effectively making the loudspeakers seem unduly amplifier sensitive. The usual solution is to fit a step-down transformer.

In spite of the low quoted nominal impedance of the MG1.4, this figure turns out to be a minimum. Analysis of impedance from 2Hz right up to 20kHz confirmed the basic 5 ohm figure quoted by Magneplanar. The only deviation was an upward one, to 10 ohms at 700Hz, as shown in the impedance trace reproduced here.

Our conclusion is that the MG1.4 is not a difficult load to drive and, contrary to rumour, it does not go down to 2 ohms and freak amplifiers out.

### Impedance



Impedance of the MG1.4s measured 5 ohms minimum, the peak reaching 10 ohms at 700Hz

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Micromega are fast gaining a reputation for producing Compact Disc players that even the hardest critics like. This, combined with the unique styling of their transport systems, has given them a strong position in the esoteric CD market.

The Optic BS, featured here, is Micromega's attempt to duplicate this success, but at a more affordable price of £695. Whereas the more costly Micromegas feature their own renowned floating sub-chassis, the Optic uses a standard Philips transport. Philips actually build the Optic and incorporate all of Micromega's own electronics, including their own modified Philips Bitstream converter.

Thankfully, the Optic is not graced by the usual Philips facilities. It is consequently uncluttered and easy to use, despite the fact that its key controls are in French. Facilities are standard: basic programming, repeat and random (or aleatoire) play. My only criticism of the Optic in this sense is related to its build quality.

Micromega will naturally - and justifiably - argue that all of the expense of the Optic is taken up where it counts - in its circuitry. As a result, the Optic really isn't well made. If it had been a budget/mid-price machine I would not have mentioned it, but the Optic looks and feels very plasticky. In use this means that whilst its buttons actually work



effectively, they give no reassurance of quality. As the more expensive Micromega players are so good in this respect, it is unfortunate that the Optic did not inherit some of this class.

I have left a lot of room to talk about sound quality as the Optic really puzzled me in this respect. In their brochure, The Musical Design Company (British importers of Micromega who are French) state very succinctly the typical failings of Compact Disc players. I do in fact agree with their comments and accept that the more expensive Micromega players significantly ameliorate typical CD problems. Yet I have found with the Optic, that it only delivers half of what it promises.

The traditional problem with Compact Disc sound quality is two fold. First, there is a propensity towards harshness; secondly, there is a lack of information which manifests itself as sterility and lack of ambience. The

Optic deals with the first part of this very effectively: it is one of the **least** offensive CD players I have heard. It is on the second point where, in my opinion, it fails.

Whilst listening to That's Entertainment from the Jam's Compact Snap, it occurred to me why so many analogue buffs have warmed to Micromega. It sounds, superficially, a lot like a turntable. By this I mean that its tonal balance is soft and there is a warmth to the sound which I know many people find very attractive. I say it is a superficial resemblance because in other areas which I consider crucial, the Optic doesn't emulate a good turntable's performance. I found it blurred much of the information on That's Entertainment, which made the vocals difficult to understand, and reduced the anger in the song to mere dissatisfaction.

Similarly, on Rachmaninov's 2nd Piano Concerto, although the Micromega allowed unfatiguing listening - which many players at this price do not - and produced a very wide soundstage, it lost the feel of the music to a degree. The 2nd Piano Concerto is a tremendously sad and longing piece which is brilliantly crafted. The Optic doesn't seem to convey this; instead it imparts a lethargy which seems to spare the listener from the intended expression in the music. In sonic terms, it essentially exhibits a lack of resolution. Piano notes bloom rather than have a distinct leading edge and decay, and the string sections are lumped together and resultingly lack texture. At a similar price, the Arcam Delta 70.2, whilst offering a balance which is vastly different - and subjectively less nice - does offer an insightful performance which is far more meaningful.

To conclude, this must be a question of priorities. If a person finds the sound of Compact Disc so offensive that he/she cannot bear to listen to it, then the Optic is a perfect choice. However, to my ears, which normally listen to vinyl records, CD simply isn't like that anymore. It now needs to become more informative and more detailed. Micromega are achieving this in their more costly players, which are easy to listen to because they are more detailed. With the Optic however, all of the polish with none of the fun is not a successful blend of properties, I feel ●

# Optical allusion

Listeners often allude to the unusual sound of Micromega's CD players. Danny Haikin takes a look at the £695 Optic.

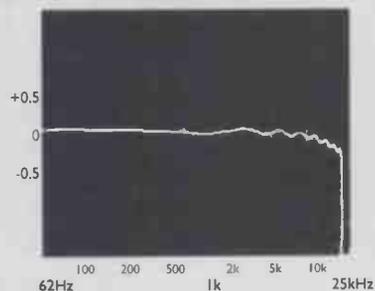
## Technical Performance

The Optic uses Philips SAA-7321 Bitstream converter. It has been superseded by the 7350 and, shortly, this will be superseded by yet another new chip.

Because the SAA-7321 is now getting long in the tooth by fast changing DAC standards doesn't necessarily mean it is ineffective. Such a presumption would be naive. There is plenty to be done with vital support circuits, such as clocks which affect timing, that can change sound quality in a useful or detrimental manner. It gives a designer latitude to make improvements

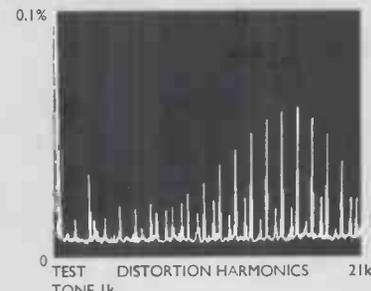
that might well result in a unique sound - and this appears to be Micromega's approach. Unfortunately, the underlying technology must still be implemented properly and this is where Micromega, like others before them, are experiencing problems. The first Optic we had produced unusually high levels of distortion - and so did the second. Both failed to resolve a -90dB signal too, which is not an inherent Bitstream problem. I suspect board layout error, something that plagues Bitstream because of the high frequencies involved.

## Frequency Response



Falling upper treble helps give a soft sound

## Distortion



Strong distortion was a problem, which is not right for Bitstream

# performing artist

**KEF's £450 Reference 101-2 loudspeakers act for**

**Roy Gregory - to his enjoyment**

I know hi-fi is supposed to be fun, but sometimes you have to get serious. The Kef 101-2 has made me get serious. Why? Because in some important respects, it sets new performance standards at the price. Yet, paradoxically, because of its strengths it will be (indeed, already has been!) severely misunderstood. This is an easy speaker to dismiss. To do so is a mistake.

Examining the reasons behind the paradox reveals both the speaker's abilities, and why it differs from other products. The 101-2 is part of Kef's revitalised Reference Series. As such, rather than being the best market compromise at the price, an amalgam of size, finish, driver technology and bass extension, its design aims are much less complicated. It has to be the most musically faithful speaker the company can make for its size.

Now, logically, that should be the aim for each and every loudspeaker. Unfortunately, it simply isn't so. The terms "musicality" and "faithful" seem open to the widest possible interpretation. In the case of the 101-2 their point of departure is the live, acoustic event but, living as they do at the end of the signal chain, they can do no more than accurately transduce the signal they're given, nothing added, nothing taken away.

Where a speaker design occurs in the context of a particular system, it can build in compensatory "attributes" to make up for inadequacies further up the chain. Obviously such a "dedicated" approach gives that product a limited application, but one in which it should trounce all comers.

## Dogs Dinner

Substitute a "general" design without the inbuilt compensation and you end up with a dogs dinner. What is more, if the entire chain has had its performance skewed toward certain specific musical attributes at the expense of others, substituting a product aiming for allround competence is going to produce an even more chronic mismatch.

The Kef 101-2 is just such a "general" product. It owes its loyalty to the original musical event, rather than a company dogma. To try using it with a set of "dedicated" electronics and front end is a waste of everybody's time.

If you do so, you are likely to conclude that the 101-2 has dynamic and treble limitations. Lots of speakers offer exaggerated dynamics. It's easy to do, makes up for the dynamic limitations of so many front ends, and makes them impressive in demonstrations. Unfortunately it is achieved at the expense of tonal accuracy and real bass. It's remarkable how impressive a pumped up midbass can sound with a quick roll off below it. Fast, agile, articulate and inaccurate.

Likewise, thinning out treble tonality and jacking up the level produces an impressive, busy sound with loads of detail. The fact that it's totally unintegrated with the midband and is once again, exaggerated, is neither here nor there!

All of which brings us back to the 101-2. It doesn't do any of the above. What it receives is what you get. Compare it to an "overly impressive" competitor and you'll be disappointed. Use it with an unbalanced system and again, you'll be disappointed. That's not the way to judge it.

## Inherently Revealing

Firstly you have to set this loudspeaker up properly, which, given it's inherently revealing nature, isn't always straightforward. I got the best results using tall, heavy stands (Apollo or Foundation with cones between the speaker and top plate). I ended up with the speakers toed in to face directly at the listener, and about eight inches out from the wall. Bi-wiring is mandatory, and I got good results from RS, Furukawa and Cogan-Hall cables. Finally, you need to let the 101's run in. I had them on for over a week with a CD on continuous repeat, before I listened to them. Even then they continued to improve.

The weeks wait might not do anything for your patience, but it gives you an opportunity to appreciate the finish and

appearance of the baby Kefs. Covered in real tree, the 101's are one of the prettiest pieces of hi-fi I've come across. Design conscious friends (and their wives) were amazed by the svelte appearance with the contoured baffle and driver trim exposed. Clip the clever magnetically held grill in place and the understated yet classy effect is complete. As the 101 uses the same 160mm Uni-Q driver found in the 105-3, you can place it on its side without wrecking the sound. To this end, even the front baffle badges can be rotated! What this adds up to is a compact, high quality speaker of excellent appearance, suitable for near wall or (at a pinch) shelf mounting. An extremely interesting prospect I think you'll agree.

## Three Recordings

Once it's run in and hooked up, you'll want to know what it can "do". The best way to find out is to get hold of three recordings of the same piece of music. I used the Tchaikovsky Violin Concerto, played by Kyung-Wha Chung on Decca, Perlman on Readers Digest and Jascha Helfetz on RCA.

Played back via the 101's the results are fascinating. Kyung-Wha Chung's precise and clipped presentation pales beside the liquid lyricism of Perlman's sumptuous performance but both are eclipsed by the power and tension, the total control of pace and tone possessed by Helfetz. The 101's don't just lay bare the stylistic and interpretive differences between these soloists, they leave you in no doubt that Helfetz is in a class apart.

Along the way you find out all about the differences between a classic English orchestra like the LSO with Previn, and the powerhouse Chicago under Rainer. In other words, the 101's are transparent to the nature and spirit of the performance, just as much as its substance. They are as articulate in revealing the overall picture as the individual notes that make it up. They present music with an overall coherence which makes the unique stylistic and interpretive choices made by the performers clear and (where appropriate!) understandable. Using the 101's you should never confuse one player or band with another. Try the same comparison on most other speakers and you'll be surprised how they obscure the individual character of each performance, the tone and vitality which sets each one apart.

You can repeat this trick in other ways. Take three Cello Concerti; Elgar with du Pre, Walton with Piatigorsky on RCA and Dvorak with Starker on Mercury. Each is arguably the definitive reading, and again the differences between the composers are laid bare, served by superb performances from their soloists, conductors and orchestras. And not forgetting the speakers.

## Perfectly Scaled Dynamics

The Elgar and Dvorak pieces in particular, demand wide dynamic range. The 101's can't match the scale of a full orchestra.

No speakers, certainly none this size, can. What they do is give you perfectly scaled dynamics so that shifts are reproduced in the correct proportion. They'll also go surprisingly loud if the music demands it.

You'll notice that I haven't dissected their performance. Listen, and you'll realise that the music is all there. The treble doesn't draw attention to itself, but nor is it dark or sat on. Percussion transients are spot on, as is the decay that follows, and brass instruments can produce a nice sense of "blare" without the hardness and edge they so often suffer. In fact the 101's limitations are far less imitating.

Their stereo performance is inhibited by their near wall placing, showing excellent width and height, but curtailed depth. In the style of small speakers, images appear as pinpoints rather than rounded wholes. The bass is surprisingly deep from such a small box and trades extension for a loss of definition. The weight and scale is needed to reproduce orchestral music and create a convincing soundstage, but if you drive them hard with modern rock or pop music which has loads of low end poke, they'll get into trouble. You'll find that they handle the live Psycho Killer off "Stop Making Sense" really well. "Take Me To The River" is another matter. Play it loud and the 101's seize up, getting congested and rhythmically sluggish. It's not that they can't handle rock and pop - they can't handle really OTT bass lines, backed up with synths, at ear damaging levels. That's not what the 101's are about. If you want house music, I strongly recommend a pair of Cerwin Vegas. They'll lap it up!

**Partnering Equipment**

The other area you need to watch is partnering equipment. The Kefs tell you all about the music. They also tell you, in close up, about what's playing it. Short-comings are revealed mercilessly. Whilst they are reasonably efficient, they also like to be kicked around. I achieved fine results with the JA30's, but the sheer power available from a pair of MFA 200's 100 Watt triode coupled monoblocks added an extra dimension. The new Alechemist Genesis monoblocks also did an excellent job. Using that kind of amp to drive £450 speakers may seem ridiculous, but remember that the whole concept of the Reference Series is to offer the quality of the 105's or 107's across the range.

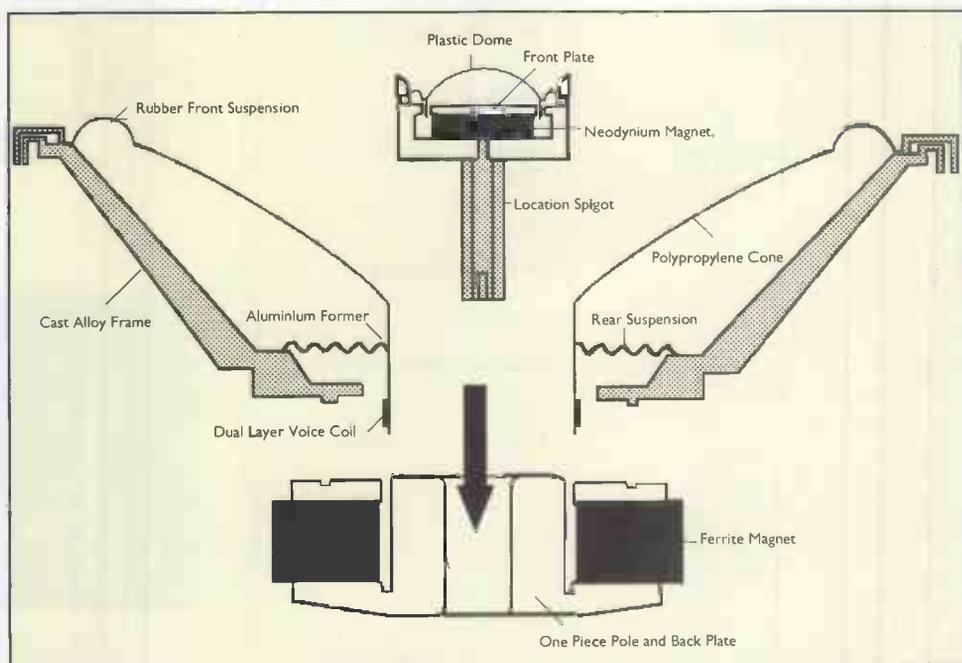
The Kef 101-2's are a challenging product. They set new standards of coherence, timbral accuracy and tonal range for the price. They do it in a box that looks a lot more expensive than it is. They throw down a gauntlet to manufacturers of both speakers and the equipment that drives them. They are powerful servants to music ●



The Kef 101-2 is based upon a single Uni-Q drive unit. This novel form of dual concentric arrangement places the tweeter inside the woofer, positioned at the base of the main cone in place of the usual dust cap. It emulates a point source, in order to give a more coherent sound, with better imaging.

KEF were able to develop Uni-Q when super-powerful Neodymium magnets became available. They allowed the tweeter magnet to be shrunk

down to fit the limited space available. This exploded sectional view shows clearly how the tweeter spigot passes through the centre of the bass/mid-range unit, to position the tweeter at the base of the main cone. Consequently, all sound comes from one source, rather than multiple drive units spaced apart on a baffle. A crossover network is bolted to the backplate, making for one compact, full range assembly.





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JBL have a longstanding reputation for big, powerful but rather expensive loudspeakers. An American company, JBL produce loudspeakers that seem to reinforce the American Dream: Big is Better! The problem with producing American sounding loudspeakers is that they do not sound acceptable to British ears.

We British live in smaller rooms than our American brethren and because of this JBL designed a range of loudspeakers fit for European rooms and European ears. The cheapest of these is the £109 XE-1, which is also the least expensive loudspeaker that JBL have ever produced.

Although the XE-1 is their least expensive model to date, it has not been poorly finished. Our review sample was finished in black ash veneered MDF with a grey moulding on the front panel which has the JBL logo standing proud from it. On removing the front grille (a good move as it appears a little resonant), the quality of the front mouldings becomes apparent. Once again, the JBL logo is used, this time on the black tweeter surround. The only slight let down concerns the rear panel. Here, spring terminals are used, instead of 4mm sockets. Keith Haddock of Harman UK, the distributors of JBL loudspeakers, suggested that outside of the UK spring terminals are preferred. The terminals fitted to the XE-1 are too small to accept 4mm plugs. Physically, the XE-1s are 31cm high by 18cm wide and 22cm deep.

This loudspeaker size, I feel, makes the XE-1 slightly too large to be used as bookshelf units, unless you have a big bookshelf! Of the other types of support available, I felt that the XE-1s function best on open frames like Linn Kan II stands. The XE-1s are not particularly fussy as to room positioning either. This does not mean that they will work well if you put them behind the curtains or under the sofa, but instead the XE-1s are not too worried if they are pushed against a wall or out into the open. In our room, I found the XE-1s worked best about 30cm from the rear wall, just over 2 metres apart and with a very slight toe-in. There is, however, considerable room for maneuver here.

Loudspeakers that submit themselves for testing here tend to be used with a myriad of different combinations of equipment. In terms of amplification, everything from the Denon PMA-350 to a pair of Musical Fidelity P180s were used to assess these loudspeakers. A good arbiter of how successful a piece of equipment is comes when the reviewer has finished with the item. If it is still used for the next review, that is regarded as a good sign (or else the next reviewer is too lazy to move the equipment!). For a loudspeaker of this price, they stayed in position for a little longer than expected.

Initially the XE-1s sound very impressive, especially when playing rock music. They produce a powerful, voluminous guitar sound which draws the listener into the music. "Back Seat



## sound as a pound

**The US loudspeaker manufacturers JBL have produced their first range of Euro speakers. Alan Sircom gets his ears out to the 109 XE-1.**

Education" from Zodiac Mindwarp and the Love Reaction's "Tattooed Beat Messiah" album played with the sort of gritty, overblown guitar sound that one expects from a track that begins "Hey baby, come over here. I want to borrow you for a while!" The instruments did not sound too jumbled; the lead and rhythm guitars were easy to follow and differentiate.

When listening to vocals the problems began to show up. Lyrics were hard to follow, sounding as if the vocalist was singing behind the band. With the XE-1s, it was harder than usual to define the subtle nuances of such a lyric. This was borne out by other tracks, especially those of the less heavy persuasion. "Freedom Now" by Tracy Chapman on her "Crossroads" Compact Disc made her voice sound recessed and "cuppy". This seemed to be more noticeable with male vocalists than females, but it was still there, nevertheless.

I should not let this dissuade you if you are a fan of heavy rock music, as the XE-1s really do shine with this material. They are capable of playing music loud,

with lots of bass, while still remaining tightly controlled. The XE-1s are not too subtle, so classical music enthusiasts should look elsewhere. As if to prove this to myself, I attempted to play a performance of Rachmaninov's 2nd Piano Concerto by the Concertgebouw Orchestra with Vladimir Ashkenazy playing and Bernard Haitink conducting. The XE-1s tried to cope with the piano sound, but I still felt that they are happier with a Fender-Rhodes electric piano than a Steinway grand. When the orchestra built up to dramatic crescendos, the XE-1s began to sound powerful, if a little lost. On the quieter passages, the loudspeakers failed to sound convincing or detailed.

I found the vagueness of the vocals upsetting, because otherwise the XE-1 comes close to being a superb budget rock loudspeaker. As it stands, it is still more than capable, producing big, ballsy sound for the money. Not for those who place refinement high on their list of criteria. I feel that anyone who enjoys groups like Metallica, but is on a tight budget, should give the JBL XE-1 a close examination ●

**When did you start Meridian and why?**

Alan Boothroyd and I started a design partnership in 1975 - Boothroyd Stuart and partners - to design consumer products.

**What background do you have?**

I have a degree in Electronic and Electrical Engineering and Psycho-Acoustics from Birmingham. Then I did a second degree in Operations Research at Imperial College, London. Operations Research is the study of applying mathematical terms to common-sense problems. That was in about 1971, which was followed by a year at Marconi Instruments in St.Albans. From 1972-75, I worked at Lecson Audio. Then Alan and I went into consultancy in 1975.

**What happened next?**

Well, after two years I decided that we should start a manufactur-

ing division of the design company. You are probably aware that Alan has gone on to design a lot of other products for other people as well as us. He is still part of the group - Cambridge Product Design. So, in 1977, we set up Meridian. Our first product was the M1 active speaker. It was followed by the 100 series range comprising tuner amplifier and active speakers. Then in 1983, we got involved in Compact Disc with the MCD and PRO-MCD top-loading players.

**What was special about the PRO?**

What was special was that it had the converter circuitry held in its own box underneath with a separate power supply, making it the first two-box CD player.

**Your equipment has always been very stylish. What got you involved in that?**

We have had several threads running right through. One is that we want our products to be very elegant. Another is that

**speaker that is an extension of your existing philosophy and outlook?**

It is entirely consistent with what we were doing in 1977. Except that now we are able to say that we are able to make a crossover which is exactly what we want. We also give the user tone controls - earlier audiophile products had to take all that away as everything that you put in the analogue chain upset the sound. This has digital tone controls and digital loudness.

**Aside from digital tone controls, what else is innovative about the D6000?**

One of the fascinating things about this speaker is that it knows how loud the sound is, as it is calibrated in the factory. They have that sort of acoustic response that you just put them in a room and they work! The shape of the speakers is at once both sculptural and functional. Some people criticise by saying that it's just a digital loudspeaker. What it actually is is an exercise in dynamic range. It reproduces music at natural volume: that is what it is about! What



**Bob Stuart with the D6000 digital loudspeaker. It uses normal drive units, but accepts digital inputs. They are processed through digital tone control, crossover and equalisation circuits. Afterwards, the signal is converted back to analogue through DACs, then to power amplifier and on to the drive units.**

# Questioning Meridian

**Hi-Fi World questions Bob Stuart, co-founder of Meridian, about his unique digital loudspeaker, a new Analogue to Digital convertor and related topics.**

they should be simple to operate, not intimidating. We don't think products should be any bigger than they need to be.

**How have you changed since those days?**

I think what happened was that we expanded the strengths of the company. Certainly in a management sense. Up until 1987, I was running everything. Since I pulled back, to become just the Technical Director, Meridian have performed a lot better and more products have come out. We have made enough to make our production world class.

**So moving up to date with your new digital loudspeaker, the D6000, do you feel that you have come up with a**

has been exciting is the interest that is coming from the professional as well as music-loving customers.

**I suppose that their interest is that you could use a DAT recorder, take the digital output and lead it straight into the D6000s. That's a pure digital line, basically, right through to the loudspeakers. And the Digital-Analogue converter is in the speaker?**

Three converters, actually! Two are 606 type, the mid-range and the top each have differential circuitry, whilst the bass uses the 7321 chipset. It's all Bitstream, but we didn't think we needed the 7350 chip for signals below 200Hz.

**Are there many other digital loudspeakers in the world?**

I think there is only one model in production. I think there are quite a lot of digital speakers in prototype, or in laboratories, but these are the first ones that have been heard.

**Moving aside from the D6000s, what is your point of view on the DAT/DCC debate? Are you looking into either medium actively?**

The good things about DCC have been well publicised - compatible mechanism, the ability to play analogue or digital tapes. But it is using a widely available medium, so from a consumer point of view it is more interesting. There is no doubt that DAT will provide a more precise recording, I'm not confused about that.

**What do you mean by "precise" exactly?**

By that I mean that if it's correctly engineered, it is capable of storing the signal that we want to capture. DCC doesn't put the same signal on the tape and you can never get back to an un-processed version. You can't post-process and come back to what you might have had. Now, that is not to say all DAT machines are right; wrong ones sound quite strained. But that is an engineering question. We haven't decided - we have yet to come out of the closet on DAT.

**Why is that? Surely if DAT is already here and is more accurate, it would seem an obvious choice for you.**

DAT has worried us on a number of fronts. Obviously, the first was the huge lobby against it in America, because of which we decided to wait and see.

Secondly, for better or worse, the DAT business is fundamentally dominated by the people who are good at making video recorders.

Then, on a completely different front, we are rather puzzled as to its use domestically.

So, the whole digital tape thing is a great concern to us, as are solid-state storage systems and their alternatives - we are very interested in them. But we are actually going to be doing something with DCC.

**I still feel that it is funny that you should choose DCC, especially after saying DAT is more accurate.**

That is not to say we are not going to do anything with DAT either, but there is the problem that it is only worth doing if you have access to a reliable mechanism in a quantity that we can deal with. It's one of the reasons that we never made an analogue tape machine, as we felt that we couldn't make a contribution to that medium.

For the professional, involved with the capture of sound, DAT is fantastic. But what we couldn't decide and we are still unsure about is what is the market for a good sounding high-end DAT machine at the consumer level? And is that market worth the cost of development and the pain of dealing with the Japanese supplier of the transport mechanism.

**Does this mean that Meridian are not happy using OEM parts?**

We don't mind using OEM (Outside Equipment Manufacturer) parts, but our history, as a small manufacturer, dealing effectively with the large Japanese manufacturers is relatively poor.

Phillips are terrific. They understand that people like us bring them publicity and that we make the whole business richer by adding variety. The Japanese companies only want to know how many thousand you want. What we need from a supplier is a serious understanding of our company's requirements in continuity. It's not that we don't like the Japanese, but we do certainly have a policy of using the minimum number of specialised Japanese parts, just for that reason. Time and again, in the fifteen years that we have been in business, we have been using a Japanese IC (Integrated Circuit) that has been discontinued. The Americans and the Europeans don't do that.

**Have you played with digital recording media much, on a practical level? I saw that you have a DAT recorder on your test bench.**

Oh yes. We have fiddled around a little and we believe we can make sense out of it. We have a kind of toe in the water starting this month with our Analogue to Digital converter, the 607. It features a Crystal chip - a very expensive specialist American 64 times oversampling model. It's a one bit converter - it works incredibly well. We've worked hard on the support circuitry, the oscillators and the analogue circuitry. It measures beautifully; if you put it through a DAC, it measures like the DAC!

**What's the A-D for?**

Well, there is a requirement to get analogue sources to the D6000 loudspeakers. So we do interesting things like digitise the outputs of the turntable, radio and tape. So, in fact, one of the ways of using this speaker, you see, is that you have an analogue pre-amp, dealing with relevant sources, the output of which is then digitised and sent to the speaker.

**I know that many semi professional musicians master onto DAT but none of them can afford an off-board A-D converter. Is this a professional device?**

Well, that's the thing! It's a consumer A-D, but it's usable by professionals. We saw this space in the market. There are lots of converters at around £20,000, but when you look at a DAT player, they have a A-D converter chip which costs £4! There is no middle ground at all. You can improve the quality of a DAT machine just by putting in a good A-D converter and a good D-A converter. Ours sounds really sweet, it has a great openness about it. There has been much more interest in the professional DAT than we expected. We haven't set the price yet but it will be under £1,000.

**When the arrangement of separate Transport and Digital-Analogue converter first appeared, I noticed a remarkable improvement in CD performance. Do you think such a quantum leap can take place again?**

Yes it will. But you won't hear it from the DAC! I believe that the next big change will come at the front end. There is so much that has been learnt but not applied to the

recording or the process of making the discs. We know that you can do the most horrific things to a signal, digitally. It is only when these things have been sorted that you will be able to hear the next jump in CD performance. But let me ask you a question. Do you take the view that the perfect product would get perfect reviews, or that the reviews could be random?

**I feel that you would get random reviews, according to pre-conceptions of what we should hear!**

I speculate as to what would be the result if somebody did make a perfect product. We have been in digital audio for quite some time. Digital to analogue conversion have gone through four generations of systems. At each generation there have been measurable differences. But I also can see that we are two generations away from a converter for which I can't imagine an objective measurement, at the moment, that would say that it had a problem. The interesting question is that not only can you make a perfect product, but would anybody

Some people criticise by saying that it's just a digital loudspeaker. What it actually is is an exercise in dynamic range. The D6000 reproduces music at natural volume. That is what it is about!

believe you, would it be true and what would be the result? I think that it is going to happen!

**We have had this argument once before. When CD came in, everybody believed that it was going to be perfect, until they found a more refined set of measurements that blew holes in that "perfect" product. As such, I think that perfection is unattainable.**

Yes, but this time the driving force comes from psycho-acoustic research. The reason we get involved in this type of thing is that you hear a difference and you need to explain it. So you research it, finding things from other disciplines that might apply. But there is a limit. One of the interesting things is that the human hearing capability is incredibly acute and focussed in several areas, but it is finite. However, there is, still a long way to go, but what I am trying to get across to you is that in certain areas there isn't a possibility to go on and on. You can fool some of the people, some of the time; if you make something and persuade people that it is better, some will believe you.

Certainly if you make something different, then a lot of people will like it - that's what loudspeakers are about!

It is getting very baffling, the whole thing, isn't it? People are beginning to push rather hard and find that there are no answers, virtually, or that the answers appear to be horrifically complex.

In fact, what it leads us to, especially when trying to design a product like the D6000, is a whole new way of looking at things. In the past, the only way to measure an amplifier was to measure its simple harmonic distortion. If it was less than 0.1% then the pundits said it was a good amplifier. If we apply our digital audio criteria back to power amplifiers, particularly those pertaining to sound pressure levels and discrimination of

**The complex digital electronics of the D6000 loudspeaker, plus its analogue power amplifiers, are bench tested through umbilical chords. The whole assembly can be seen in the foreground here.**



**Every Meridian product is soak tested for three days before despatch. CD players are mechanically cycled and the room is thermally cycled.**

different frequencies, you'll see that the traditional ideas had some foundation, but they are full of holes.

You should measure a power amplifier like you measure a DAC; why apply a double standard? People rarely measure a piece of equipment using both channels simultaneously, nor do they evaluate it with all possible combinations of components in the system. All these things actually make quite a lot of difference. The point I'm trying to make is that you can measure a piece of equipment and then you have a problem as you have to put it into a system that could vary. One of the nice things about digital audio is that you have the opportunity

to minimise this. For example, we can play the D6000 optically, obviating the use of differing cables, so that that is one less barrier to worry about. There is a trend in high-end to return to balanced connections, which helps obviate some of the system problems that occur, but it's by no means perfect.

**One common criticism of CD is its lack of depth perspective. Is there a true depth perspective in a digital medium?**

Yes, but the apparent lack of perspective comes from the absence of noise. I think that you are less likely to get artificial depth

perspective from digital than off LP as the generally higher hiss level of LP subjectively results in an increased sense of spaciousness. A lot of people set their listening level relative to the hiss level of the LP.

It's like when Dolby was first introduced, a number of people complained that it sounded dull. It took the hiss away, so there is no doubt that it changed the recording, but you have to be very skilled to know that you have not made it worse.

The ear judges perspective by both low and high frequency returns. The improved performance of the Bitstream chips at high frequencies helps to create an acoustic.

**So, once again, it comes back to psycho-acoustics.**

Absolutely! What disturbs me is that some of the criteria by which equipment is designed is based on communication theory, not what the human ear can actually cope with.

I proposed a law in a lecture I gave at the Audio Engineering Society, which I called the Law of the Increasing Importance of the Smaller Difference. Because of the manner of human nature, one might look at a tree as a tree, broadly speaking. When you look at human faces the objective difference between them is actually very small. To us, however, hundreds of thousands of people look very different. Our perceptual systems are geared to this. The difference between the sound of two pianos or two violins is very fine, but one can still differentiate between them. It is this acute ability to discern fine differences and place a value on them that drives us all forwards ●

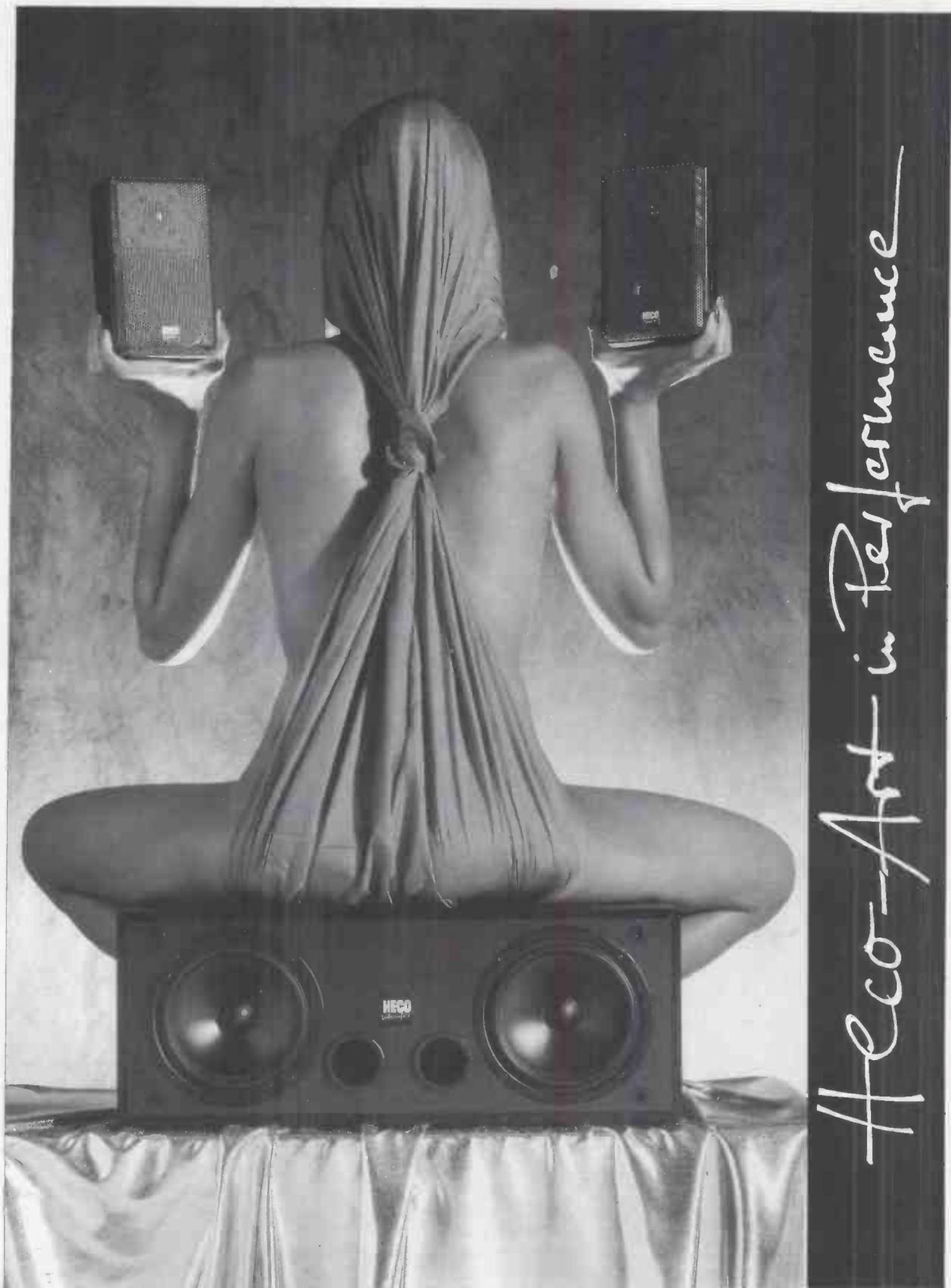
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# The Art of Audio Technica

**We interview Technical  
Director, Hisao Sugiyama**

**Can you tell me something about Audio Technica as a company? When was it started and why, for example?**

Audio Technica was started in 1962 in an area of Tokyo, Japan, called Shinjuku ku. The first products were moving magnet pickup cartridges, but they were followed quickly by a tonearm. So we started with pickup cartridge technology and we have remained in the forefront ever since. A new, larger building was obtained by 1965, again in Tokyo. It combined both the factory and the headquarters. Expansion was rapid; another factory was acquired during 1970, in Takefu, Fukui. Later we established Audio Technica (U.S.) at Akron, Ohio and Audio Technica Europe at Dusseldorf, West Germany. Both were added during the 1970s.

**On what principles have you designed the latest moving coil cartridges and what do you consider especially important in the design of pickup cartridges?**

The most important aspect in designing a cartridge is its cantilever. In flagship models

we use Beryllium, which is an ideal material for matching stiffness with lightness. It is a very hard metal.

**What sort of tube do you have for the cantilever. Does it have a special cross section?**

We use a tube of very small diameter and with a slight taper. The taper increases stiffness, so better transduction is possible. The signal is more accurately transferred from the LP groove up to the signal coils, without loss.

**Do you believe in low tip mass?**

Yes, we believe in very low effective tip mass, which is why we use a nude diamond. The one we use with OC-30 is similar to ART-1 diamond. This is the microlinear stylus which suffers almost no wear after one thousand hours. Contact area is very wide.

**Are you worried about vertical tracking angle and stylus rake angle?**

The value is fixed and has to be analogous to the cutting machine.

**Yes, but the replay device cannot mimic the cutting stylus so there is always a problem in this area.**

Vertical tracking angle is difficult and it is depending upon the mass of the tonearm. Our vertical tracking angle is fifteen to eighteen degrees and we always specify tracking force, which affects the figure. If this is adhered to, vertical tracking angle is correct and distortion minimised.

**How do you bond the stylus to the cantilever?**

The diamond shank is mechanically very precise and so is the hole on the cantilever. They are an interference fit, but glue is used to secure the diamond.

There are some companies that make too big hole, which means that the diamond can move before it is bonded. This is bad.

Beryllium is a very hard material and has very high Q. It is difficult to use on its own because its Q is too high. In order to damp this Audio Technica uses sputtering process to apply a layer of gold, which has low Q. By this process a fine layer of gold is obtained on the cantilever walls and Q reduced.

**What is the generator?**

We use a Neodymium magnet, because it is very strong in its magnetism. This means more output is available.

**Do the coils have any special properties?**

They use very pure copper wire of PC-OCC6N standard (Perfect Crystal - Ohno Continuous Casting, 6 Noughts purity) and the impedance is low at twelve ohms.

**Do you think there is anything in the design of a Moving Coil cartridge that gives such a clear sound? Is it normal engineering or are there any special reasons?**

Cantilever engineering is most important we feel, but coils and terminal pins in the signal path are very important also. The OC-30 employs Vanadium permendur metal in the yoke and in the pins. All these things help for clear sound.

**In the UK we consider the relationship of the body to the groove very important in order that the stylus can transcribe the signal accurately and without losses.**

We agree that you must tighten up fixing screws strongly, but not to the point where you tighten up and cause damage.

Another point is that cartridge body must be rigid and reasonably heavy. If it is soft then signal will be lost and vibration and resonance may affect cantilever.

**Do Japanese audio enthusiasts worry about the characteristics of the pickup arm?**

Answer is Yes. Audiophiles are paying a lot of attention to tonearms in Japan. They like heavy arms with plenty of mass to stop resonance.

**How have you managed to improve the OC-5 over its predecessor, the AT-F5?**

In OC-5, OC-10 and OC-30 the generating part is using Neodymium, which means high power and high sensitivity, increasing the dynamic range. Increasing the power increases the NS ratio (Signal to Noise ratio, or S/N ratio!) and this helps sound, because noise is further down.

**What is the output level of the cartridges?**

They give 0.4mV, which is high for a low impedance, moving coil cartridge.

**What do you prefer to use to match these cartridges into amplifiers?**

I prefer a transformer for maximum efficiency. We do have a 660T transformer which is available in this country

**What has been happening to cartridge sales in Japan since CD was introduced?**

Listening to CD has increased dramatically

amongst audiophiles. Having said that, there are certain groups of people who cannot retire from enjoying natural analogue sound. These people are constantly there.

**Is the LP still sold in Japanese shops?**

No new pressings are being made in Japan. Majority of records are from imports to Japan. Percentage wise, LP sales are under 1% and only special shops sell LP. Special selected LPs are displayed for sale, but otherwise LP is not sold any more.

**Listening to CD has increased dramatically amongst audiophiles. Having said that, there are certain groups of people who cannot retire from enjoying natural analogue sound.**

**Will Audio Technica continue to make cartridges in a situation like this?**

Yes, Audio Technica will continue to meet demand whilst it exists.

**But is there currently enough demand?**

Yes. On top of Japan we rely on Europe widely. We still make 600,000 pickup cartridges per month, a majority being for other manufacturers (OEM).

**Does Audio Technica believe there is much life left in LP?**

The present generation of people with LPs will continue to demand cartridges at a lower level than before. We think LP will live on at a low level.

**Audio Technica has a special reputation with pickup cartridges. Will the company try and adopt the same role with CD?**

Audio Technica is a parts manufacturer for CD laser pickups but there is a lot of pressure on costs. I don't think Audio Technica can make the same contribution as it has made with cartridges. Anything that is intended to improve the sound of

CD we are interested in. We are making CD accessories for this purpose.

**But accessories are not hi-fi?**

No. Now we make a contribution to sound quality in microphones, headphones and cables. In microphones we are now very strong.

We won't be involved in DA converters, nor DAT and such like. At the moment DAT and DCC are so much unstable that we will not move in this area.

**What do you use as your personal hi-fi?**

It is home made. Woofer is a JBL unit. The squawker is a wooden horn and the tweeter uses an aluminium horn. This is one system. Other system, for audio visual purpose, uses Mission loudspeakers. Home made valve amplifier with ultra-linear circuit was used to feed the loudspeaker, using KT88 output valves (from Telefunken). This was abandoned because it got too hot in the Japanese summer. Now I use Technics amplifier. I want to make my own FET circuit, using Toshiba or Hitachi FETs. I prefer to use A Class, but it is bad in the Japanese summer. Turntable is a Direct Drive on a base plate of aluminium of 20mm thickness. Arm is Audio Technica. It has a detachable headshell, but these do not sell in Britain any more - only fixed headshell. I am crying every day, trying to sell them!

**Will your new cartridges be sold around the world?**

In Japan only OC-30. In Europe limited quantities in to the UK, Germany, Norway and Italy. That's all. We have a big market in Europe.

**What future plans do Audio Technica have for hi-fi? Will you be making horn loudspeakers? You seem to like them!**

Ah, horn loudspeaker for home use only. The expansion of the cable and headphone business will be pursued. We have electrostatic headphones and these sell steadily; we know you like electrostatics. We do not have to advertise them, because they have steady popularity.

**Will you continue research into high quality pickup cartridges?**

Yes. We are always doing many hearing tests and we are always pursuing new materials. The difficult problem is to harmonise the new materials with better sound quality. But we have long experience and company specialises in this technology. We will continue to produce better products as long as market shows a demand ●



# sonic sanction

**Unusual and fascinating, the DM20 Gold amplifier from Sonic Link forced us to listen differently. Its sanction provoked various responses amongst Hi-Fi World staff. Noel Keyword describes what happened.**

The first surprise about the Sonic Link DM20 Gold is that you get 18 watts per channel for £600. At this point you might decide that reading any further is pointless! But, the seemingly high price of the Gold is due to Sonic Link's use of highly specialized, quality components. The standard DM 20 - at around £300 - has a similar circuit layout without such high quality components, but at present we are not acquainted with it.

I do believe, quite strongly, that component quality is a crucial factor in the sound quality equation. However, this is not to say that good basic engineering can be discarded,

nor the subtleties of audio circuit design that extend and enrich it. Confirmation of this came in conclusive fashion when I first heard a Deltec amplifier: these are masterpieces of audio engineering which, I feel, represent a significant step forward in amplifier sound quality. With the example of Deltec in the background and the persuasive if largely theoretical arguments in favour of specialised audio components in the foreground, I was primed to be receptive to reviewing the DM20 Gold amplifier. However, I am not convinced the price is entirely justified by its use of special components. Sure they cost a lot and both manufacturers and dealers margins go on top, but even then £600 is one helluva lot of money.

Graham Nalty travelled from Borrowash, Derby, to London with a review sample for us. If he felt some trepidation at casting his product amongst the lions, he was brave enough not to show it. I carried out basic measurements of distortion and power output in front of him. The high distortion figures prompted me to ask for his views about their subjective impact, to which he was surprisingly casual (see Measured Performance). I got the impression that Graham worries less than usual about basic circuit configuration, but much more about component quality. It is not for me to cast judgements on this; the final arbiter has to be perceived sound quality. Not unsurprisingly, it was different enough to arouse a fair bit of interest and discussion at our offices.

## Construction

In layout and construction the DM20 Gold is absolutely conventional. It comprises a pressed steel chassis, over which slides a pressed steel cover. The basic chassis is flimsier than usual but it gains rigidity from the cover, which screws on. If the flimsiness is due to cost cutting, then the money saved must have been spent on the mains trans-

former. It is a massive and expensive toroidal; tests confirmed its effectiveness. Both moving coil and moving magnet cartridges can be used, according to which phono board is specified.

All controls are normal. To the left is a rotary switch for power. It has a chunky action, a small clockwise twist bringing power on, accompanied by a small thump from the loudspeakers. I should explain that, being capacitor coupled, the DM20 doesn't possess DC offset and this form of coupling also helps suppress switch on crashes. The downside is that capacitor coupling can affect deep bass quality adversely.

The volume control is a small Japanese Alps unit - nothing special here. To its right is a balance control, then a row of input selector buttons marked Tape, Radio, Video, CD and Disc. Although tone controls are not fitted, there is a headphone output. It does not mute the loudspeakers because "the switch contacts would degrade the sound unacceptably", Sonic Link say. An ingenious way around this, adopted by Arcam for example, is to fit two pairs of 4mm speaker sockets, one connected direct and the other through switch contacts, allowing owners to balance convenience against sound quality. It would have been nice to see this facility adopted in the DM 20 Gold. The tape monitoring facility is conventional, allowing a three head deck to be properly used. All inputs are via phono sockets; loudspeakers are connected to binding posts that also accept 4mm plugs.

Just reading the instructions for this amplifier gives you more than a whiff of its design rationale. Even fuses get the treatment: "The audio grade fuses used in the Sonic Link DM20 have been chosen after very careful listening to all types currently available. The use of any other type of fuse will audibly degrade sound quality and only the 5A Audio Grade fuses supplied by Sonic

Link and which can be obtained through your dealer should be used in the DM20." Sonic Link continue by saying the sound quality of interconnect leads must be considered and, needless to say, they recommend their own.

We auditioned the DM20 Gold through Epos ESII loudspeakers, being careful not to use too much volume. I wanted to be certain that output overload wasn't reached. Inputs were from a Denon DCD-3520 CD player and a Rega RB-300 arm carrying a Linn Asaka MC cartridge, fitted to a Heybrook TT2 turntable. Graham had said the amplifier exhibited a bright balance; I felt these items would not accentuate it.

From the word go, with three of us listening, the DM20 attracted a lot of strong comment. I extricated myself from the melee and listened in peace later! I know from experience that products like this often have a strong and unique character which, just by being different, can for many listeners also be disturbing. Since it took me two weeks to acclimatise to Quad ESL-63s, which I now worship, I appreciate that preconceptions must be abandoned. A cry that went up immediately, after just a few minutes of Tracey Chapman's "Bridges", was that bass lines sounded loose and a bit uncontrolled by current standards. I felt there was satisfactory bass depth, but that quality was a bit plummy. This is almost certainly due to the output capacitors, since they do have such an effect.

**Presentation**

It was the whole matter of presentation that really interested me. The DM20 Gold seemed to contract the space occupied by vocalists and put a spotlight on them. It was a peculiar but pronounced effect that drew attention to singers, whilst suppressing the overall richness and breadth of the rest of a performance. I also noticed that prominence was given to high frequency detail; strummed guitar became vibrant and attention grabbing. After some hours spent with Compact Disc, my final conclusion was that the DM20 Gold does retrieve low level detail unusually well. Most impressive was the way it enhanced breadth of vocal expression by revealing nuances of delivery. I was quite stunned by this, and by the way it retrieved the sense of atmosphere within which a singer was performing. This strength alone might be enough to sway many listeners, convincing them the DM20 Gold offers a picture more specific and real than is usually the case. To some extent I would concur.

Balancing this attribute is the peculiar way vocalists or dominant instruments were apparently highlighted, at the expense of the rest of the performance. Such magnification all but pulled vocals out of a mix, resulting in a balance that was arguably correct. Dynamic contrasts were not great either, although I could not say the DM20 Gold became boring. It seemed polite across the mid band and in the low frequency regions.

It was at high frequencies that harmonics and low level detail seemed highlighted, with less slurring and general muffling than the norm. In my mind I have wondered whether this was due to an enriching process caused by harmonic distortion or whether it was due solely to the presence of superior electrical components that, as predicted,

have such a beneficial effect. The fact that the DM20 Gold exhibited some of the detail retrieval of a Deltec amplifier leads me to assume that it is doing something very well. It is the distortion and other undesirable effects that compromise it in the end, however.

I was disappointed by the moving coil disc stage. As Sonic Link point out in their instructions, it is not sensitive enough (0.6mV) to suit low output moving coils like the Asaka. I had to wind volume full up. Surprisingly, input hiss remained very low - perhaps due to the use of silent FET input devices. Hum was apparent, which was the first disappointment. The major one was purely sound quality; overall balance was toward a bass light sound where high frequencies seemed generally accentuated. I was intrigued by the DM20 Gold with Compact Disc, but this did not follow through to its performance with LP.

I strongly suspect the DM20 Gold greatly benefits from its use of high quality audio components and discrete devices. Graham Nalty has achieved a level of detail retrieval not common amongst modern, conventional amplifiers. Unfortunately, I also believe the DM20 Gold is compromised by the questionable performance of its basic circuits. I do not believe such high levels of distortion, capacitor output coupling and such like can be ignored in the search for good sound quality - especially at £600.

This amplifier is a testing ground for one man's ideas and as such it is a mixed bag, albeit a thoroughly intriguing one. I cannot help but admire the single minded dedication and determination of Graham Nalty in his quest for improved sound quality. I strongly suspect that further development is needed in order to realise the latent promise that the DM20 Gold possesses ●

**Technical Performance**

This is an unusual amplifier from Graham Nalty, of Sonic Link. Its design rationale revolves as much around use of specialist audio components inside as it does around circuit configuration, to attain good sound quality. The expensive Gold version we tested is fitted with Holco resistors, high quality polypropylene and polyester capacitors with low dielectric storage properties and various special wires of silver plated copper. Most of the electrolytic capacitors are special audio grade Cerafines from Elna, a Japanese company. All active devices are discrete and most are FETs (field effect transistors). These days very few manufacturers have discrete devices in the disc stages in particular; the Signetics NE5532 integrated circuit has become number one choice in this role.

A huge toroidal mains transformer is fitted, with banks of Schottky diodes for rectification; it is claimed they sound better. Each channel is supplied by its own winding in order to provide better inter channel isolation and regulation. The output stage uses complementary FETs, operating in push-pull as usual. No overall feedback is applied, but there is local feedback and degeneration, both of which lessen distortion. Having said that, the DM20 produced high levels of distortion under test. I tested it with Graham present and he was unconcerned. Asked at what level he thought distortion to be audible, he shrugged and said he wasn't sure, but that it may be around 20%. Simple listening tests conducted way back in the fifties led engineers to conclude that, with harmonics above the second, no more than 1% was acceptable. My own experience leads me to concur: second harmonic alters timbre and is very difficult to detect, 5% perhaps being a crude limit. Third harmonic and higher orders have a sharpening effect. These should not exceed 1% in my view and I prefer to see 0.1% as a rule of thumb upper limit for distortion of all types.

The DM20 Gold amplifier produced 0.4% distortion, predominantly third harmonic, in the mid-band, as our analysis shows. At high frequencies it rose to around 1% - a very high level. So low distortion is not a feature of the DM20. It gloriously ignores the impact of distortion altogether, homing in on other factors. Whilst I am willing to accept that component quality is important and it does have an affect upon sound quality (this is now a common belief) it does not follow that because of this distortion is unimportant.

Power delivery of the DM20 was limited, but current delivery from the huge transformer was excellent. Output into a standard eight

ohm load was just 18 watts, but this doubled to 36 watts into a four ohm load and the DM20 could drive two ohms as well, I found. The small output devices inside might get hot if pushed hard, even though they sit on large heatsinks. This is not meant to be a powerhouse, so much as a low power amplifier of unusual construction, based upon use of high quality audio components.

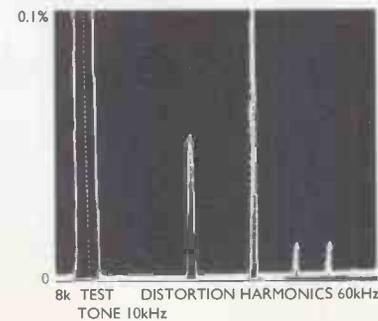
The CD, Radio, Video and Tape inputs all measured normally - distortion apart. Hiss was low, channel separation wide and sensitivity high. There is no dc offset from the output, because capacitor coupling to the loudspeakers is used.

The disc amplifier we had was for moving coil cartridges, but a moving magnet board can be installed. Frequency response was a bit limited, reaching just 16kHz. Channel separation was high and hiss quite low. At 0.6mV, sensitivity suits high output MCs only however. Distortion was a little higher through the disc input than through CD, so the disc stage adds some distortion at normal operating levels.

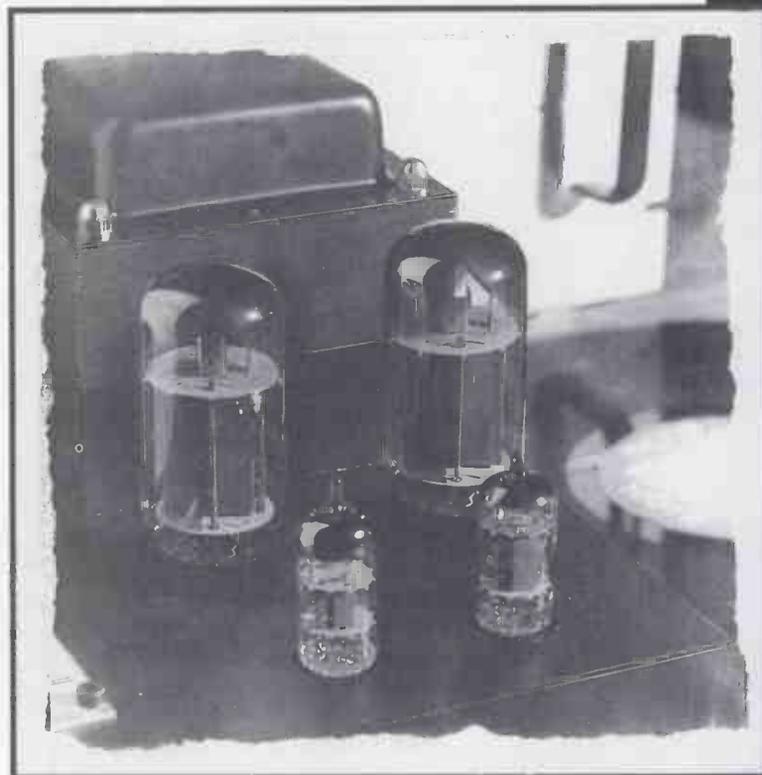
**Test Results**

Power	18 watts	
CD/tuner/aux		
Frequency response	17Hz - 20kHz	
Separation	-63dB	
Noise	-87dB	
Distortion	0.4%	
Sensitivity	150mV	
dc offset	none	
Disc	MM	MC
Frequency response	16Hz-15kHz	20Hz-16kHz
Separation	-69dB	-68dB
Noise	-73dB	-71dB
Distortion	0.6%	0.7%
Sensitivity	5mV	0.6mV
Overload	100mV	9mV

**Distortion**



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# Denon style

A Denon "Lifestyle" system catches Danny Haikin's eye.



The Denon NS-1 is a lifestyle hi-fi system. As such, it aims to serve a joint purpose: it should provide music whilst at the same time be integrated with the lives of the people it serves. Before I discuss whether it achieves this or not, I will first say that its very existence should be whole heartedly praised.

Hi-fi systems are typically good sounding or easy to live with, or often neither. The specialist manufacturers, with one or two exceptions, make no effort to make their products attractive to use, as well as listen to. The mass market manufacturers in attempting the latter usually fail with the former and thus miss the whole point. With the NS-1, Denon have attempted both: attractive looks and operation, plus good sound quality. It is the only system of its type I have used which comes anywhere near success.

The NS-1 can only be bought as a complete system, and retails at £790. It comprises a Compact Disc player (DCD-210), an amplifier/tuner (DRA-210) and a cassette player (DR-210). Denon will shortly introduce an optional loudspeaker, although any of the inexpensive smaller designs will work successfully (Royd Sevens, Mordant Short MS 3.10, Goodmans Maxim 2). Bigger and better loudspeakers will tend to show up some of the limitations of the NS-1 and are not required anyway.

Operationally, the NS-1 is superb. Apart from the way in which each individual component works, they all "talk" to each other and offer genuinely useful facilities. I will describe each separate component first.

‘ It is the only system of its type I have used which comes anywhere near success.

The DCD-210 Compact Disc player is similar to Denon's standard budget machines. It features their own multi-bit chip technology and a digital output option. Standard CD facilities are fitted: direct track access, creative programming for up to 20 tracks, passage repeat and random play. As with all of the NS-1's components, a hinged flap hides all non-essential controls.

### Unique

The DR-210 Cassette Deck is, to my knowledge, unique in featuring a CD like horizontal loading mechanism.

This has allowed Denon to reduce the height of the DR-210 to 92mm - the same as its fellow components. It may seem like a small point, but everybody that used the DR-210 was taken back by this loading drawer. It doesn't of course allow vision of an inserted cassette as conventional machines do - but has such charm that it more than makes up for it. Other facilities are: auto reverse, automatic tape type selection, replay mode and counter stop.

The DRA-210 is a receiver. The tuner section is a fairly conventional digital model with 30 presets and a search facility. The amplifier, with a healthy 50 watt (manufacturers figures) power output has the ability to drive two pairs of loudspeakers - at the same time. Unusually, for an amplifier of this sort all speaker connections are good quality 4mm sockets. A pre-amp out facility will also allow the DRA-210 to drive a separate amplifier - which could then be used to drive another amplifier and loudspeakers in another room. A wide range of inputs will accommodate all sources, including LP, and will even integrate with a television and video for picture and sound. With brilliant insight, Denon have also included a full timer. The NS-1 can be programmed to wake you up, send you to sleep and make a recording whilst you're out.

## Special

You may be thinking that all of this is fairly boring so far, but it is the way that Denon have made the NS-1 work as an entity that is really special. Turn on the receiver and the name Denon will slowly form on the display panel; select a CD track and it will be instantly heard. Decide that the radio better suits your mood and again it will be instantly playing. Because the NS-1 components are digitally linked, the amplifier can sense which component has been activated and automatically switch itself to the correct input.

‘ The NS-1 can wake you up, send you to sleep and make a recording whilst you’re out.

This linking also has other advantages. The Compact Disc and Cassette Player can be put into edit mode and will fully control a recording. This can include recording level - with a small sonic penalty - and track order. If it is sensed that on a particular CD, a song will be prematurely cut off by a tape side ending, the system will simply re-arrange the track order in order to fit them all in. It will even warn you of a potential problem where a cassette tape is not long enough to accommodate a whole CD.

Most of this, including the volume setting, can be operated from a

remote control handset; the NS-1's motor driven volume pot is particularly impressive. All of the various controls work so well that they almost go unnoticed.

## Inviting

From our black and white photograph it is not obvious just how special the NS-1 is aesthetically. There is nothing earth shattering involved, but just a thoughtful blend of colours and shapes. The brushed aluminium finish, bronze buttons and green lit display give a clean, almost inviting impression. Unlike the typical jet black finish that most hi-fi is subject to, the tinted aluminium of the NS-1 actually looks interesting. Surprisingly, it seems to look appropriate in all manner of settings and it isn't at all flashy. Whereas most attempts at this sort of styling suffer from being overt and attention seeking, Denon's work is subtle and relaxed.

Denon have also chosen to hide the vast majority of the NS-1's control buttons behind a hinged flap. Again, nothing breathtaking but it makes such a tremendous difference. With the flap closed the NS-1 is clean and uncluttered.

## Sound Quality

Overall, I was pleasantly surprised with the sonic performance of the NS-1. It is not as good as a carefully chosen separates system, but the fact that it can be mentioned in the same sentence makes it better than any rack system in the world.

Connected to a pair of Goodmans Maxim 2 loudspeakers, I was pleased to find that the Hi-Fi World CD - from our March issue - was produced clearly and enjoyably. On the Clive Gregson and Christine Collister track - The Most Beguiling Eyes - it made a fair stab at capturing the emotion in the female vocal, and reproduced the piano clearly and realistically. On a more dedicated system, I would expect some more definition and authority, but this was not bad performance. The CD sound is

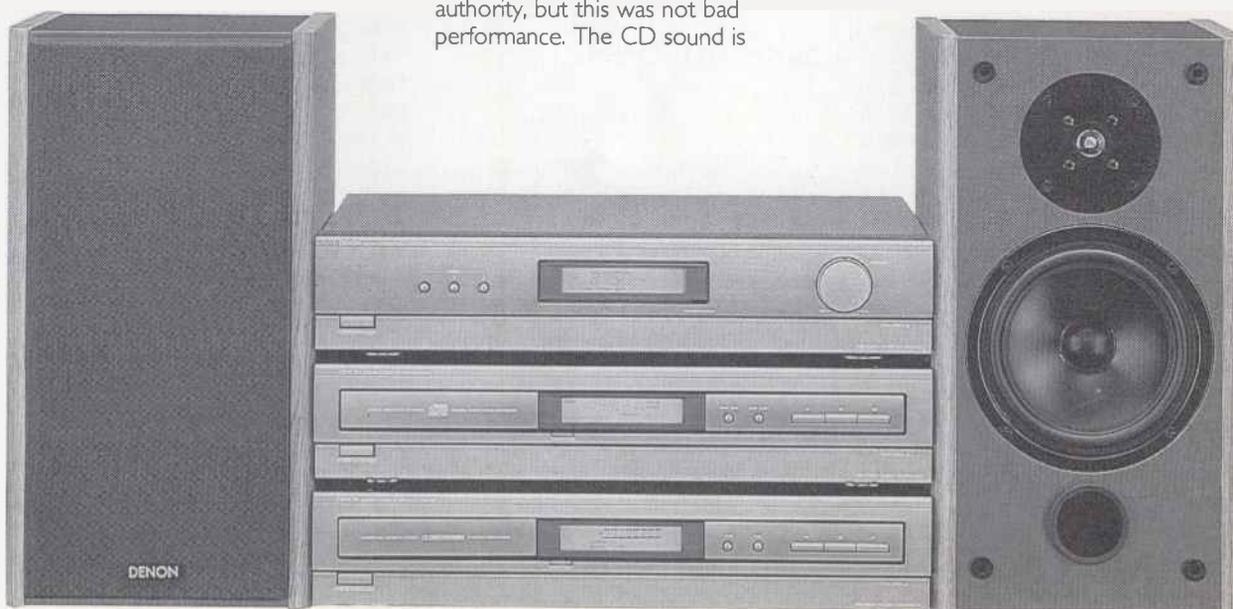
basically very competent and, taking the NS-1 in its intended sense, is likely to be a real surprise to an unsuspecting casual buyer.

## Cassette

The cassette deck is also very good. It exhibited a small amount of instability with heavily struck piano chords but essentially offered a fine performance with ferric and chrome cassettes. I would be surprised if Denon's own DRM-400 stand alone model would be any better. Pre-recorded cassettes were handled well; although we did not measure any of the NS-1's components, I would guess that the cassette player had been correctly aligned.

Radio quality was slightly less good by the high standard of the other components, but on Radio 3 and 4, it was hiss free and inoffensive. It suffered mainly from sounding a bit thin. However, there are very few tuners, with full presets, that don't sound quite thin, so this is not a serious criticism.

There is not any more to be said about the sound quality of the NS-1; its uniqueness will ensure its success. At an inexpensive price level, there has never before been an acceptable compromise between performance and operation/appearance. During my time in the retail industry, I spent many Saturday afternoons delivering seminars on the inherent advantages of a real hi-fi, as opposed to rack hi-fi feigning to be the same thing. Most people were convinced. They now own hi-fi systems which I have no reason to believe haven't provided hours of enjoyment. A substantial few were never convinced. They now own systems which I find it difficult to accept could ever provide long term musical enjoyment. The Denon NS-1 is perfect for those few ●





To take a break from out-and-out reviewing, I felt that it would be a good idea to put together a complete system that I could happily live with. I didn't realise, at that time, the difficulties system matching would entail!

Sitting in the Hi-Fi World recreation room (a.k.a. Pub) I decided that a system today should consist of turntable, Compact Disc, amplifier and loudspeakers at least. I had visions of a truly complete system, involving cassette tape, Digital Audio Tape machine, tuner, video recorder and Teasmaid. The problems involved in finding a two-source system that worked almost shelved the idea before it began.

## “ The three items compliment each other beautifully

To begin with, getting products to arrive at a similar time created difficulties of Herculean proportions. First a turntable would arrive, except without a tonearm. The tonearm would then arrive at the time that the turntable was supposed to be returned. Products were either out of stock, being modified, updated or discontinued. Some products arrived

damaged, or faulty or worse. Finally, enough pieces of equipment came together for a listening session to take place. At the end of the day, I feel that the system presented here is one that I can happily recommend.

The first part of the chain is the Pink Triangle Little Pink Thing turntable (£449), which, in this case, has been fitted with a Rega RB300 tonearm (£142) and Goldring 1012 cartridge (£46). All three of these products have, individually, received great praise from the hi-fi press. The turntable is one of the best of the mid-priced turntables, in many ways capable of showing up some more expensive decks.

The turntable's particular strengths are its fine soundstaging and delicate nature; one that does not impose its own character upon whatever is being played. In a positive way, it sounds CD-like in its approach to music. The three items compliment each other beautifully; the clarity of the LPT matches and is enhanced by the Rega arm by virtue of its neutrality (this being one reason why the arm is so popular with the manufacturers of seriously high-end turntables). Finally the Goldring cartridge as recommended by Malcolm Steward in the April edition of Hi-Fi World, is both lyrical and detailed, without being overtly rich or warm.

The next link in the chain is the Arcam Alpha Compact Disc player (£399.90). Combined with the Sonic

**Alan Sircom pieces together a quality system possessing CD and LP for around £2000**

# system selector

Link Violet interconnect cables (£80), this CD player is arguably one of the finest single-box players under the £600 price barrier. As with the LPT its strength is neutrality, never injecting its character into the music. This is not to say that the Arcam is unmusical, but purely accurate. Again, the Alpha CD player has received good press in the past and, I feel, will continue to be superb value for money, for years to come. Sonic Link Violet cables have been written about in this month's Tweaky Corner and provide a considerable upgrade to any system by opening up the soundstage and adding to the clarity of the CD player.

## Its tuneful nature portrays music with poise, grace and drive

Amplification, speaker cables and stands all come from Linn Products. The Linn Intek came out to lukewarm press coverage, with reviewers suggesting that it is a good amplifier, but a little overpriced. By moving production to their own factory, Linn have managed to improve the Intek while lowering the price to £398. Now, with new double sided circuit boards and new diode circuitry, the Intek deserves more praise than it receives at present. Its tuneful nature portrays music with poise, grace and drive which are attributes more common with pre/power amplifiers. The cabling is Linn K20 which, at £2.90/metre can equal, or better, the performance of many cables costing far more. Finally from Linn, the £99 Kan II stands are among the finest small loudspeaker stands on the market today.

The final part of the system is the £330 Royd Sintras. Big and powerful, yet contained within small boxes, the Sintras are a dramatic loudspeaker at a reasonably undramatic price. Again, the words poise and grace come to mind, but not in a gutless manner. Here is where the last problem manifested itself. Many of these pieces of equipment need quite significant warm up times. In the case of loudspeakers this can run into weeks! This factor must be considered when purchasing a system of this quality, as the sound of some products when new bears little resemblance to the sound that they produce when run in.

Having run in the system properly, the sound opened out immeasurably. On connecting the system up it had all the detail and grace of a 1960s

transistor radio! After a couple of days of constant use, it began to come alive. Finally, after heated debate and warmed speakers, the system began to sing.

The initial impression was of a finely honed, detailed system, that has a light, delicate and well focussed sound. For loudspeakers that work quite close to the wall, the Sintras image well. This is particularly noticable on vinyl as the LPT is especially good at creating precise soundstages. One criticism here is the apparent lack of image depth. This is due in part to the loudspeaker's proximity to the rear wall and in part to the choice of arm. The system might be better served with the Linn Akito tonearm, which appears to create a deeper soundstage on the LPT. However, time did not permit this change to be made.

We are in possession of both the LP and Compact Disc of Echo and the Bunnymen's "Ocean Rain" - a good place to start comparing media within the context of this system. In many ways, the Arcam and the Pink share many similarities. Both are very clean sounding, but slightly lacking in deep bass. On the track "My Kingdom", I felt that the LPT created cleaner, more precise vocals which were both richer sounding and more articulate. The Arcam CD seemed to smear the vocals by comparison. About half way through the track there is a passage of quite complex multi-layered guitar playing. This sounded muddled at times on the Arcam, but appeared not to trouble the Pink in any way.

It is unlikely that many prospective buyers would have a piece of music on both LP and CD however. On playing Roxy Music's "Do The Strand" from the Compact Disc of "For Your Pleasure", it became apparent that the criticisms that I have noted of this CD player earlier while still noticeable, are only thrown into sharp repose when compared with the vinyl source.

Moving over to vinyl, Rachmaninov's Symphonic Dances for Orchestra (Op.45 - Athena Records) recreated the drama and intensity behind the piece of music well. The strings sounded full and the woodwind strong and convincing. As suggested earlier, the soundstage was slightly two dimensional, but otherwise the piece was presented faultlessly. Looking at the system as a whole, the words subtle and precise spring to mind.

Being critical for a moment, those who are used to the warm, rich sound of turntables like Rega Planar 3s will find this system a little too clean sounding. The richness of the amplifier and loudspeakers add warmth to the analytical nature of the two sources, but it is still a system that is inherently precise as opposed to being euphonic. If one places clarity and neutrality high on ones list of priorities then a system such as this should prove welcome.

When it comes down to the final analysis, a "bespoke" hi-fi system is a very idiosyncratic choice. It may prove unexciting to some people, fascinating to others. This system goes somewhat toward producing an accurate, coherent, yet listenable system. If you are looking for a £2,000 system, this could be a good place to start ●

## If one places clarity and neutrality high on ones list of priorities then a system such as this should prove welcome.



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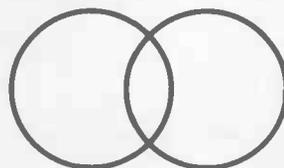
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## PAUL HARTLEY'S SYSTEM

Paul Hartley, our first victim, also just happens to be our cover photographer! This means that, for the first Readers System I did not have to take any photographs, letting Paul do all the work. All I had to do was listen and eat!

I have heard heard Paul's system in the past, but since he has had one or two major and interesting additions, we felt that it would be a good starting point. The system now comprises of a Linn Sondek LP12 sitting on a Mana sub table, Pink Triangle Pink Linnk power-supply, Linn Ekos tonearm and Linn Troika cartridge. On the amplification front Paul uses a Naim NAC 62 pre-amplifier, with a Hi-Cap power supply and NAP 250 power amplifier. Single wired Naim NAC A5 loudspeaker cable is used to connect to his loudspeakers; Snell Acoustics Type Ks on Pirate stands. Finally, Paul also owns a Marantz SD-60 cassette deck, for making cassettes to use in his car and studio, and a CD-85 Compact Disc player which, by his own admission, sees little action.

Before we come to listen to his system, as it stands today, a brief history of how his system came to be where it stands today. Paul's first real system consisted of a Garrard SP25, Goldring Moving Magnet cartridge, home made Sinclair modular amplifier and Elac elliptical loudspeakers (at this time, the vast majority of cartridges were ceramic models, so a moving magnet was a Big Event in any system).

A few years of listening to Humble Pie records and Paul felt that the speakers were in need of a change. Out went the £6. 16s, 6d Elacs to be replaced by Wharfedale Lintons. Not long after these were purchased, Paul's Sinclair amplifier collapsed, which he admits was probably due to it being not well built as his soldering is closer to arc welding, except done with a shovel!

### Sansui

To this end he purchased a Sansui AU-4900 amplifier, which is still in use today, thirteen years later, in his studio. This lasted in his home system for about three or four years. Unfortunately, this new improvement showed up the weaknesses of the Lintons, meaning they were on the way out! John "Never Knowingly Undersold" Lewis provided the next fix for Paul's system, which by this time had moved from Humble Pie and Free to Genesis and Little Feat. This fix was a pair of Tannoy Cheviots. These loudspeakers were large, uncontrollable and possessed of

potentially trouser-flapping bass.

By now, it was clear to Paul that his turntable was rather antiquated. Comet rectified this with their classic £49.95 Pioneer PL12D turntable. This happily stayed in his system until the early 1980s when he purchased his Linn Sondek from Grahams Hi-Fi in North London. This was originally fitted with an early S-shaped Linn Basik tonearm and an Arcam (nee A&R) P77 cartridge.

From here, the Linn/Naim bug struck! The turntable was soon followed by a Naim NAC 42 pre-amplifier and NAP 110 power amplifier, a Linn Ittok tonearm, a Linn K9 cartridge and the Snell K loudspeakers which at the time were sited on Foundation 155 stands. While going in the right direction, this combination sounded dreadful, in Paul's opinion, as the brightness of the K9 was exaggerated by the Snell loudspeakers. To try to overcome this problem a Naim SNAPS power supply for the pre-amplifier was incorporated. This power supply improved matters in some respects, worsened them in others.

### Linn

About three years ago, the system was dramatically improved by upgrading the cartridge to a Linn Troika, at the same time moving up to his current NAC 62 pre-amplifier. The cartridge change was obvious; the cost of bringing the amplifier up to date made it more sensible to go for the better pre-amplifier.

Eighteen months passed, without undue strain on Paul's wallet. But the upgrade bug was calling from afar. By this time, Paul had established strong ties with members of the hi-fi fraternity. After these fraternity meetings, he would leave the pub and ponder on the next upgrade. This has meant that within the last eighteen months his system has taken a major upturn.

Listening to his system today, it attempts to approach the concepts of musicality and soundstaging with almost equal ardour. The near classic combination of Linn turntable and Naim amplification creates a rhythmic, musical presentation that is offset by the seamless imagery of the Snell loudspeakers. The most recent additions to his system, the Mana table and the Pink-Linnk power supply have pushed up the quality of the system, especially in terms of the detail and the space around individual instruments. He was so moved by the improvement that the Mana sub table provided that he submitted an article to our Tweaky Corner. Paul commented on the level of subtlety that was missing from the earlier system, which he felt was improved upon by the newly-fitted Pink-Linnk. At the time of listening, the motor was still bedding down and as such was causing an almost imperceptible vibration through the turntable. This, we were told would settle after about a few days of use.

In all, Paul Hartley's system is musical, rhythmic and detailed, while also possessing a level of imagery that is lacking in a great deal of British hi-fi systems. It is not perfect; Paul would be the first to admit that his system lacks deep bass, which can tend to compromise dynamics. We both agreed that this probably involves improving the loudspeakers to the larger Audio Innovations Model J loudspeakers. On the whole, however, Paul's system gives him a great deal of pleasure.

# readers' systems

**In a quiet, suburban street in South West London live two busy professionals, with two similar, but radically different systems. The opportunity to listen to a pair of systems within a Sunday afternoon, together with a free lunch, proved irresistible...**

## STEPHEN LOGUE'S SYSTEM

Two doors north of Paul's house lives Stephen Logue. He also suffers from the hi-fi plague, much to the consternation of his girlfriend. His addiction starts back with his musical parents, over in Southern Ireland. His childhood memories are of evenings listening to jazz, live or recorded, around the house.

Access to hi-fi equipment in Southern Ireland is rather limited and as such Stephen's first "real" system consisted of a Sansui turntable and amplifier with a pair of Leak loudspeakers. As his love for jazz developed, so did a growing dislike for the hi-fi system that he owned at the time. First part to go was the loudspeakers, to be replaced by a pair of Wharfedales (the type of Wharfedale speaker has been forgotten in the sands of time!).

While content with the hi-fi in his possession at the time, Stephen still believed that there was more that could be dragged from his record collection. So, in late 1978, after visiting a show. Stephen

In sound quality terms, the system sounds pretty much as one would expect a system of this calibre to sound.

met one Noel Cloney. Noel was a Linn/Naim dealer working from a terraced house. He introduced Stephen to the joys of proper hi-fi by playing a system consisting of Linn turntable, Naim amplifier and Gale 401 loudspeakers. This sounded like nirvana to our fledgling audiophile. Unfortunately, the price of this system was too high for Stephen, so he had to settle for a more moderate system that comprised a Rega Planar 2 turntable, Quad 33 pre-amplifier and 405 power amplifier with the aforementioned Wharfedale loudspeakers.

### Naim

As soon as funds permitted, the Quad amplifiers, that he found a little bland, just had to be replaced by a Naim NAC 125 pre-amplifier and NAP120 power amplifier. At around the same time the Wharfedale loudspeakers were replaced with Naim NAL 402 loudspeakers. These didn't last too long as they lacked "the Gale sound" so they were rapidly traded up for a pair of Gale 401s, which sat on a pair of home-built stands that were considerably more rigid than the tubular Gale stands. Even this was not enough. Miles

Davis did not sound like Miles Davis yet. This was overcome by the addition of a Linn Sondek, with a Grace tonearm and a Supex cartridge. Unfortunately, the Gales are power hungry beasts so a bigger power amplifier was needed. This meant that the NAP 120 was replaced by a NAP 160.

The next five years were Stephen's hi-fi wilderness period. He suggests that he was too busy womanising to be concerned with hi-fi. Seems fair enough to me! It was also about this time that he moved over to England where his work in computing forced him to London. As he met up with more and more enthusiasts, Stephen began to take a more active interest in his music again.

Having discovered the delights of the London Jazz shops, Stephen felt that it was time to look at the hi-fi again. In 1984 his ageing Linn was replaced by an up to date model, this time with a Linn Ittok tonearm and Linn Asak cartridge. Two years and a new house later Stephen felt that the Gales were sounding weary, as well as looking

Happiness is now closer at hand, however, by two recent additions, namely the Linn Lingo power supply for the Sondek and the Naim NA SBL separate box loudspeakers. Since the days of the Gale loudspeakers, Stephen felt that the system lacked a certain amount of deep bass and drama. The SBLs have certainly changed all that! Apart from a Denon DRM 12 cassette deck, to make tapes for the car, an Audiotech table for the Linn, an Apollo table for the rest of the electronics, that's it!

In sound quality terms, the system sounds pretty much as one would expect a system of this calibre to sound. It has an impressive dynamic scale and presence but without the imagery detail that was inherent in the earlier system. It had been professionally set up and sounded considerably better than similar systems that I have heard, in demonstration rooms or even in some private homes. Apparently, the credit for this goes to RPM in Clapham. This proved to me just how important the quality of installation is. If



distinctly out of date. So somewhat reluctantly, the Gales were replaced by Linn Kan loudspeakers.

The mortgage played an important part in Stephen's life for the next two or three years. But, as his neighbour's (Paul Hartley) system took off, so did Stephen's. First, in 1989, a Linn Troika was fitted in place of the Asak, which was sounding rough by comparison. At the same time, the Naim 125 was replaced by a NAC 32.5 pre-amplifier and a Hi-Cap power supply. Soon after this, a pair of second-hand Naim NAP 135 monobloc power amplifiers became available that helped beef up the sound of the Kans greatly.

### Not There

1990 saw some further upgrading, in the shape of a Naim NAC 72 pre-amplifier, a pair of Naim NA IBL loudspeakers and his third Linn, this time with a newer Ittok arm. In Stephen's own words, it was getting close to his desired sound, but still not quite there.

poorly installed, a system like this could so easily sound flabby and loose. With this system, it sounded detailed, well controlled and relaxing, without itself being relaxed.

When asked what the next change would be, Stephen seemed to be considering moving up to a Mana table. He had also considered the idea of the Linn Ekos or Naim ARO tonearms, as well as possibly going up to active amplification. But as Stephen is more than happy with the system as it stands, I suspect that the next upgrade will be a little time in coming.

To conclude then, we have two systems that are both very impressive in their own ways. Although there are common points, both in terms of equipment and sound qualities, the two are radically different in many respects. If I were judging the two, I would find it quite difficult to determine which system I preferred. Both are good, both are slightly flawed. Maybe your system is better??? **AS**



**1** Before freeing the suspended sub-chassis, loosely fit the cartridge. Keep the stylus cover on if possible, since the delicate stylus is perilously close by. Do not tighten up the screws at this stage. Headshell grooves either side of the screw slots are for nut capture. Put the screw in from below, you'll need a short screwdriver like the one shown here.

# SETTING UP A TURNTABLE

**Installing a pickup cartridge into a turntable and aligning it accurately are crucially important operations. Here we show you the basics of this dying art.**

**3** Getting the belt on is one of the tricky bits. It must not become contaminated with grease from hands or oil from the main bearing. The latter will happen if it slips off under tension.

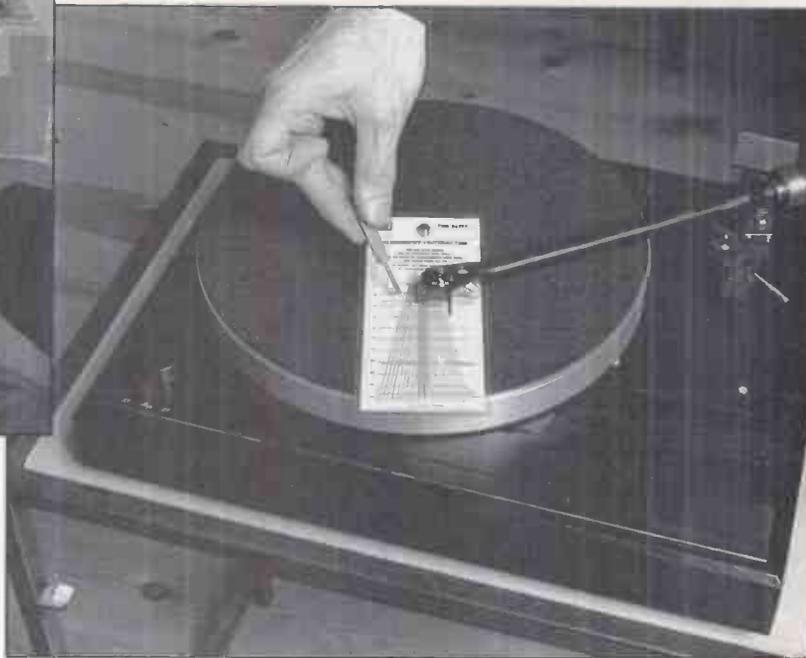
One way to perform this task is to wrap the belt around the hub, keeping it under tension by passing it over a fingernail. The belt can then be carefully maneuvered over the motor pulley. At the same time the hub is rotated, as seen here, the belt will be drawn onto the motor pulley automatically. It's tricky but it is possible and it keeps the belt clean.

**2** Having fitted the cartridge, remove all packing. Here there is a full complement, comprising a cardboard bearing protector and transit screws locking the suspended sub-chassis in place. The platter must be slowly lifted right out of its bearing to remove the cardboard, taking care not to allow oil to spill over the top plate. Transit screws also have to be removed. Sharp eyed readers will notice we took this shot before fixing the cartridge!

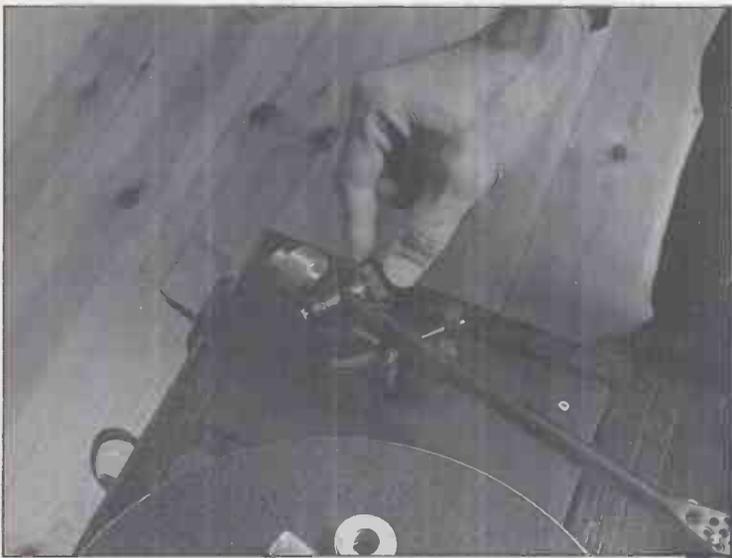




**4** With the platter and mat on, the arm must now be balanced out. Fit the counterweight and remove the stylus guard. Leave the cartridge temporarily positioned. Move the counterweight forward or backward until the arm balances horizontally. You may need to put a steadying finger under it to prevent the arm waving around unduly. This is another delicate operation: take care.



**6** Here's the long careful bit: positioning the cartridge to minimise tracking error. Here we are using an Elite alignment protractor, which the Editor helped design. Set up on the inner groove radius by moving the cartridge forward or backward in the headshell until the arm is at a perfect tangent to the groove. Make absolutely sure the cartridge is itself parallel to the edge of the headshell, since it is the cartridge that really has to be at a tangent to the groove at this point. A small (make-up) mirror on the turntable can help check this.



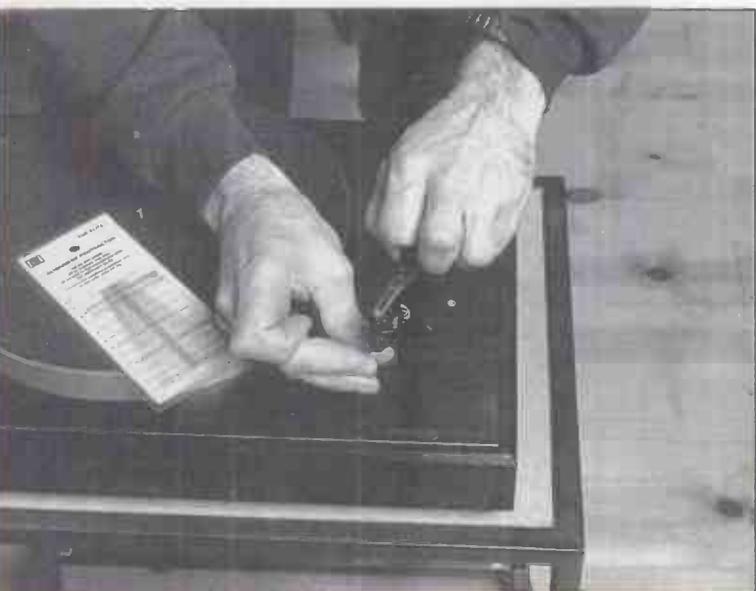
**5** Having balanced out the arm, set the quoted tracking force. This is provided by the cartridge manufacturer. If only a range is quoted, use a value that lies in the middle. Do not apply bias force yet. Where two counterweights are available, use the heaviest one that achieves balance, because this minimises rotational inertia. A heavy weight close to the pivots is better than a light one far away.

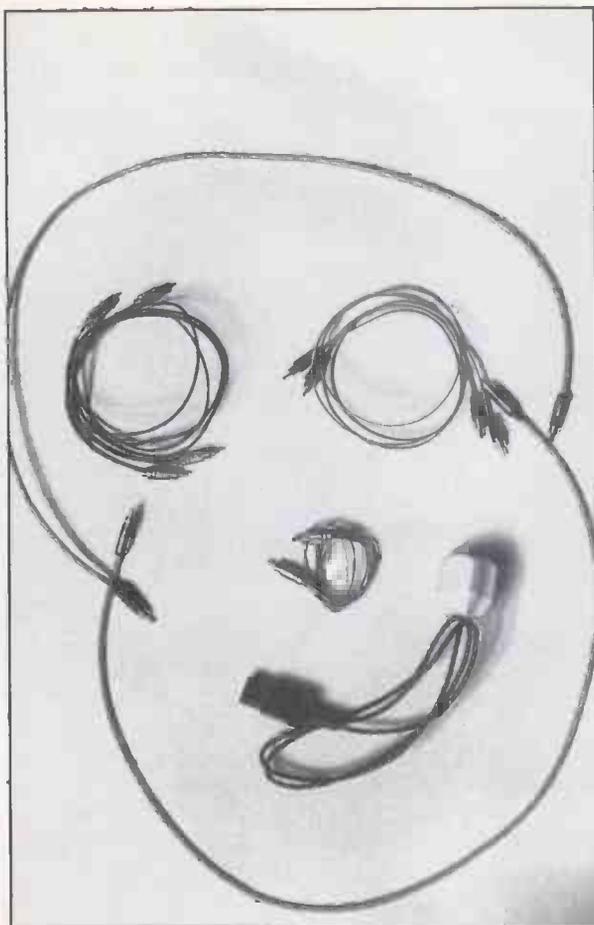


**7** Check that the headshell is tangential to the groove at an outer radius of around 120mm from spindle centre. Readjust to get it tangential here and at, or close to, the inner groove (60mm from spindle centre). This gives two points in the arm's radial path across a record where tracking distortion reaches zero.

**8** Having positioned the cartridge properly, tighten up the fixing screws. It is wisest to set tracking force to zero, rebalance and then reset tracking force. Now apply the bias force too. Then set arm pillar height - if it is adjustable so that the arm is horizontal. You can try setting the rear of the arm low, in order to lessen vertical tracking angle error, but the cartridge body will then often foul warps.

And that's it! Just remember to keep the stylus spotlessly clean, preferably with a brush and cleaning fluid, such as the Nagaoka cleaning kit we sell (see our Audio Accessories page).





# tweaky corner

Tuning tips of all sorts for your hi-fi.

## SONIC LINK CABLES

Sonic Link are a company which specialize in affordably priced interconnect and loudspeaker cables. As such, their products enjoy universal appeal. The Sonic Link range is quite vast - too big to cover in one go. For this month I have chosen key items from the range which I have used in a number of hi-fi systems and have proven to be successful. All Sonic Link cables are insulated with P.T.F.E. (Teflon) and have silver plated copper conductors.

The quality of mains supply has long been seen to affect the performance of a hi-fi. At £49, Sonic Link manufacture the "Pure Mains" lead fitted with a gold plated plug and a choice of either a figure of eight (small radio type) or an IEC (kettle

type) plug at the equipment end. The aim of this lead is to reduce the degradation of mains supply through its alleged higher conductivity and filtering (of RF) effect.

I have tried this lead with many Compact Disc players, with total success, but only occasional success when used with amplifiers. With an Arcam Alpha CD player it improved the performance achieved with a standard lead in a number of ways. First, it made the sound more relaxed. There was a flow to music and a lack of glare which I imagine CD critics would find very welcome. Secondly, the perceived dynamics were greatly increased. The most startling example of this was with the latest Rickie Lee Jones CD. Before adding the Pure Mains her voice was oddly static and uninteresting; with its addition she was suddenly inspired and powerful.

This improvement was similar with every CD player I tried, so I feel confident in recommending the Pure Mains to all tweaky CD users. With the various amplifiers the differences were less clear cut; I actually preferred the standard lead on occasions. Sonic Link dealers can doubtless give specific advice.

Sonic Link interconnect cables come in all sizes, colours and prices. The least expensive, the Pink, retails at £15.00 for a 1m length terminated in nickel plated phono plugs - Sonic Link can supply other terminations such as DIN or XLR connectors. At such a low cost, the Pink is primarily intended as an upgrade from the commonly used give-away leads supplied with most inexpensive and mid-priced CD players and tuners. As such, it offers tremendously good value for money.

A typical budget system (fronted by a Marantz CD-40) was greatly improved by the inclusion of the Pink cable. Whilst a better quality CD player, at a few hundred pounds more, will improve such a system significantly, the Pink had a civilising effect which the system certainly benefitted from. Switching from the supplied Marantz lead to the Pink essentially tamed the sound; not in a negative, lethargic sense but more by focusing instruments and giving a sense of perspective. It simultaneously gave poise and allowed a more detailed insight into a previously uncouth performance. If anyone has such a system and doesn't have the inclination to upgrade one of its components, I would strongly recommend they try the Pink and hear what happens.

At a much higher level in both price and performance is the Sonic Link Violet. Priced at £80 - with gold plated phono plugs - it is not cheap for a piece of wire, but as intercon-

nect leads go it is not too expensive either. I would contend that at its price the Violet is inappropriate for budget hi-fi systems. That it will improve on the performance offered by the Pink is largely inconsequential in this instance as the cost involved would be more sensibly put towards an actual component upgrade. In a suitable system however it is certainly worthwhile. With a Meridian 206B CD player moving from the Pink lead up to the Violet effected a major improvement. With a Mozart piano sonata it allowed the tremendous scale of the grand piano to be more realised and gave each note a succinct, staccato property it previously lacked. Even the phrasing in the music seemed clearer, making it far more communicative. It made less of a difference than adding a separate DAC, but the Violet lead represents about one sixth of the cost of such an upgrade.

If you're wondering why I have made no reference to other, similarly priced cables it is because, in my experience, they are too variable in the results that they yield. Radio-spares low noise cable is good quality, at a very modest cost, but of the more exotic types they are either very expensive or only good in places. The Sonic Link cables are, to my ears, genuine improvements. And, as Sonic Link have a dealer network, you can even get a full demonstration. **DH**

## MANA SOUND FRAME

It's been the source of some irritation for some years now, the thought that for all the upgrades I've made to my system, I'm still not getting the best from my turntable. I mean, since I bought the LP12 back in 1981 I've had every mod and improvement going, from the Valhalla to Ekos, but there's still the niggle that the blasted thing's not got it's own little table.

Special turntable tables aren't exactly new and in fact have been de rigueur for any serious system for nearly ten years, but yours truly shares a house with that which is the nemesis of hi-fi. Namely a six year old son.

So the turntable must live high on a shelf, relatively safe from danger, with a torlyte board beneath its rubber feet.

Why doesn't he buy a custom wall shelf I hear you say? Well, apart from the fact that most of them are pig ugly, they also manage to take up an extraordinary amount of space. My circumstances dictate that the gear sits on small shelves within a small alcove.

Enter the Mana Acoustics Sound Frame. Mana Acoustics have in recent months come in for some very good press for their Reference Table, a two tier unit fabricated from L shape section steel. The sound frame is in essence the top two inches lopped off and fitted with four very sharp downward facing spikes.

Setting up the frame is relatively simple and requires only a spirit level, a spanner and allen key. Once levelled up a nicely bevelled piece of smoked glass sits on the upward facing spikes and the turntable on top of this. A word of warning though, I thought that the glass had a propensity to slide sideways on the spikes, so care must be taken when placing the turntable on it.

After one last check that everything was level, and the locking nuts were tight, I placed the first record on the Linn and sat back to hear the results of my labours.

Well you don't need a degree in the bleedin' obvious to hear the huge improvement the sound frame wrought. Perhaps the easiest way to describe its effect is that it stripped away a lot of the muddle. Suddenly there was air and space around voices and instruments, the effect was not subtle. The sound stage opened laterally and also front to back and small detailed sounds that were perhaps always lurking, were thrown into sharp relief.

Several hours and many albums later I was even more convinced as to the worth of the Sound Frame. Even those albums I had always dismissed as bad recordings suddenly developed redeeming features.

I suppose you've probable gathered by now that I'm quite taken by the Sound Frame. The trouble is I've now got a few niggling doubts. If

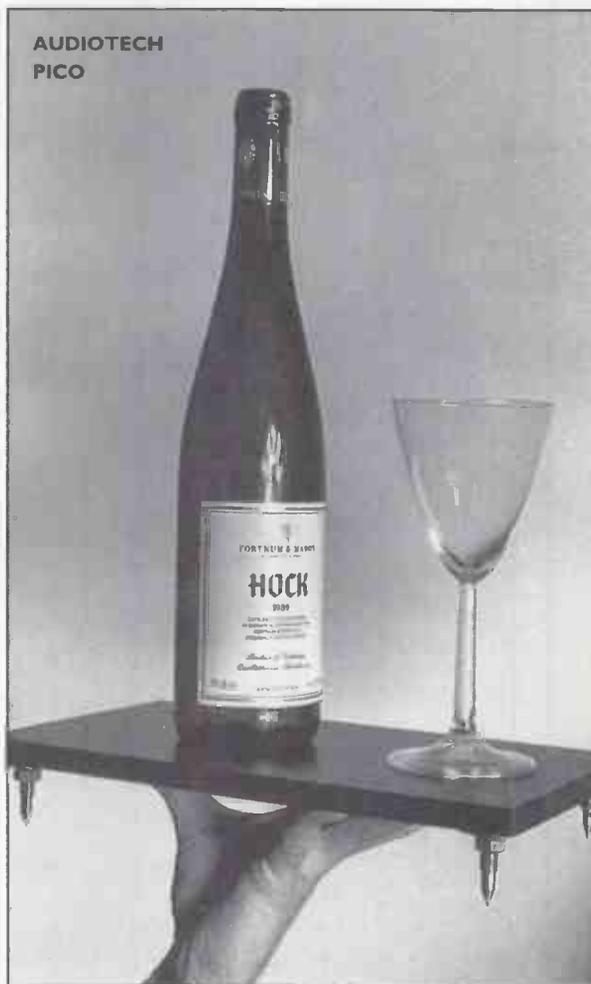
such a huge improvement can be brought about by this, the junior member of the Mana Stable, what could a full pukka Reference Table do?. Life's never simple is it! **PH**

## AUDIOTECH PICO

If you've just bought a Linn Lingo or Dirak and you're wondering where to put such an unusually sized box, read on. Audiotech have made a very small and neat sub-table which is just the right size to fit underneath their own ATTI table (and possibly others as well).

Imaginatively named, The Pico (which is Italian for small) will reside in its undertable home without making any contact with the main turntable table. Whereas a two tier table will accommodate a turntable and an item such as a Lingo, it will increase the overall weight and therefore degrade the turntable's performance. With the Pico the main table is unaffected.

I'm not going to tell you that the Pico will transform you're hi-fi: it makes a small, but worthwhile difference. It has however cured a rather delicate situation which prevailed before its inclusion in my hi-fi. At about eight in the morning I stagger bleary eyed, to the hi-fi to switch on the radio, only to be strangely overtaken by an intense throbbing pain in the little toe region. Two minutes later I would realize I was now kicking a Lingo and would offer it profuse apologies. The tranquility with which mornings now pass is worth infinitely more than the modest £20.70p that is the retail price of the Pico. **DH**



AUDIOTECH PICO

MANA SOUND FRAME





**Richard Kelly's monthly look at budget hi-fi - old, new, borrowed or blue.**

The Leak Troughline range of valve tuners were considered amongst the finest available in the 1950s and 1960s. At the time, most hi-fi enthusiasts could only dream of owning one, whilst suffering a lesser unit. Today, it is possible to purchase a working Troughline tuner for around £25 though expect to pay much more for a 'mint' example, or if purchasing through a dealer.

So is the Leak Troughline tuner worth buying? The first model was, I believe, sold only in open chassis form. Intended for cabinet mounting, it looks rather untidy on an open shelf. This version was superseded by the Troughline II, which was also intended for cabinet mounting, but being fully encased, is an acceptable part of the domestic scene.

How well does it work? The Troughline III is a sensitive and stable mono tuner, with a standard of long term reliability reminiscent of Quad. As with Quad equipment, it is not unusual to find a rough, uncared for Leak tuner that is twenty five years old or more, and still in good working order, despite not having been serviced over the period.

The Troughline III has a much more modern appearance than the earlier models, though internally it is similar to its predecessor.

**Stereo**

All of the earlier models mentioned above were mono and of limited use in the modern hi-fi system. The Troughline Stereo tuner, however, is comparable with

modern types. I believe that the Troughline Stereo tuner was one of the earliest stereo tuners available on the UK market - it most certainly was one of the best.

OK - they were amongst the finest available back in the 1950s and '60s - but how do they compare today? It is in the area of FM tuners that we have seen some of the most startling developments, with almost every aspect of the specification of today's tuner exceeding that of these early units. Why, then, are these old models still in use? It is for a combination of reasons, but mainly that for most purposes, the limits of achievable performance of current designs are not required.

For example, the basic sensitivity of the Troughline Stereo is below that of a modern tuner, but not by much. A typical aerial required for the old tuner might cost around £10 more than the minimum required for today's finest. The saving in the cost of the tuner would more than offset this. Bear in mind then, that for really good results the aerial required is more crucial and should deliver a strong signal of at least a few millivolts.

**Drift**

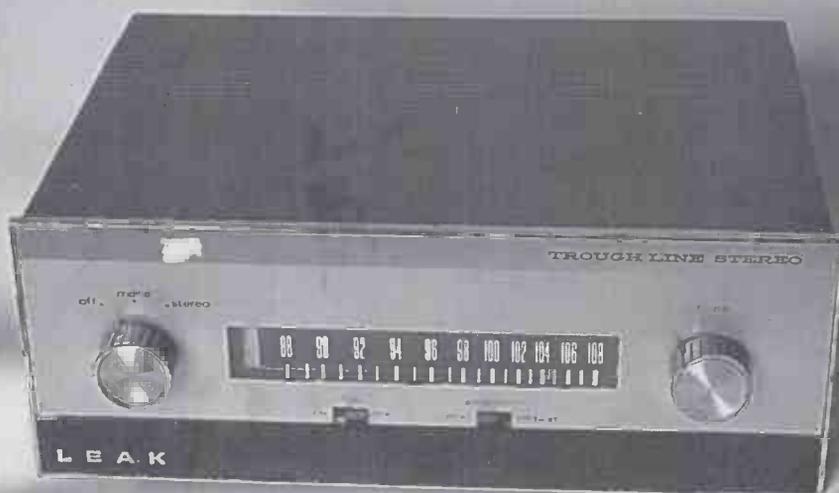
There must, say the astute, be more to it than this - do they drift? The Leak Troughline range of tuners are remarkably stable, even by today's standards. That was the reason for using a Troughline: it imparted great stability by standards of the day. If tuned in 'cold', with the AFC switched off (automatic frequency control - a device to enhance stability, as well as correct for errors), the tuner will still not drift enough to cause serious deterioration in sound quality, even after many hours of use. With the AFC switched on, the effects of drift are negligible - as with a modern tuner.

So far, so good, but what about sound quality? This question must be divided into two parts. Firstly, interference rejection.

**Rummaging through priceless old goodies in a warehouse full of old hi-fi, Richard Kelly unearthed a Leak Troughline tuner for the editorial office.**

**We asked Mike Solomons, of London Sound, who has long experience of repairing and aligning the Troughline to explain what to look for when buying one.**

# FM capture

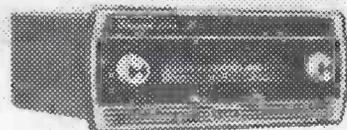




HIGH FIDELITY  
HOME MUSIC EQUIPMENT

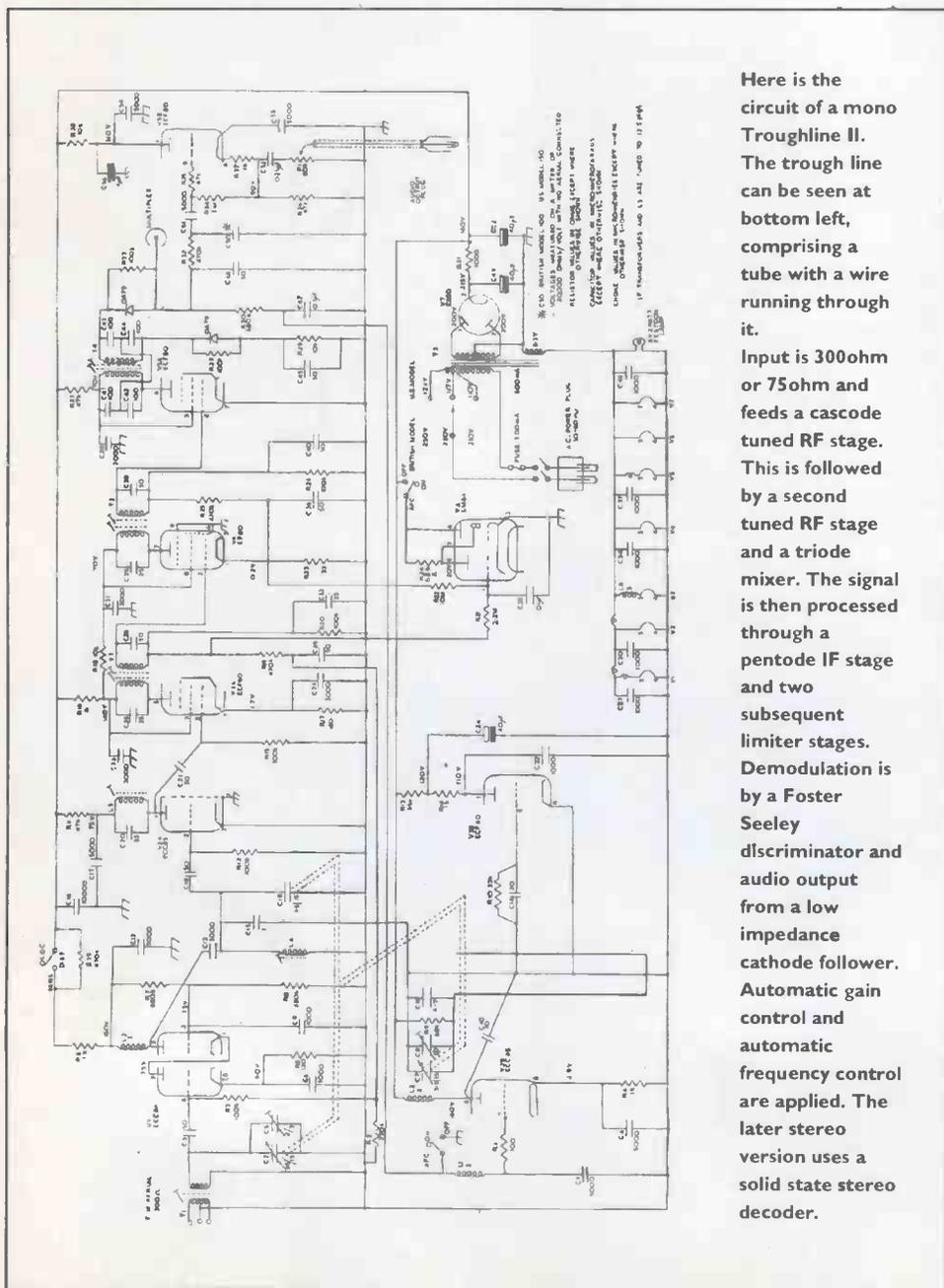
TROUGH-LINE II F.M. TUNER  
SPECIFICATION

- Frequency Range : 88-108 Mc/s.
- Sensitivity : 2 micro-volts at the aerial terminals for full limiting.
- Aerial Impedance : 70/80 ohms, unbalanced or 300 ohms, balanced.
- Audio Output : Cathode follower output delivers approximately 1 volt and facilitates the use of long output leads with negligible high frequency attenuation.
- A.C. Power : Self-powered. Consumption : 46 watts, 200/250 volts, 50-60 c/s.
- Valves : 2 x ECC85, ECC84, EF80, EMB4, E280, 2 x OA79.
- Dimensions : 11 1/2" x 4 3/16" x 7 1/2" deep (29.2 x 11.2 x 19.7 cms.).
- Cost-Out : 10 1/2" x 3 1/2" (27 x 9.85 cms.).
- Weight : 11 lbs. (5 kgs.).



This tuner is radically different from any other present-day F.M. receiver in its engineering design and circuitry; the oscillator employs a novel trough-line tuning inductor which, in conjunction with AFC, prevents frequency drift; the choice of 12.5 Mc/s for the intermediate frequency, in preference to the usual value of 10.7 Mc/s, prevents mutual interference between this tuner and any TV set in the same house; the high sensitivity of 2 micro-volts at the aerial terminal for full limiting makes this tuner suitable for fringe area listening. The tuner is self-powered.

The original specification of the mono Leak Troughline II, dated July 1961.



Here is the circuit of a mono Troughline II. The trough line can be seen at bottom left, comprising a tube with a wire running through it. Input is 300ohm or 75ohm and feeds a cascode tuned RF stage. This is followed by a second tuned RF stage and a triode mixer. The signal is then processed through a pentode IF stage and two subsequent limiter stages. Demodulation is by a Foster Sealey discriminator and audio output from a low impedance cathode follower. Automatic gain control and automatic frequency control are applied. The later stereo version uses a solid state stereo decoder.

The Troughline range of tuners are more susceptible to outside interference than their modern counterparts. Often, where a good aerial is used, this is no problem, but severe interference is less well tolerated by these earlier units. Equally, weak stations tend to be swamped by stronger local signals.

Secondly, we must consider the sound quality itself. The measured specification, in terms of distortion and stereo separation, is inferior to even quite cheap modern units, but these deficiencies are not harsh and unpleasant. On the contrary, many listeners are completely unaware of them.

Care when Buying

What should you look for when buying? Many of the earlier mono tuners were converted to stereo. Whilst the cost of a competent conversion today would probably be prohibitive, these early conversions, (I carried out some hundreds myself), generally worked as well as the factory version. As a rule of thumb - if it has lasted to today, then the owner must have been pleased with the conversion, so it was probably a 'good one'. (This rule is generally helpful when deciding on the purchase of any working old unit.)

Take care with your second hand purchase as it is likely to be in need of some attention, (allow for a five year service interval, as with most good hi-fi equipment). Unless you are a competent engineer, any repair is likely to be expensive. Typically, your £25 'bargain' will cost around £50 to overhaul - occasionally more. There is only one 'standard' fault that is suitable for DIY repair, and that concerns the sensitivity switch. If the contacts fail, the tuner sensitivity will be very poor. A simple DIY repair is to attach the two wires that go to this switch to each other - BUT SWITCH THE POWER OFF before removing the covers. (Editor's

note: the Troughline works at 160V on the h.t. line but has higher voltages in the power supply which could be lethal. Do not attempt mods or repairs if you are not conversant with the proper procedures).

If performance is poor, do not be tempted to replace valves. The unit stresses its valves very lightly, so it is common for an original set from the 1950s or early 1960s to be in good condition. A fall off in performance is more usually due to component failure, and a need for realignment - most definitely the province of an experienced and well equipped service department.

The measured specification, in terms of distortion and stereo separation, is inferior to even quite cheap modern units, but these deficiencies are not harsh and unpleasant. On the contrary, many listeners are completely unaware of them.

#### Choice of Model

To sum up, what are the options, snags, advantages? Unless already converted, the original mono tuners are of little use, except as a simple workbench tuner. Conversion to stereo today would not be economically wise.

There are no sensible 'tweaks', though a substantial improvement in performance will usually be noted after thorough servicing. For most purposes, we may lump together the Leak Troughline Stereo tuner, and the Troughline II and III mono tuners that have already been competently converted to stereo. The only real advantages offered by the factory Stereo version are aesthetics - it is labeled 'stereo' and is easier to service for any Leak engineer.

Avoid non runners - repair may be cheap, expensive, or non viable. It is also likely to be impossible to replace external trim, so appearance is important. The advantages for some applications are clear: this tuner is cheap to buy, has an order of reliability rarely seen nowadays and is straightforward, though not inexpensive to service. Sound quality will satisfy all but the most discerning (and rich) enthusiast.

The writer, Mike Solomons, has been servicing high quality modern and vintage hi-fi equipment for twenty three years, specialising in the main UK brands from an early stage. His company, London Sound, based in Harrow, North London, still concentrates on these products, and can be reached on 081 868 9222.

In the Midlands Troughlines can be repaired by:

Electronic Colour Services,  
32 North Lane,  
Headingley,  
Leeds LS6 3HE  
Telephone: 0532 782185

## OUR LEAK TROUGHLINE

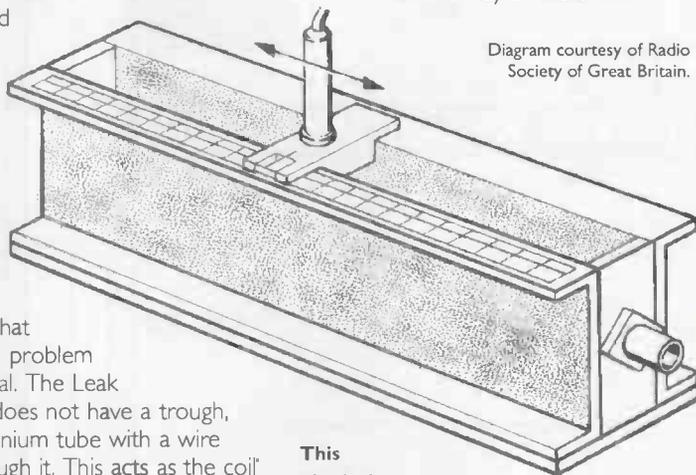
Leak Troughlines might not look beautiful, but this worried us little. The fascia is silver, with a black lower strip. Ours was in good condition, with the remains of an old price label on it and a few scuff marks. You can see that the layout is rudimentary, with a simple VHF/FM tuning scale and a few switches. Whilst the Troughline might look a bit crude, it is well built and tunes smoothly, due to a heavy flywheel tuning action.

Troughline describes a particular type of tuning coil that took the form of a line in a trough. It is a mechanical arrangement that imparts good frequency stability. Valve tuners were prone to thermal drift in particular, so any arrangement that lessened the problem was beneficial. The Leak Troughline does not have a trough, but an aluminium tube with a wire passing through it. This acts as the coil for the local oscillator, which must stay frequency stable if the tuner is not to drift off a station. Leak's Troughline is consequently a stable tuner, but it has automatic frequency control all the same.

Only VHF/FM is covered, not any other waveband. Ours being a stereo version, it had power-on with mono/stereo selection on one rotary switch. Tuning is performed with AFC switched off, using the magic eye indicator. Sensitivity is very low on Local setting, so we operated ours on Distant, even though it was fed from an outdoor aerial that supplies a minimum of 1mV. However, measurement showed that 6mV was needed to reach full quieting (minimum hiss). Be prepared to supply plenty of signal. Performance with an indoor aerial is unlikely to be satisfactory, unless a transmitter is close by.

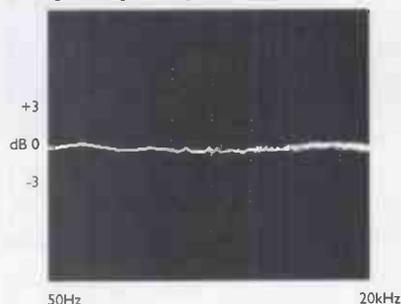
Frequency response proved very flat, as our analysis shows. Our Troughline sounded unusually smooth

and warm, with the sweetest treble I have ever heard. Everyone remarked on the lack of hiss and the sense of deep background silence. But then, with enough signal, this tuner is as quiet in stereo (-70dB) as modern designs. Four of us on the editorial team were quite stunned by the sound quality of the Leak; it bore no resemblance to modern tuners at all. There was a beautifully natural and relaxed quality, free from the grainy upper mid-range and treble delivery of modern designs. Everyone agreed this was the easiest and sweetest sound they had ever heard. I thought the Troughline sounded absolutely wonderful and would happily live with one. Only stereo imaging seemed vaguer than today's tuners. **NK**



This physical embodiment of a Troughline clearly shows how such a peculiar name was derived. A wire passes down the centre of an aluminium trough and, here, it is tapped by a sliding contact. The arrangement substitutes for an inductor or coil. In practice, the Leak tuner has an aluminium tube, or cavity, rather than an open trough.

#### Frequency Response



Our Troughline possessed flat frequency response. It sounded very neutral.



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# Mana Acoustics

## 'SEEK AND YE SHALL FIND'

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Paul Messenger, HiFi Choice, May '90

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Martin Colloms, HiFi News, July '90

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Paul Messenger, HiFi Choice, June '90

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Peter Turner, Audiophile, July '90

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Malcolm Steward, Audiophile with Hi-Fi Answers, Dec '90

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Malcolm Steward, High Fidelity, Dec '90

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## secondhand savvy

**Richard Kelly tells you how  
to play safe when buying  
secondhand hi-fi**

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Typical guarantee period is 3 months to 1yr.  
Full refund for goods returned in same  
condition and within 3 days. Audio Innovations  
300 revalved £275, Audio Innovations 800  
with pre and power supply £745, Mission  
Cyrus I £120, Gale 401 chrome £325, IMF  
RPM TL IV £750, Linn LP12/Mission 774 £350.

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124/126 St Mildreds Road, Lee,  
London, SE12 ORG. Tel: 081 698 8743.  
Three months parts and labour on all goods.  
Nakamichi Dragon £700, Voyd Valdi £450,  
Linn Isobarks £795, various Linn LP12s £300  
upwards. Home trials available to long term  
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**SOUTH CROYDON  
HI-FI EXCHANGE,**  
231 Brighton Rd, South Croydon, CR2 6EL.  
Tel: 081 680 9693.

Typical guarantee is for 2 yrs on production of  
receipt, repair is done for the cost of parts.  
Linn LP12/Ittok/K9 £675, Quad 44/405 II  
£395, Tannoy Cheviots, reconed £495,  
Tannoy Ardens £650. Home trial involves  
paying for the goods and returning them the  
next day for a refund.

**DENYS TRICKETT,**  
21 Bell St, London NW1.  
Tel: 071-723 8545.  
Three months guarantee. Roksan Xerxes/  
RB250 £500, Audio Research SP3 £350.  
Constantly changing early collectable hi-fi.

deviation from standard must be treated as a no-no unless it happens to be a proven and worthwhile modification. Unless you are sure that you can obtain the correct drivers and crossovers at a sensible price don't burden yourself with an iffy product. It is quite feasible that the dealer may be unaware of the problem. In a small but busy environment, with rapidly changing stock, it is all too easy to overlook some small but vital detail. If this is the case there may well be some room for manoeuvre over the price! There is nothing more certain to get a dealers heckles up than for you to get stroppy and suggest that he's turning you over. Stay calm in these conditions and you are bound to come out a winner.

### Classifieds

Rather than go to a dealer you could always search through the classifieds. Two excellent sources are Exchange and Mart and Loot. They are stuffed with all sorts of goodies, though they are not all the bargains that they appear to be. It seems a lot of people think that they can charge as much and sometimes more than a dealer. It wouldn't hurt to point this out to a private vendor; he after all has no premises to maintain or guarantees to honour. If he doesn't budge, shrug off disappointment and buy from a reputable dealer - never pay over the odds just because you're desperate to get your system together.

A method I've used in the past is to tell various dealers what piece of equipment I'm after and how much I'm prepared to pay. It's quite amazing how quickly they phone back to check that I'm still looking, and that they have one on hold should I still want it. Being of the lazy persuasion I find this a more amicable scenario than going through every publication I can get my hands on.

I hope this piece is of use to our impoverished readers, and will encourage them to tread where angels have stumbled. Just use your common sense, don't part with any money 'till you are satisfied. And get those promises in writing! Appended to this article are some dealers that have been recommended to me and some that I know to be sound concerns. The equipment shown may not still be available, I have shown them only to indicate what one can expect to pay. Happy hunting...

There is a scene in the hi-fi universe that seldom gets the coverage that it deserves: the hazy, shady world of second hand equipment. For good reason, many people feel that its an area best left unexplored. But the unknown, if approached cautiously, may yield genuine bargains that could not be obtained elsewhere.

Probably the wisest adage of all, when looking for second-hand equipment is "Not all that tempts your wandering eyes and heedless hearts, is lawful prize; nor all that glisters, gold". If you always carry this round in your head you should, at least, have a fair chance of staying solvent! It certainly saved me when I spied an expensive Transatlantic pre-amp that was going for 15% of its original retail price. With careful questioning of the vendor it came to light that it had been repaired, after it had managed to fry a few components when the mains transformer had not proved man enough to cope with a rise in voltage above 240v (which is quite common on our mains supply). I was assured that it had been repaired with standard factory parts. Well, if it did blow once when in standard form, there's every chance of it happening again, so no thank you very much!

### Caution

Never buy anything as speculative as this unless you have got the resources to rectify the problem once and for all; hard though it may be to pass up such a chance. There is always something even better around the corner, just be patient. The aforementioned pre-amp did pop up again at another venue some months later. This time, it was even cheaper because it needed rebuilding after a quick trip on UK mains.

Another rule is never buy anything assuming that it will function - you must know that it works. Many of my friends have started museums by way of ignoring this rule. By and large, I find that second hand audio dealers honestly try to help their customers and value their continuing trade as they constantly swap items in their systems. They have even been known to offer items on a home loan basis to their well known and trusted customers. Nearly all offer to refund or exchange goods within a specified period of time. Be warned, however. Some will honour this agreement when you just don't like the goods whereas others will only do this where the goods prove to be faulty.

There are no hard and fast rules governing second hand audio dealers, as everything is negotiable. It is your responsibility to check all the facts relating to your purchase and get them in writing where possible. It is a sad fact of life that some things cannot be guaranteed and from experience, a lot of these things come cheap from the Orient! So please, don't get shirty with the man when he refuses to guarantee the apple of your eye. Instead thank him profusely for steering you away from a whole heap of trouble. Remember, it is solely your decision what you decide to buy.

If you are in the market for speakers, I must warn you to check for a few things. First, look at the drivers: are they all matching and original units. It is not uncommon for someone to have replaced blown units with non standard parts to effect a cheap repair. Obviously this is most undesirable. Any

# THE HIGH END

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2-400W Pure Class A

## SOLENIUM VALVE HYBRIDS

We are fully aware that some of the above may not be within everyone's reach so the Solen range may help. Internationally they are recognised to be as good as some top-rated equipment at up to ten times the price. Maybe not quite so powerful but breathtaking in their musical qualities.

Models available -  
Classic B35,  
Tiger B50,  
Caruso B100



## DIAMOND ACOUSTICS. ENSEMBLE. ACOUSTAT

Speakers are personal. We think that our own designed Diamond Acoustics Reference 1s and 2s are the best you can buy, well we would wouldn't we. They are, however, a little special, offering incredible space and detail and sounding powerful and dynamic. The Ensemble are recognised the world over for their tonal accuracy and they do not take up much space either. The Acoustats are a superb range of electrostatic loudspeakers. The 11 and the 1100 being hybrids with an integral bass box, the 2200 and the 3300s being full range. If you like the sound of a panel loudspeaker, then these have got to be incredible value for money.



Diamond Acoustics



Acoustat



Ensemble

## COGAN-HALL

The cable controversy ever reigns. Some manufacturers say that cables are not that important. Others say that if the rest of the system is 100% then you don't need special cables. That's a bit like putting two-star petrol in a Rolls-Royce. The Cogan-Hall cables are one of the best cables currently available but not the most expensive. They are made from copper tubes and so have twice the surface area. These cables are used worldwide by many top reviewers. I believe these cables are the single biggest improvement to any system without changing a component part.



## STOP PRESS

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## REFERENCE IMPORTS

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◆ 'TOWARDS PERFECTION' ◆

● At present, I have an Arcam Alpha CD, Onix OA215 amplifier and Rogers L5-6a loudspeakers on Apollo stands, wired up with Mission solid core cable.

I have been thinking of upgrading to Meridian's 200 transport with either their 203 convertor or Deltec's PDM 1/2 or Little Bit. Is this wise, or is the Alpha transport good enough to use with a separate convertor already?

Also, could you recommend some pre/power or integrated amplifiers at around £600, and some loudspeakers at around £400 for future purchase.

**Gary Morrison**  
Aberdeenshire

In answer to your first question, the Alpha would certainly benefit from a separate convertor but would still limit the overall performance. To get a much better sound you must have a better transport and a better convertor; you are definitely on the right lines with the products you have listed. Remember to consider Arcam's own Delta 170 transport (£600) which is also very good.

The Onix OA215 amplifier that you use is so good that I feel you may need to devote more money to its replacement if you are to make a significant improvement. Maybe you should delay changing your loudspeakers and devote the money to getting a really first class amplifier. As you obviously like the Onix I would have thought one of the Naim amplifiers - NAC 62/NAP 140 - would meet with your approval. Our Ass. Ed. has been very impressed by the Audio Innovations 500 series integrated. Just use the same good judgment that endeared you to the Onix, and I'm sure you'll make the right choice. **DH**

● Having recently ditched my records, my system comprises: a Sony CDP 790 CD, a Naim Nait 2 amp, Mission 760 speakers, Naim NAC-A4 cable and a Creek 3140 tuner. The CD player sits on a Mana table and the amps are run from a Lynwood Basic mains conditioner. Interconnects are by The Chord Company.

Excellent though the Sony is, it lacks body and some warmth in the midrange, and in the bass extension and slam.

I have to do most of my listening through Sennheiser 520 headphones and am consequently thinking of downgrading the Nait to an amp like the Arcam Alpha with a headphone socket. Also, I have approximately £300 to spend on improving my front end. Should I keep my Sony and add a separate DAC such as Arcam's Black Box 3, or change the whole player to something like the Arcam Alpha ACD-1.

Any suggestions would be appreciated.

**P.N. Ashton**

First I would strongly caution you against down-grading a hi-fi component. In my experience it is always very disappointing. If you are unhappy about using the Nait with a separate headphone amplifier - as made by QED amongst others - you should change to a model which is at least as good. The Linn Intek, at £398, has a headphone socket as do the Ion Systems amplifiers (Obelisk 3 at £355). Because the Nait is such a popular amplifier, you will get a very good price for it second-hand.

With your front end dilemma, I need to know of your future plans. If you see this upgrade as your last for some time, I would recommend an integrated box such as the Alpha - which is an exceptional component. If you are likely to upgrade again, it would be sensible to add a separate DAC - Deltec or Arcam - to your existing Sony. Whilst this will probably not sound quite as good as the Alpha, it will be a big improvement and will allow you to simply add a separate



## readers' queries

**Write in with your problems to Hi-Fi**

**World, 64 Castellain Road, Maida Vale, London W9 1EX.**

**Our panel of experts will endeavour to solve them or at least offer some practical advice.**

transport at a later stage. This will result in a huge improvement.

Lastly, have you thought about moving your mains conditioner to your CD player? An amplifier such as the Nait already has a superb power supply; in some instances I have found that conditioners actually have a negative effect. On the other hand, I have heard CD players greatly benefit. **DH**

● With so many interesting new issues on CD only, I am forced to contemplate buying a CD player. At present I use a Systemdeck 11x 900/Rega RB 250/Glanz MFG 310 LX with a Denon PMA 250 and Goodmans Maxim 2 speakers. Could you recommend a selection of CD players that would provide a broadly similar sound.

Secondly, in your opinion would my sources then warrant a modest upgrade of amplifier and loudspeakers.  
**M.J.Mallet**  
Cornwall

It is very unlikely that you will find a CD player that produces a similar sound to your existing turntable. This does not mean that you will not find a good sounding model, but you should listen very carefully to the type of sound that CD produces. I find the sound of the budget CD players unacceptable and would always suggest starting your listening to players costing around £300. The Marantz CD-505E is a good player at this price; even better is the Arcam Alpha ACD-1 at £400.

Your amplifier and loudspeakers, although good ones, are worth upgrading from. I would consider some of the excellent mid-price amplifiers: Onix OA21s - £300, Linn Intek - £398, Naim Nait 2 - £389 and Ion Systems Obelisk 3 - £355. Your existing Goodmans Maxims, if carefully mounted on good stands, are capable enough to be used with this new equipment. If you are able to improve your loudspeakers as well, audition Royd Sapphire and the Linn Index 2 on Kustone stands. There are also many other models which your local dealer can doubtless suggest. **DH**



The assembled horn loudspeaker with its grille off

# BUILD A HORN LOUDSPEAKER

Hi-Fi World offers a DIY kit to build a small horn loudspeaker.

The designer, Bill Webb, talks about its background.

A few decades ago, a typical hi-fi system might have consisted of a turntable connected to a fairly low-power valve amplifier and some sort of horn loudspeaker. The turntable, although currently an endangered species, never went away. Valves all but disappeared in the sixties under the march of the transistor but are currently being brought back from the brink of extinction by a dedicated band of audio conservationists. But whatever happened to horn loudspeakers and why did their numbers diminish? Perhaps they simply couldn't cope with the evolutionary pressures of the changing hi-fi environment and, driven by market forces, retreated into various protected habitats where their unique qualities could be appreciated.

To understand what happened to the horn, we need to look at its strengths and weaknesses and see why the mainstream hi-fi industry appears to have chosen to ignore a whole category of loudspeaker for a generation or more.

## Efficiency

In the early days, the principle attraction of the horn was its efficiency. Horn systems could convert 10-50% of the electrical energy they received into sound, compared to the 1% or so of today's power hungry infinite baffles. The first gramophones did not even use an amplifier. Instead a small diaphragm mechanically energised by the needle was connected directly to a conical horn (HMV dog optional).

Other benefits of horn loading include large dynamic range, manifested by its ability to actually reproduce loud sounds loudly. An inefficient loudspeaker would have to have an impossibly large power handling and an excursion of several inches to match the dynamic capabilities of a low frequency horn.

If you add another horn benefit of fast acceleration of transients - a result of improved air loading on the moving diaphragm - a well designed horn loudspeaker can offer astonishing realism, impressive power and dynamic transient reproduction.

So, with all this going for horns, why aren't we tripping over them in the shops?

## Decline

The principle reason for their decline lies in relatively large size and high cost of manufacture, together with the development of higher power transistor amplifiers which made it possible to drive relatively inefficient loudspeakers. In related fields such as theatre and concert hall sound reinforcement, where size and manufacturing cost constraints are not as prohibitive as hi-fi, horn loudspeaker designs have been refined over the years to produce near hi-fi quality at extreme sound levels.

Horn loading techniques can be applied to any frequency band. Without going into the theory, low frequency horns tend to be big (very big), midrange horns are, naturally enough, mid-size and high frequency horns are comparatively small. It's all to do with the wavelengths of sound in air. Low frequencies are long (28 feet at 40Hz) and high frequencies are short (less than 1 inch at 20kHz) and the horns that produce them are in proportion.

In practice no single horn can cover more than three or four octaves. So you need at least a three-way system using three differently sized horns to cover the nine octaves of the full audio band from 40Hz-20kHz. Since a 3-way fully horn loaded loudspeaker system is obviously going to be many times more expensive than a 2-way direct radiator system in a simple reflex or IB enclosure, there aren't too many of them about.

A hybrid system using a combination of horn loading for the bass with direct radiators for midrange and high frequencies would represent a more achievable goal in the real world. Even so, bass horns are invariably folded inside the cabinet to achieve the long path lengths required and the manufacturing cost of such enclosures is still prohibitive. Current hi-fi cabinet manufacturing techniques are high volume automated processes which produce fairly simple cabinets and are essentially unsuited to more complex horn loudspeaker production.

Yet building a low frequency horn is not beyond the capability of the DIY home constructor, who would like something different for a loudspeaker. In the remainder of this article we will be

looking at a simple DIY horn design which combines many of the attributes of horn loading techniques in a practical home-build loudspeaker.

### Small Horn

In spite of horn theory, which implies very large dimensions for bass horns, a smaller horn can achieve very respectable results. As with everything else the best that can be aimed for is a good compromise. There is no real point in building the ideal mega-horn if a) you become insolvent in the process and b) you can't get it in the house.

The ideal horn consists of a long circular tube which expands its cross-sectional area from start (throat) to finish (mouth). It's rate of expansion is determined by the type of horn. It can be exponential, conical or hyperbolic or anything in between, depending on your persuasion. As already mentioned, reproduction of low bass implies a very big mouth (twenty something square feet) at the end of a very long path (20 ft plus). Not much hope there for the average flat-dweller. Even by folding the horn and changing from a circular to rectangular cross-section, theory dictates that the mouth would still be the size of a doorway. This is where the art rather than the science of horn design comes in - how to design and build a low frequency horn in a compact, room friendly enclosure without sacrificing the efficiency gains, dynamic range and superior transient clout of ideal large horns.

### Simple

Apart from compact size, a prime consideration of the Hi-Fi World DIY design was that it should be simple, easy to construct and affordable. To this end, two different home assembly kits will be available to the home constructor to suit different levels of practical expertise. The first kit, for the fairly skilled woodworker, comes with all drive units and a set of detailed construction plans. It does not include any wood, which has to be purchased separately and attacked with a jig-saw.

The second kit is in flatpack form and contains everything required to build a pair of loudspeakers including pre-machined 18mm MDF panels, drive units and full assembly instructions. This kit can be built in a matter of minutes as the MDF panels lock together during assembly whilst the glue takes hold.

In detail, our DIY design is a compact bass horn using a quality 8" plastic cone driver for bass/midrange with a metal dome tweeter to supply the extreme top end. The finished loudspeaker is only 30 inches high and 18 inches deep and can be either floor-standing or mounted on low stands if preferred.

### Rear Energy

The rear energy of the bass/mid driver is used to feed the throat of a folded horn of modest dimensions. The expanding horn couples the relatively high mechanical impedance of the vibrating

speaker diaphragm to the lower impedance of the outside air, raising the efficiency of the driver in the process. This type of horn, in which one side of the cone performs as a simple direct radiator and the rear drives a low frequency horn, is capable of achieving good low frequency response and reasonably high efficiency.

An interesting feature of this design is the chamber between the rear of the loudspeaker cone and the throat of the horn. This plays an important role as an acoustical low pass filter allowing only frequencies below 150Hz to be transmitted from the horn whilst allowing both upper bass and midrange frequencies to radiate from the front of the cone. The folds in the horn also act as low-pass filters to further impede the transmission of midrange frequencies due to their destructive cancellation as they negotiate the bends of the horn ●

Some of the individual items provided in Kit 2



### The Editor says...

The most awe inspiring sounds I have ever heard have come from big horns. Because their huge mouths drive the air in a room so efficiently, and because the room as a load is translated back onto the speaker cone so well, they deliver incredible levels of bass power with enormous speed and unbelievable ease. If you want to hear effortless thunder, listen to a big horn.

When Bill Webb, who has designed loudspeakers for Tannoy and Goodmans, offered to design a compact horn for Hi-Fi World, I jumped at the offer. Let me say right away, that a small horn doesn't match the fear a Tannoy Westminster can instill in listeners, but it does have a faster bass than reflex enclosures and the like.

We found that in practice our horn possessed certain other benefits. It is easily tunable to vary bass level and quality, just by altering the amount of internal wadding. Use a little and you get big bass. Use a lot and it will almost disappear. In between there will be a happy medium that suits personal taste. Since stuffing the loudspeaker should occur in-situ, room characteristics are automatically taken into account.

Then there are the drive units. They are high quality, dedicated hi-fi types sourced from Mordaunt Short. Less expensive units are common and we were offered plenty of them. Whilst they would have brought the cost of the kit down significantly, none had the sheer smoothness and grace of the Mordaunt Short units. Everyone here agreed it was better to spend more in order to produce a loudspeaker that was unquestionably smooth in its delivery of the upper registers. We are pleased to have exclusive use of them.

Two kits are available:

#### KIT 1

For those who want to build their own cabinets.

Contains two pairs of Mordaunt Short drive units (8in plastic cone bass/mid-range unit, plus capacitor coupled metal dome tweeter), input terminals, BAF wadding, screws, wires, plus plans and build instructions for the loudspeaker. Woodworking experience is essential, since whilst basic layout and construction are explained, fine constructional details are best determined by owners to suit tools available.

PRICE: £109

POST, PACKING AND INSURANCE: £9.00

TOTAL £118

#### KIT 2

For those who want a complete kit including all wood, drive units and hardware, etc.

Contains all parts, including two pairs of drive units, BAF wadding, input terminals, screws, wire, coupling capacitor, grill frame and cloth and lock together, routed MDF panels. Comes in two packs for ease of carriage. No surface finish is provided on the MDF, but it is naturally smooth and consistent and will accept most types of finish Easy assembly: apply glue and lock panels together.

PRICE: £189.75

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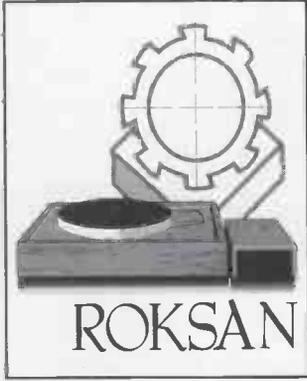
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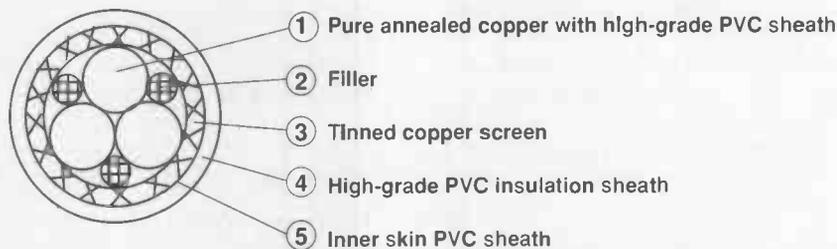
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Left alone, mechanical contacts tarnish. Oxidation occurs and other airborne agents - especially in smoke filled rooms - also combine to form surface deposits. The effect often becomes serious enough over a period of time even to make self wiping contacts go intermittent. Mechanical contacts can deteriorate unless cleaned.

Hi-fi signals are, by their nature, very prone to degradation from this phenomenon - and there are myriads of contacts that slowly tarnish in any system.

Kontak is a unique and

## NAGAOKA Anti-Static Record Sleeves

Nagaoka specialise in pickup cartridges and record accessories. They are recognised experts in this field, producing very high quality products in the way Japanese companies do. Their translucent, plastic record sleeves are treated to be immune to static build up. You can clearly see the entire disc surface through them, so labels or even picture discs can be recognised instantly. Lack of dust attraction makes for a clean sleeve and helps keep records pristine. Nagaoka's sleeves come in packs of fifty. We suggest you get a pack, have a good record cleaning

Use carefully to keep your pickup cartridge stylus and cantilever clean.

**NAGAOKA STYLUS CLEANING KIT Price: £2.20**

## NAGAOKA CD Cleaning Kit

I have tested a variety of CD cleaning devices (the editor writes), including the cogs and wheel types, using a Cambridge Audio CD-1 dropout counter to measure errors and detect improvement. Of all the kits, this one from Nagaoka gave the best results. It better removes sticky deposits (like jam!), whereas the machines do not. So again, it might not look so complex as some, but it is very effective. We recommend it from testing and personal trial.

**NAGAOKA CD CLEANING KIT Price: £9.95**

# HI-FI WORLD SPECIAL AUDIO ACCESSORIES

## RECORD STORAGE CUBE

Here's the record storage cube so many people have asked for. It has been designed to hold roughly one hundred LPs, having an internal width of 37cms. Internal height is 32.5cms and depth 32cms. The cubes can be stacked or placed alongside each other, in a line. They offer useful storage for a variety of household goods.

Strongly made from 20mm MDF, the panels are machined to have strong side joints. We have specified an expensive two-part paint finish, with a textured acrylic top coat in black. High tensile machine screws with cross heads are supplied, plus instructions. All holes are pre-drilled; simply bolt the panels together.

The cube is delivered in a flat pack.

**RECORD STORAGE CUBE Price: £38**

effective two part cleaning solution that removes contaminants from electrical connectors of all sorts. It is applied with the pipe cleaners supplied. Clear instructions list the most sensitive contacts that need treatment in a hi-fi system, but others not in the signal path, such as fuses, should not be ignored. Make sure equipment is turned off and unplugged from the mains of course, before cleaning any contacts - mains related or otherwise.

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. Those who use it, including the staff of Hi-Fi World, find this two part cleaning solution very effective. After application, the sound of a system regains its original life, sparkle and vigour. You will be surprised at the difference Kontak makes.

**KONTAK Price: £19.50**

session and replace all the old inner sleeves with these new, spotless ones.

**NAGAOKA LP SLEEVES Price: £6.95**

## NAGAOKA Rolling Record Cleaner

The big drawback with most record cleaners is that they fail to lift dirt effectively off the record. Brushes pick up fluff, but they also redistribute fine dust around the grooves, causing noise to build up. Nagaoka's rolling record cleaner actually lifts dirt from the bottom of the groove - even fine dust! This is the only way we know to properly dry clean a record.

**NAGAOKA ROLLING RECORD CLEANER Price: £9.90**

## NAGAOKA Stylus Cleaner

Here's another simple but effective cleaning kit from Nagaoka. It consists of a stylus brush and cleaning solution.

## STILTON Gold Plated 4mm Plugs

Gold is, chemically, one of the least active metals. It resists corrosion well as a result. Gold is also highly conductive. These are both excellent properties for electrical contacts, which is why all the best switches have gold plated contacts. Look at the nickel plated surface of most 4mm loudspeaker plugs and you'll see it is dirty. Try cleaning it and you'll prove it is dirty.

We suggest you consider using our gold plated 4mm loudspeaker plugs instead. They stay free of contamination longer and ensure an excellent electrical connection is made. To maximise their potential, they solder to the speaker cables, eliminating the additional metal contact made by clamp screws. Heat shrink sleeving is provided, plus conventional plug caps. You will need a soldering iron to connect these; a dealer should be able to do the job in minutes.

**STILTON PLUGS Price: £7.50**

## THE GREEN PEN

Straight from Japan, where they can get seriously nutty about hi-fi, comes THE LASAWAY GREEN PEN. Manufactured by an offshoot of one of Japan's largest engineering companies, this pen is designed to improve the light distribution from the laser

of a Compact Disc player. By reducing optical interference, it produces a purer reflected signal from the disc surface. This in turn improves faithfulness of the optical signal and results in better sound quality.

When red laser light hits the silvered reflective surface of a disc, some of it scatters and is reflected back off the disc edges, causing optical interference. Because green is at the opposite end of the light spectrum to red, an opaque green coating best absorbs this light.

The LASAWAY GREEN PEN provides such a green coat and has been formulated to be harmless to the plastic of the disc. It is carefully applied to the outside and inside edges, but not to the reflective face of course. I have tested this (the editor writes) and personally feel that Lasaway's claims are justified. We were careful not to adjust volume, but individual images - like singers became denser sounding and louder too. It was as if the images were focussed and strengthened. There was an enriching process to be heard as well. More information was coming from the performers and instruments. I was pleasantly surprised by the LASAWAY GREEN PEN, because I am slightly sceptical about such products. This one worked.

**LASAWAY GREEN PEN**  
£6.50

## AUDIO TECHNICA CD Lens Cleaner

Here's a product for smokers in particular. However, seeing the peculiar haze that coats the inside of my windows after a few weeks - and I don't smoke - suggests to me that non-smokers are included. 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, plus cleaning fluid. Each brush takes one drop of fluid, then the disc is inserted and played. These brushes gently clean the laser lens, removing oil, grime, dust and other airborne deposits like nicotine (ugh!). Audio Technica recommend use every month or so (just watch your windows!).

**CD LENS CLEANER**  
Price: £14.80

## AUDIO TECHNICA Cassette Deck Head Cleaner

We've seen the automatic cassette head/capstan cleaners - those natty little cassettes with all the wheels and cogs inside. Trouble is, Nakamichi tell us they do not recommend such gadgets are used with their cassette decks. I own a Nakamichi ZX-9 (the editor writes), which is used for tape testing, as a reference and such like. This poses a dilemma, over which there has been much discussion on the magazine. If I am not prepared to use one, then should we sell one?

The truth is that they are fine for simple two head decks, but are best not used with more complex and delicate precision mechanisms found on a Nakamichi. The dilemma is resolved by Audio Technica's cassette head cleaner system. Using good, old fashioned manual techniques with cleaning buds and a carefully formulated cleaning solution that will not harm the rubber of pinch rollers, this little kit works wonders. Heads are cleaned with light pressure and plenty of care. Use of disposable pads means dirt isn't retained, to possibly cause damage by scratching.

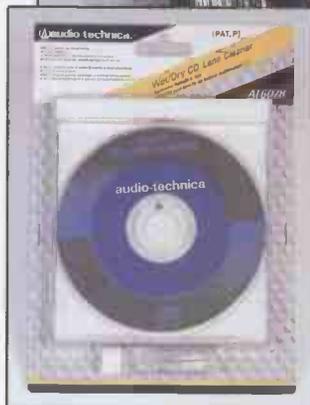
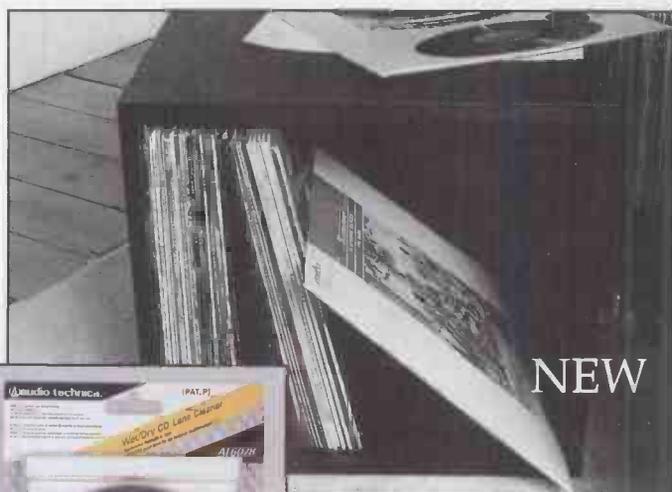
This kit might not look so natty, but that isn't our concern. We feel obliged to make an informed decision about products on your behalf: our choice is this cleaning kit.

**AUDIO TECHNICA CASSETTE DECK HEAD CLEANER**  
Price: £6.95

## AUDIO TECHNICA Electronic Stylus Cleaner

Scared of damaging your stylus when cleaning it? Try this amazing little device - an electronic stylus cleaner that vibrates gunge 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.

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# ABB EY R O A D

## ANNIVERSARY

**Abbey Road Studios celebrate their sixtieth anniversary this year.**

**We spoke to Ken Townsend, Director of Operations, about their history.**

‘ I would say that Abbey Road is the best studio in town; town being the world. I don’t think I’ve ever been in a better studio...’

Paul McCartney  
January 1982

When the words “Abbey Road” are spoken, one thought will enter most people’s minds: a zebra crossing with four members of the most successful pop group in history walking across it. This is an internationally famous image of the Beatles. Not a day passes at No 3 Abbey Road without the piercing screech of a braking car, stopped in its tracks by four tourists making their own version of The Beatle’s last album cover. When we arrived, a group of American students were busy adding to the graffiti on

the roadside wall, watched benignly by security staff. Writing on the wall is an accepted gesture of appreciation. Westminster City Council are less happy about disappearing Abbey Road signs however.

Although the The Beatles made Abbey Road a household name with their eponymously named album, the intrinsic history and achievements of the studio itself are less well known, even though they are quite remarkable. This year Abbey Road is celebrating its sixtieth birthday, an event that gave us the perfect opportunity to quiz Ken Townsend - Director of Operations - on the history and magic that have been an inspiration to all that have worked there.

When Abbey Road opened on November 12th 1931, it was the world’s first dedicated recording complex. With the then recent merger of the Gramophone Company and the Columbia Company to form EMI (Electrical & Musical Industries), there was increasing pressure for recording time to be made available. It is not clear precisely who initiated the purchase of No 3 Abbey Road. “I wasn’t really born

its walls. The first recording to be made in a dedicated recording studio was started with Elgar's cheery message: "Good morning gentlemen. A very light programme this morning. Please play as if you've never heard it before."

The original Abbey Road complex contained three recording studios, able to accommodate all forms of music. Studio 1, still the world's largest studio, has the ability to house 250 musicians and, additionally, provide auditorium space for 1000 people. The original EMI press release read: "Just over four and a half miles of electric cable connect the three studios with the central control room. Six microphones can be used at any one time in each studio and each microphone has a separate control. This will ensure that all records will be recorded with the correct balance of instruments and vocalists. There are waiting and retiring rooms for artistes and special departments for the scientific maintenance of the whole installation."

There are two strands to Abbey Road's subsequent history: the technological developments that have taken place and the truly impressive range of people who have worked there. In this sense Abbey Road's history reads like a who's who of the music world

## TECHNOLOGICAL DEVELOPMENTS

Originally, recordings were made directly onto wax - and then sent to a factory to be made into 78rpm records. As tape recorder technology began to emerge, it promised hugely increased versatility. At this time there were no equipment manufacturers, so Abbey Road pioneered their development. The BTR1 and 2 tape recorders gave the hitherto unknown possibility of repeat performance. Before this, recordings

were made live. Mistakes and odd creaks and coughs were all captured and laid down onto the unchangable wax master. Even with Abbey Road's mobile recordings - the Lancia mobile unit - everything had to go absolutely right on the night. If the recording was started at the wrong time, the final record could end up with half a side of lead-in groove!

The late David Bicknell, recording engineer and one of the pioneers of Abbey Road, recalled his first trip out to record Malcolm Sargent conducting a performance of Elijah: "When the producers said they were ready in the van, it was my job to give Malcolm Sargent a signal and then he started the concert. It was imperative I kept well hidden as all this was being done without the audience's knowledge and they would have been very confused to see a chap crawling about amongst the orchestra clutching a telephone"

### Magnetic Tape

In 1946, Abbey Road sent an engineer- Berth Jones - to Germany to learn about developments in magnetic tape technology that had taken place during the war. A magnetic code breaking system used by German command gave Abbey Road the necessary information to develop the BTR 1 and 2 tape recorders; these remained in use for over twenty five years. This effected a transformation in recording techniques and abilities. Unrestrained by the need for live and unchangable recording, all sorts of possibilities became available. A particular phrase or section of music could be repeated over and over until the desired result was obtained. The various usable parts of tape could then be spliced together and made a whole. A piece of music lasting twenty five minutes may have had as many as a hundred joins.

Crucially, this technique also allowed several microphones to be



"Three months later The Beatles arrived at Abbey Road for a proper recording session and recorded "Love Me Do" in Studio 2. Suffice is to say, the rest is history."

then, so I can't remember" Ken Townsend remarked. It is clear, however, that there was a prevailing reluctance in some quarters of EMI, where it was thought to be utter madness that a record company should have its own recording studios.

Osmund Williams - then manager of the EMI Artists Department - contested this view. It was his perseverance that eventually sold the idea to the EMI board and the purchase of the current site was then made. Tragically, Williams was never to see his dream come true as, at the age of 46, he developed a brain tumour and died in the summer of 1931.

Abbey Road went on however, and two years after its initiation, refurbishment of the original house to form a studio was complete. Although the exterior of the building was, and remains, unaltered, the adjoining building - No 5 Abbey Road - and surrounding land had to be bought. On November 12th 1931, the largest and best recording studio in the world was opened by Sir Edward Elgar conducting his historic recording of the Falstaff suite within

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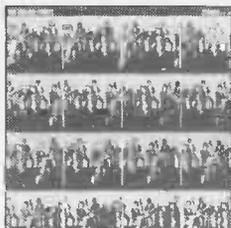
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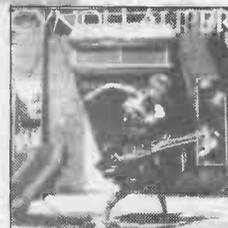
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used at the same time. Whereas a dance band such as Ambrose would have crammed around one microphone and spent time adjusting the internal balance, sections and sometimes individual performers were subsequently blessed with a microphone each. These innovations were rapidly followed by the development of the microgroove record that revolved at 33 revolutions per minute, ousting the old shellac 78s.

### Solid State

Although the move from valve to solid state technology was significant, the next major technological development was digital recording. Whilst the specialist hi-fi industry in particular has expressed many doubts about digital processing, such fears were not echoed at Abbey Road Studios. There, digital has been seen as offering a major step forward in recording quality. It was used for all classical recordings as soon as was then possible.

The first digital recordings came from Abbey Road they claim and, amongst them, was Andre Previn's recording of Debussy's Images. Previn described the prototype digital recorders as: "...the best sound of all time." There were some problems however. Initial recordings of Geoff Love and his Orchestra suffered from the absence of the contrived string sound that is part of their appeal, and the original recorders - converted video recorders - were not perfect.

More recently Abbey Road have taken to the use of Digital Audio Tape (DAT). Ken Townsend explained that this has tremendous advantages as it allows them to "identically copy" digital master tapes and send them around the world. He does not however see it as a commercial medium, favouring the promise of Philip's Digital Compact Cassette (DCC) technology instead. Interestingly, Townsend believes that Compact Disc reproduction is approaching the quality that is heard in the recording studio and this fact has of necessity made them more self critical in the studios.

## THE PERFORMERS

The tremendous success of The Beatles has, in some ways, obscured Abbey Road's overall influence upon and position in the music business. The studios themselves have inspired so many different performers that Abbey Road has transcended its life as a building and taken on a sort of metaphysical influence and mystique. The empathy that is felt by people who have worked there manifests itself in all categories of performer and spans a period starting from the

very first recordings right up to the present day.

One of Abbey Road's earliest aficionados was the then fifteen year old Yehudi Menuhin. "Every time I go past Abbey Road Studios I blow it a kiss; I feel so strongly about the place." And he has spent a long time enjoying this bliss, having recorded nearly 250 works there.

It was originally classical artists that dominated Abbey Road, the pop scene being mainly big band. Other notables include the world famous pianist Arthur Schnabel who recorded all thirty two Beethoven piano sonatas and five concertos there. It is said that he required twenty nine waxes for a single record as, in a frustrated temper, he would slam his piano shut and mutter "impossible, impossible". It took over a decade to complete a hundred records.

Sir Thomas Beecham was also very active at Abbey Road. His widow, Lady Beecham recalls: "Abbey Road was for him the place to work and he made a tremendous amount of records there...Many times he would change the things he was supposed to record, dashing off into a cupboard and producing a totally different piece for the orchestra."

### Pop Music

Popular music, although less prevalent than then now, also brought many star performers. Geraldo, Flanagan and Allen, Al Bowly and Ray Noble, Fred Astaire, Paul Robeson and Noel Coward all recorded the songs which made them household names at Abbey Road. As war commenced, Abbey Road was to play its part by recording dance hall favourites from the likes of Gracie Fields, Max Miller and George Formby. During this time, a most notable politician, Sir Winston Churchill, visited Abbey Road and on witnessing the white coats worn by the engineers commented: "My God, I thought I'd come into the wrong place. It looks like a hospital" The stringent dress policy and strict three hour working sessions were soon to change with the arrival of widespread pop music however.

In the late 1950s it was realised that in order to establish a British pop scene like that developing in the United States a more casual approach was called for. Pop at that time meant a three minute single. EMI/Abbey Road had three record labels which catered for different music: HMV, Columbia and Parlophone. However, it was then the case that classical music had priority and pop music was a poor second cousin. The chairman of EMI, Sir Joseph Lockwood, was aware of and unhappy about this situation. He got to know the pop producers in order to change it.

Amongst these producers was

George Martin, shortly to become artists manager for the Parlophone label. Whilst HMV and Columbia were already making considerable progress into the pop field, Parlophone under Martin's control went on a different route. At only twenty nine, Martin recorded all sorts of strange and unusual material. Spike Milligan, Peter Sellers and Harry Secombe were produced by Martin, as were Peter Cook, Dudley Moore, Alan Bennet and Jonathan Miller - recording Beyond The Fringe. However, with the increasing popularity of pop music internationally, Parlophone needed a new act to compete with the likes of America's Elvis Presley and Doris Day.

### Beatles

George Martin was to find just such an act. On June 6th 1962, he, Norman Smith and Ken Townsend stayed behind after work to do a special commercial test for a four piece pop band that Martin had been in touch with. Following the session and after Martin had been "going on at them" at length, he asked if there was anything that they didn't like. One of its members, George Harrison replied: "I don't like your tie!" Some have argued that this one comment clinched the whole deal. Three months later The Beatles arrived at Abbey Road for a proper recording session and recorded "Love Me Do" in Studio 2. Suffice is to say, the rest is history.

The Beatles' contribution to Abbey Road was immense. It seems completely appropriate that the last Beatles album should have been named after Abbey Road, as their long relationship was so mutually beneficial. The fact that the Beatles are pictured walking away from the studios was a hidden message that the affair was all over, many fans felt.

Subsequently, Abbey Road Studios have recorded many of the last decades most popular artists - Kate Bush and Pink Floyd for example - and they are currently very involved in the recording of film soundtracks. A letter of commendation from Walt Disney for Abbey Road's production of the soundtrack to "Honey, I Shrank The Kids" hangs on Ken Townsend's wall. It is an accolade Abbey Road are proud to have received, yet their history is also testament to the fact that they have played a major role in the history of recorded music. And this history is far from over. Abbey Road have recently heard that one of their recording engineers, Haydn Bendall, has been awarded 'European Engineer of the Year'. Furthermore, the recent no. 1 single "I am the One and Only", by Chesney Hawks was fully recorded in Abbey Road's new Studio Three. ●

# record rover

**The LP is disappearing from high street retailers, but it lives on in smaller specialist stores. Danny Haikin goes roving, searching them out to find what they offer.**

High street record shops now blatantly favour Cassette and Compact Disc; their shelves are being progressively cleared of LPs, excepting those in the charts. Music buyers who are committed to the vinyl record - be they hi-fi buffs or not - are now better catered for by the smaller, specialist record shops: their stocks have never been more desirable.

As can be seen from the list of retailers on P100, there are specialists covering all forms of music, and they include many second-hand outlets. The thing they all have in common is a commitment to supplying vinyl records for as long as is commercially possible.

Although the increasing rarity of records is not welcome, the situation is somewhat ironic. Of the specialist shops I have visited, or heard recommended, they nearly all provide a level of service which is far higher than that offered by the large chains. They know more about music, are more helpful and generally have more competitive prices. As these shops are increasingly common, buying the records that are available has never been more enjoyable.

## Second hand

For this article, I will talk about used records. Most specialist shops have a second-hand section and many are second-hand only. It is natural to be hesitant about buying such precious things as records second-hand, but do not be put off. Used records are the only source of much classical and jazz music, and offer genuine bargains for current and deleted rock/pop/soul/reggae. I was able to visit three such shops and am reliably informed that the good service I found, in London, is reflected nationwide.

Before I talk about these however, there are some general points about buying second-hand which are worth mentioning. The single, most critical thing is condition. This can vary from as new and perfect, to un-playable. The first point to remember is that the quality of an actual record player will be very influential in determining the actual amount of surface noise that is heard. A good record player which is correctly set up, with a stylus that is not worn, will allow most records to be played without too much surface noise. A poor turntable will be noisy with brand new records, let alone second-hand ones.

The following guide to condition, formulated by Record Collector

magazine, has been adopted by many of the second-hand shops I spoke to, and is useful as a personal guide when it is not used. First, it details the various conditions that second-hand records are sold in, and then it provides a price guide for each of these various conditions. Personally, I buy records in all but the last two of the following categories, and find very few which are unacceptable. On a poor quality turntable however I would restrict myself to only the top two or three.

Below are definitions of the varying conditions that second-hand records can be bought in. Many shops actually use this guide and will stipulate condition on a price tag.

**MINT** - The record itself is in perfect condition, will shine and exhibit no loss in quality. It will have been played once or twice and the sleeve and packaging will be unmarked.

**EXCELLENT** - The record is almost perfect but may have very shallow - hard to see - surface scratches. The record will still shine, but the cover may have a small crease.

**VERY GOOD** - The record shows signs of having been played: it may be slightly clouded and will have several shallow surface scratches. It will exhibit no serious loss in quality although the cover may be faintly creased.

**GOOD** - The record has obviously been played quite a lot and will exhibit some surface noise, but is still quite listenable. The cover will show some wear and tear but will display no major defects.

**FAIR** - It is noticeable that the record has been played quite a lot and will be clouded and scratched over much of its surface. It will exhibit a loss in quality, relative to record player quality, and the cover will be scuffed and folded at the edges.

**POOR** - The record is just about playable but is badly cared for and displays considerable quality loss - mistracking and surface noise. The record label may be defaced and the sleeve torn.

**BAD** - The record will not play properly and may even jump. The cover will be badly torn or may not even exist.

MINT	EX	VG	GOOD	FAIR	POOR	BAD
£100	95	75	50	30	15	5
£75	70	55	35	22	10	4
£50	45	35	25	15	8	3
£40	35	30	20	10	6	3.50
£30	25	20	15	9	4.50	2
£25	22	18	12	8	4	1.75
£20	17	15	10	6	3	1.50
£15	13	11	7	4.50	2	1
£12	10	8	6	3.50	1	50p
£11	9	7	5	3	75p	50p
£10	8	6.50	4.50	2	50p	-
£9	7	5.75	4	1.75	40p	-
£8	6	4.50	3.50	1.50	35p	-
£7	5	3.75	3	1.50	30p	-
£6	4.50	3.50	2.50	1.25	25p	-
£5	4	3	2	1.25	-	-
£4	3.50	2.50	1.75	1	-	-
£3.50	3	2.25	1.50	1	-	-
£3	2.50	2	1.50	75p	-	-
£2.50	2.25	1.75	1.25	50p	-	-
£2	1.75	1.30	1	50p	-	-
£1.50	1.25	1	75p	-	-	-
£1	80p	65p	50p	-	-	-

The pricing guide can be used after the condition has been ascertained. Take the asking price, assess the condition and then check the correlation. If a record is valued at £10 in mint condition, but it appears to be only very good, then the price should be £6.50. On a general level, most popular current albums will start at - mint - between £5 and £6 and then depreciate. Older records which are not rare will start between £4 and £5. With rare records you should first find a suggested price from a record collecting magazine and then use the guide.

### THE SHOPS

The three shops I visited were all in London. I do intend to visit others for a future article and would appreciate feedback from readers around the country

Reckless Records - details on list - operate two shops in London and use the grading system. Their collection of records is mostly contemporary music, but they do have a small classical section. You will not find many newly released albums but after three months they tend to appear. Prices start at £5.50 for mint new albums and reduce to about £2 for albums in fair condition. Also, the prices are reduced over time, so a mint album may be bought very cheaply if it has been around for a while. I found the rock and soul sections were very comprehensive and covered most of the list I made beforehand. Recently released albums were sparse, but there were many things which had come out last year. I picked up the Cure re-mixes album, an old Marvin Gaye compilation and a selection of 12" singles. The record condition stated on the price tag was consistent with the inspection that is offered and everything I bought played perfectly at home. The shop staff were very knowledgeable about music and were helpful in finding specific albums.

The Music and Video Exchange are the largest London based second-hand shop and have several branches, which also sell bikes and musical instruments. They carry an enormous quantity of records - again mainly contemporary music - and get new releases almost as soon as the high street shops do. They do not stipulate condition although their prices do reflect it. As the Music and Video Exchange have a policy of buying absolutely any record, irre-



Camden Town's Vinyl Experience an independent Record shop that specialises in the obscure both new and second-hand.

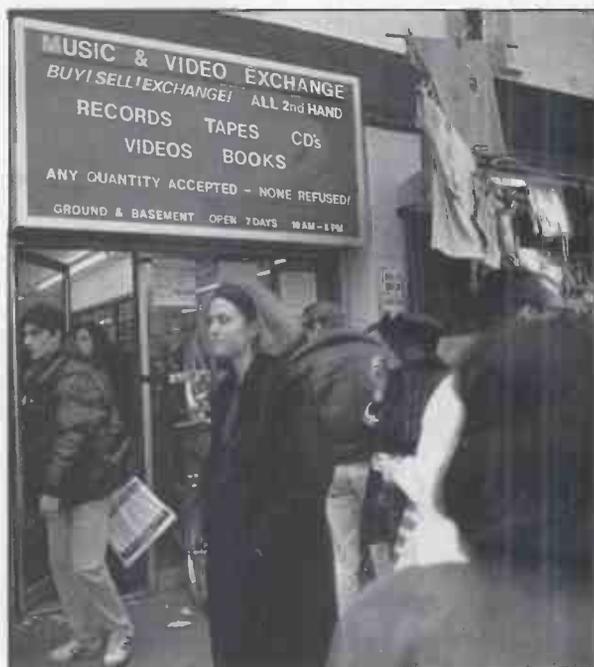
spective of worth and condition, in at least their Camden shop, they have a basement section for all of the very cheap records. Here you will find some of the most obscure, completely decimated and worst albums that have ever been sold. However, there are also some real classics from about 10p upwards. Rod Stewart fans are particularly well catered for, as is most mid-seventies glam-rock.

Back upstairs I found every rock album I could think of, and whilst the prices were not brilliant, they were made up for by the tremendous range of material on offer. Soul (dance) and jazz were less in abundance but there was still a healthy collection. The staff at the Record and Tape exchange, despite being the hippest people in the universe, are also the least helpful. I think it's a job requirement, but at least adds to the fun

Cheapo Cheapo Records are not, surprisingly, very cheap. Whilst they carry a huge quantity of records, their contemporary sections in particular are quite limited in scope. They very rarely have recently released albums and do not seem to base their stock on popularity. However, I did find some good things, and Cheapo prices are second to none. Most records were around £2 to £3 and whilst they do not appear to operate a grading system, most were in the top three categories in terms of condition. By far the most impressive thing I found was the classical section -

which was very comprehensive and very well stocked. I bought a Stravinsky box set of all three ballets - for £6, Faure's Requiem Mass for £2 and Strauss Last Four Songs - Jesse Norman - for £2.50. All were immaculate, and had I been richer at the time, I would have bought a lot more. The owner of the shop is, judging from his manner, deeply dissatisfied with the world, but very knowledgeable and happy to help; well, maybe not happy but helpful anyway. Cheapo also stay open until ten o'clock every night ●

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Here's a selection of articles appearing in the June issue of

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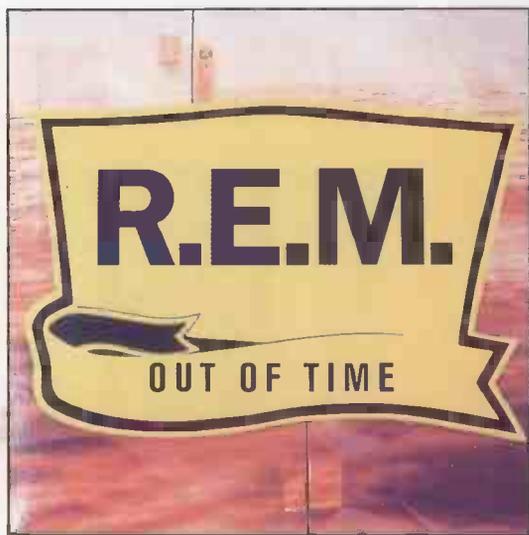
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**What started like a poor month,  
with no glut of exciting releases,  
turned out well in the end,  
thanks in particular to a  
marvellous R.E.M. disc. And for  
the would-be young at heart we  
found Carter, the Unstoppable  
Sex Machine.....**

# malcolm steward



★ RECORD OF THE MONTH

## R.E.M. Out of Time

WARNER BROTHERS 7599-26496-1

★ Risking allegations of xenophobia I'll admit that I still think that Britain has the beating of America when it comes to giving birth to the cream of rock and pop bands. There are exceptions to the rule, of course, and when the U.S. turns out a good band it's often a very good band. Little Feat - when Lowell George was still alive - have to be considered as one of the world's finest, and more recently the likes of the B-52's have shown that imagination and innovation aren't the sole preserve of the United Kingdom. It's also impossible to ignore the Violent Femmes and the band featured here, R.E.M.

Hailing from Athena, GA., which is also home territory to the B-52's R.E.M. has watched its audience and popularity

grow to worldwide proportions since the 1989 breakthrough album "Green". Thankfully, having been rewarded with universal applause hasn't diluted the band's music. Talking of the latest LP "Out Of Time" singer Michael Stipe commented that "Music which doesn't include elements of extreme happiness, as well as sadness, beauty, anger and violence is not worth doing. For us the constants are the same. It's only the strategy that changes from album to album... and song to song".

Other R.E.M. admirers have passed opinion that this new LP is unlike all the rest, though quite in what way they find difficult to articulate. For me that's not the case: it's more a simple transformation of the same formula, a different expression of the same fundamental ideas. As their record company's press release puts it, "Out of Time" is the surprise we've all been waiting for".

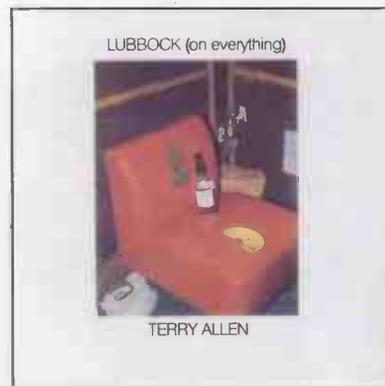
So how did this 'surprise' come about? The band's Peter Buck explained: "Our listening interests have always been wide-ranging. It's just that in the past five years we've gotten the courage to approach other forms". The four musicians decided to explore and expand their repertoire, but with the music leading whatever they did. This decision was compounded by R.E.M.'s end-of-the-decade success, the realisation that they were indeed successful enough to contemplate some experimentation. After a punishing round of constant touring the band returned to Athens to rehearse but this time they swapped instruments: Bill Berry switched from drums to bass, Mike Mills played organ instead of bass, and Peter Buck played "anything but electric guitar". Buck added "There were things we'd always wanted to try, and there was an unspoken assumption that we'd use more strings this time around. While we're not country musicians or blues players we wanted to take some of those elements back to what we were doing."

"We wanted to get away from songs that sounded the same." says Mike Mills. "It wasn't diversity for its own sake, more just the chance to entertain ourselves by doing what we thought might work. We tried to figure out what the songs needed instead of just assuming they would fit into a standard rock and roll arrangement". The approach necessitated the inclusion of extra musicians - guitarist Peter Holsapple, saxophonist Kidd Jordan, the B-52's Kate Pierson, rap artist KRS-I, and members of the Atlanta Symphony Orchestra. Lyricist Michael Stipe made a conscious effort not to write his more usual political songs. Instead he chose to try writing love songs - something he'd never attempted before.

The result has been a complete success. In fact this is one of the most uplifting albums I have heard: period. A vein of wonderful lyricism and an utter disregard for pop convention pervades the whole disc, and the variety therein is captivating. The mix of funk and pastoral elements on "Radio Song", the passion

of "Losing My Religion", the sheer pop simplicity of "Near Wild Heaven", the brooding aura of "Low", and the lilting boppiness of "Shiny Happy People" contribute to a celebration of all that's wonderful in contemporary music.

This LP should carry a warning sticker which reads "Buy this LP or die in ignorance of how marvellous 'pop' music can be".



**TERRY ALLEN**  
**Lubbock (on everything)**  
SPECIAL DELIVERY SPDCD 1007

● Originally released in 1979 on Fate records, Special Delivery have brought Texan, Terry Allen's unique approach to the country music genre to Compact Disc for its first outing. Critical acclaim has rapidly ensued from all quarters: the NME described him as "Country Music's prime ironist and lyrical bootboy", The Catalogue noted that "Lubbock" was "the finest country record ever made", and The Guardian considered that it would "tell you more about America than the guide books". High praise indeed, and justifiably deserved in my opinion - and regular readers will know that I'm not exactly enamoured with most examples of Country music.

What this album shows is that it's unwise to dismiss any musical style wholesale, and that all types of music break down into two simple categories - good and bad. It seems to me that Country music just has far too big a helping of the latter. Terry Allen's independent style remains true to the roots of the genre but his songwriting exhibits an intelligence, humour and perception so often missing in mainstream Country.

This particular album is regarded as a classic by aficionados and contains some great material, including "New Delhi Freight Train" which was covered by Little Feat on their LP "Time Loves A Hero". I figure if a songwriter could impress Lowell George sufficiently for him to want to cover one of his songs then he has to be worth taking a listen to. If you fancy expanding your horizons try "Truckload of Art" - you'll never hear Tammy Wynette singing about the rivalry between East and West coast art factions! And thankfully you won't hear Terry Allen imploring you to Stand By Your Man And Show The World You Luuurve Him. Country music needn't make you retch.



**THE FARM**  
**Spartacus**  
 PRODUCE RECORDS MILK LPI

● I wouldn't normally buy an album by a pop band like The Farm but their recent singles "Groovy Train" and "All Together Now" had such insistent melodies and compulsive rhythms that I found myself singing them perpetually. I imagined that if I bought the LP I might exorcise this musical demon. It hasn't worked yet. If anything the possession is strengthening its hold - the LP came with a limited edition freebie, a six track remix version which I've now started playing regularly too.

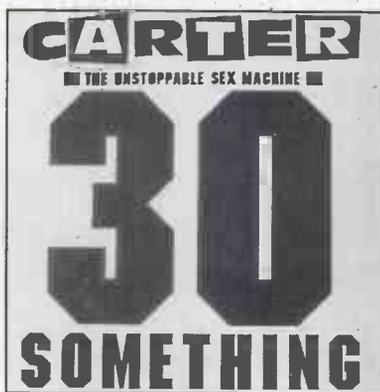
Essentially this is music to have harmless fun by. Cerebral it isn't. It's about as profound as Benny Hill. So if you're looking for music to stimulate a deeply emotional or spiritual experience, look elsewhere. The cover proclaims that it's "100% groovy" and that says it all. Music with an infectious dance beat but nothing that will make you sweaty - even if you don't remove your Woolworths anorak during sessions of getting down.

The best track is undoubtedly the aforementioned "All Together Now" and I wonder if anybody else has spotted the melodic similarity between it and Pachelbel's Canon? Is this similarity accidental or do they dig 17th Century music down on The Farm?

**THE SILENCERS**  
**Dance to the Holy Man**  
 RCA PL74924

● It's interesting to observe how at various times different parts of the country seem to erupt with talent. Currently it's a wave of bands from Manchester who have been gaining all the attention. A while back Scotland had its day and The Silencers were in the vanguard of that particular surge of creativity. The band's first two albums impressed me with their clearly defined style of songwriting and performing. I decided to take the plunge and buy their latest offering. This shows that The Silencers have refined and developed their act without sacrificing any of the individuality which marked them out as being a decidedly cut above average guitar band.

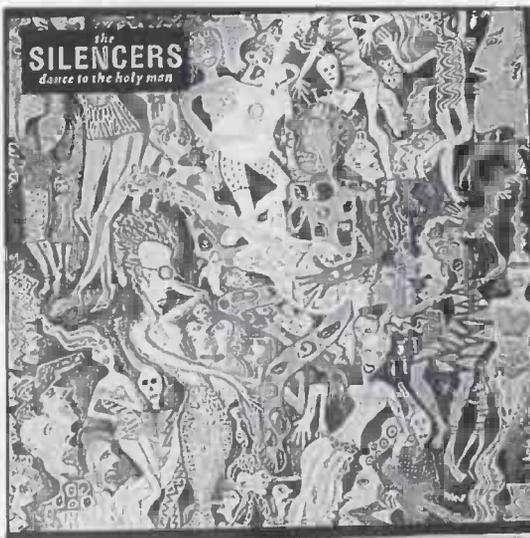
What I find appealing about it is how the group manage to sound obviously Gaelic without resorting to trite measures like the tiring monotony of Big Country's bagpipe-guitar anthemising. The Celtic influences are naturally apparent but exercise themselves more subtly. There is a pleasant balance to the songs on this album whose variety - spans from the virtual sixties' rock'n'roll parody which is "Hey Mr. Bank Manager" to the spartan, atmospheric and almost folkly "When The Night Comes Down". Straddling the two extremes are pan-cultural hybrids like "Electric Storm" which is driven along by a peculiar Highland-funk bass line. If you dislike bands who are instantly reminiscent of others, The Silencers offer a brief respite.



**CARTER THE UNSTOPPABLE SEX MACHINE**  
**30 Something**  
 ROUGH TRADE R201 | 2701

● Thirty-somethings everywhere will appreciate the opening to Carter USM's aptly titled LP. A voice heavy with resignation intones "When you're younger you can eat what you like, drink what you like and still climb into your twenty-six inch waist trousers and zip them closed. Then you reach that age... twenty-four, twenty-five, your muscles give up, they wave a little white flag and without any warning at all you're suddenly a fat bastard... YOU FAT BASTARD, YOU FAT BASTARD...". Enter chainsaw guitar and pounding drumbeats. So begins "Surfin' USM!", a modernist melange where Euro-disco collides with the Clash.

Carter USM are relentless, almost frenetic but this LP contains no mindless post-punk thrash. Jim Bob and Fruitbat, who wrote and perform Thirty Something in its entirety, show themselves to be intelligent individuals whose occasional sinking into musical cliché is rescued by deft, witty and perceptive lyric-writing. Brilliant couplets and stinging observation abounds. In "My Second To Last Will And Testament" (only a rough draft, a hand-written estimate) the singer pleads "Give my body to medical science, if medical science will have me, they can take my lungs and kidneys, but my heart belongs to Daphne". Inspired stuff in places but not late night listening. Wake up to it instead and start the day on a tsunami of adrenalin.

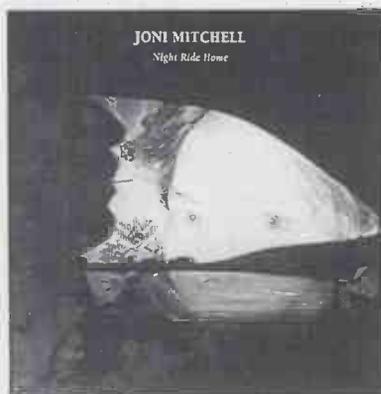


**JONI MITCHELL**  
**Night Ride Home**  
 GEFEN 9 24302 |

● I've just realised how many of the musicians I admire have also pursued careers in other areas of the arts. Terry Allen, whose LP is reviewed here this month, is also a respected painter and sculptor; Don Van Vliet (Captain Beefheart) also knows his way round a canvas; and so does Joni Mitchell. On the evidence of much of her musical output over recent years one could be unkind and suggest that she might have been better employed spending her time painting rather than recording. I always found her early songs far more appealing than her latter-day, more contemporarily-influenced work, and it's to the former that I always turn when I want to enjoy her music.

"Night Ride Home" is in no way retrospective but it has the sparser, more communicative feel that those early albums displayed. It has an intimacy and directness that focuses the attention on Mitchell and her lyrics, and the contributions of the small group of select musicians supporting her complement rather than intrude upon the songs. (For name-spotters the line-up here includes a nucleus of husband Larry Klein on bass, Alex Acuna on percussion and Vinnie Colaiuta on drums, with guest appearances from Wayne Shorter, Michael Landau and Brenda Russell.)

The album's lyrical mood is generally personal and reflective and Mitchell's voice seems mature and confident. The recording shows none of the stridency some of her albums have exhibited. This makes listening to it seem rather like having a welcome conversation with an old friend to whom you've not spoken for ages.



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## LUDWIG VAN BEETHOVEN

Piano Concerto No3 in C minor  
Op37/Piano Concerto No4 in G  
op58

Julius Katchen, piano; London  
Symphony Orchestra, conducted by  
Pierino Gamba

PWK CLASSICS PWK1153 (AAD/68.14)

● When he recorded these concertos in 1959 (No3) and 1963 (No4), Katchen was at the peak of his career as a soloist and was established as a peerless interpreter of, especially, Brahms. His Beethoven however was uneven, as this reissue demonstrates. The playing of the Third Concerto, which brings an unashamed romanticism to the slow movement that is unfashionable today, is wholly enjoyable. The first movement lacks a little urgency at the outset but recovers its momentum, and the finale sparkles. And, technically, there is little wrong with the performance of the Fourth Concerto, but comparisons with the best of modern versions (Ashkenazy, Perahia) and, certainly, Katchen's contemporary, Wilhelm Kempff, reveal it to be rather prosaic.

When sourcing these tapes from the Decca archives, PWK Classics (the 'historical' side of the Pickwick label) would have done better to pair the Third with Katchen's recording of the Second, which I recall as being very fine indeed. There is also a lot less competition to face in the B flat concerto.

Both recordings have the kind of natural warmth and perspectives which characterized Decca's recordings in the late 'fifties and early 'sixties and have predictably transferred very satisfyingly to CD. The disc comes at mid-price, but then so does Kempff in DG's Galleria series. And, if forced to choose, that is where my vote would have to go.

## TOMAS LUIS DE VICTORIA

Tenebrae Responsories (1585)  
The Tallis Scholars, director Peter  
Phillips

GIMELL CDGIM022 (DDD/65.57)

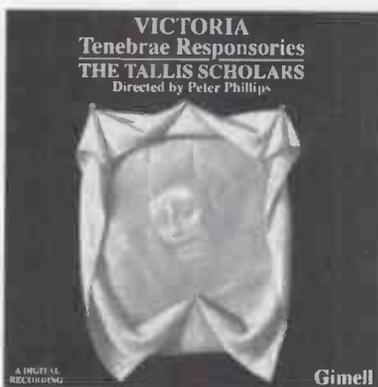
● Born in the Spanish city of Avila in 1548, Tomas Luis de Victoria devoted his musical gifts almost entirely to sacred music. He worked much of his life in Rome, being ordained as a priest and becoming one of the masters of unaccompanied Renaissance polyphony, on a par with Palestrina, Lassus, Byrd and Tallis. Among the works which have earned Victoria this status are his Requiem of 1605 (for me, the apex of music from this period) and the fullest cycle of any Renaissance composer of music for the offices of Holy Week.

The Officium Hebdomadae Sanctae, to give it its proper title, contains settings of the eighteen Responsories for Maundy Thursday, Good Friday and Holy Saturday and it is these, published in Rome in 1585, the Tallis Scholars have now added these to their very fine recording of the Requiem which appeared in 1988.

Originally, the Responsories would have been sung during Matins, but by Victoria's time they had become part of the evening office of Tenebrae, when one-by-one the candles lighting the church were extinguished. The last flame to be put out represented Christ himself, and the ensuing darkness that of the Crucifixion and entombment.

It is not difficult to imagine what a deeply-affecting service this must have been, and how five centuries ago, Victoria's music would have charged the atmosphere with its incandescent, fervent mysticism and barely constrained emotion. Not for him the serenity of Palestrina when contemplating Christ's Passion, but the opportunity for the kind of word-painting that heightens the impact of the more telling phrases. Parallels between Victoria's music and the paintings of his contemporary and countryman (by adoption), El Greco, are entirely apt.

As ever, the Tallis Scholars' performance effectively argues the greatness of this music. It isn't simply a question of precision and purity, or of the natural clarity and ambience of the sound, but an overwhelming understanding of what Victoria set out to convey four hundred years ago and whose impact remains undiminished. Perhaps the Westminster Cathedral performance on Hyperion has the edge in intensity, but the Tallis's approach is never cool. It is also never less than convincing and compelling.



**Music for catholic tastes, and  
music for Catholic worship**

**feature in this month's**

**reviews. The Christian**

**liturgy has inspired**

**composers of every**

**generation, witness Arvo**

**Part's recent, deeply-moving**

**setting of the St John Passion.**

**In the 16th century, the**

**Spaniard, Tomas Luis de**

**Victoria, devoted his entire**

**career to sacred music of**

**almost mystical intensity; this**

**century, the tragic death of a**

**friend inspired the French**

**composer, Francis Poulenc, to**

**unaccompanied choral music**

**of jewel like perfection. And**

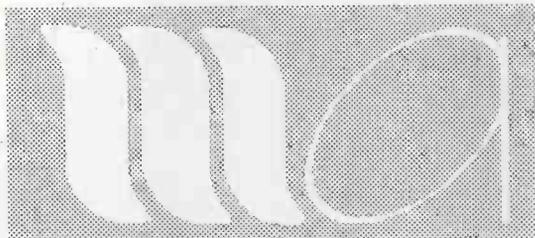
**then there was Anton**

**Bruckner, whose symphonies**

**are religious experiences in all**

**but name.**

*peter  
herring*



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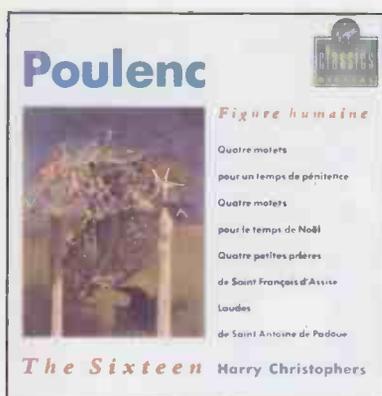
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The Sixteen, director Harry Christophers

VIRGIN CLASSICS VC 7 91075-2 (DDD/62.15)

● It took the sudden death of a close friend to move Poulenc to applying his musical talents to sacred music. Later, he acknowledged, "I think, in fact, that I've put the best and most genuine part of myself into it." Despite the motivation for the compositions, they are anything but gloomy and lugubrious, as those who attended the concert by The Sixteen, given at St John's, Smith Square in February and enterprisingly sponsored by Technics, will have discovered to their delight. Both the concert, and this recording (a thrillingly atmospheric production from Snape Maltings), have established the versatility of the choir founded by its director, Harry Christophers, in 1977. Until now, The Sixteen greatest accomplishments had been in the music of the Renaissance and the Baroque. Now, it is bringing the same precision, clarity and tonal beauty to the bright, bitter-sweet harmonies of Poulenc and his richly sensual, highly melodic treatment of a variety of sacred texts. The joyful wonderment of the Christmas motets is contrasted with the fervour of the St Francis prayers and the moving nobility of the Penitential Motets (the second of which, 'Vinea mea electa', is graced by a quite unforgettable melody).

Harry Christophers and his colleagues preface these performances of four sacred works with equally persuasive singing of one of Poulenc's secular masterpieces, the wartime cantata 'Figure Humaine'. Sacred or secular, it is to be hoped this will not be the last we will hear of them in the music of this highly individual composer.



## WILLIAM WALTON

Hamlet: A Shakespeare Scenario/As You Like It: A Poem for Orchestra after Shakespeare  
Sir John Gielgud, narrator; Catherine Bott, soprano;  
Academy of St Martin in the Fields, conductor Sir Neville Marriner  
CHANDOS CHAN8842 (DDD/51.44)

● Olivier readily acknowledged the important part played by Walton's music in his 1944 production of 'Henry V' - and who could fail to notice how much the score contributes to the impact of the Agincourt battle scene for example. Four years later, Walton again collaborated with Laurence Olivier, this time on Hamlet and the music that resulted is, if anything, even finer and more substantial. While still keeping the relationship between film and music firmly in view, the greater profundity of 'Hamlet' seems to have released Walton to make a more subjective input, especially in the 'darker' music. It is certainly a masterly score, and wholly characteristic of the composer.

Christopher Palmer has assembled the 'Hamlet' music into a very effective 'Shakespeare Scenario' lasting nearly forty minutes. It makes an impressive inauguration of Chandos's series, featuring all of Walton's film music. Two texts are included from the play, both read in his inimitable style by Gielgud.

Walton first worked with Olivier on 'As You Like It' in 1936, but this production enjoyed nothing like the success of the later Shakespeare films. Walton's approach to the score was much more orthodox, although it included a delightful setting of 'Under the Greenwood Tree' (sung here by Catherine Bott) which was inexplicably omitted from the final screen version. Here, though, it is rightly restored as the centrepiece of Christopher Palmer's arrangements, which add up to a 12-minute 'Poem for Orchestra'. It makes a pleasing contrast to the cerebral music for 'Hamlet' and, like that, is splendidly played by a much-augmented Academy of St Martin's. The recordings of both works are stunning.



## WOLFGANG AMADEUS MOZART

Lieder and concert arias  
Elisabeth Schwarzkopf, soprano;  
Alfred Brendel, Walter Gieseking, pianos; London Symphony Orchestra, conductor George Szell  
EMI REFERENCES CDH 7 63702 2 (ADD/70.40)

● While Schwarzkopf's career will always be remembered for her achievements in the music of Richard Strauss and Hugo Wolf, and in some of the finest recordings of operetta ever made, that radiant soprano voice was to prove surprisingly sensitive to the more delicate nuances of Mozart. This issue in EMI's historical References series brings together recordings made thirteen years apart.

The sixteen Lieder were taped at Abbey Road in 1955 with Walter Gieseking showing that he was as fine an accompanist as he was soloist. There is the translucency and subtle appreciation of weight and colour here that you would expect from a supreme interpreter of Debussy.

Mozart's songs call for little in the way of florid display, just the kind of understanding of their simple beauty that is so evident here. The recording is wholly acceptable for its vintage.

Thirteen years on, EMI recorded Schwarzkopf with Szell and the LSO in a selection of concert arias, originally partnered by some Strauss Lieder. The playing, like the sound, was sumptuous, with no less than Alfred Brendel contributing the piano obligato in a superlative performance of 'Ch'io mi scordi di te'. Schwarzkopf was in magical voice (this was also the year of her unforgettable recording of Richard Strauss's 'Four Last Songs') and I doubt we will hear finer Mozart singing and playing in this bi-centenary year. And if you want to hear why recording connoisseurs still talk fondly of that 'Kingsway Hall sound'...

★ **RECORD OF THE MONTH**

How the Bruckner discography has been enhanced in recent months (though, mercifully, we shall be spared the situation where - as with Mahler - every conductor feels it is his right to inflate the catalogue with yet another cycle of the symphonies). Eloquent and fear-somely penetrating interpretations of the Seventh and Eighth Symphonies marked the culmination of the career of Herbert von Karajan; Riccardo Chailly proved himself capable of maintaining the Concertgebouw's Bruckner tradition with a superb Fourth; there were magisterial live recordings of the Eighth and Ninth by Gunter Wand; and welcome appearances on CD for Jochum's Fourth, Klemperer's Sixth and Walter's Ninth. Now comes what must surely be the finest recording of the Third to have appeared in recent times.

outpourings of a nervous, hyper-sensitive village organist who worshipped at the feet of Wagner. No matter that his symphonies have their naive aspects: the repetition of phrase and the awkward discontinuities, these can be readily transcended in the finest performances.

And there, perhaps, lies the rub. It has never been enough to play Bruckner well; it has to be played with a large measure of understanding and total conviction. Which is why only comparatively few conductors have ever excelled in interpreting Bruckner. If there was ever any question that Bernard Haitink was one of that select group, it will surely be dispelled by this recording of the Third Symphony, the most revised of them all.

Bruckner began the work in February 1873 and had completed a first draft of the orchestral score by July. It was four years before the chance came to perform it, but the composer's conducting of the

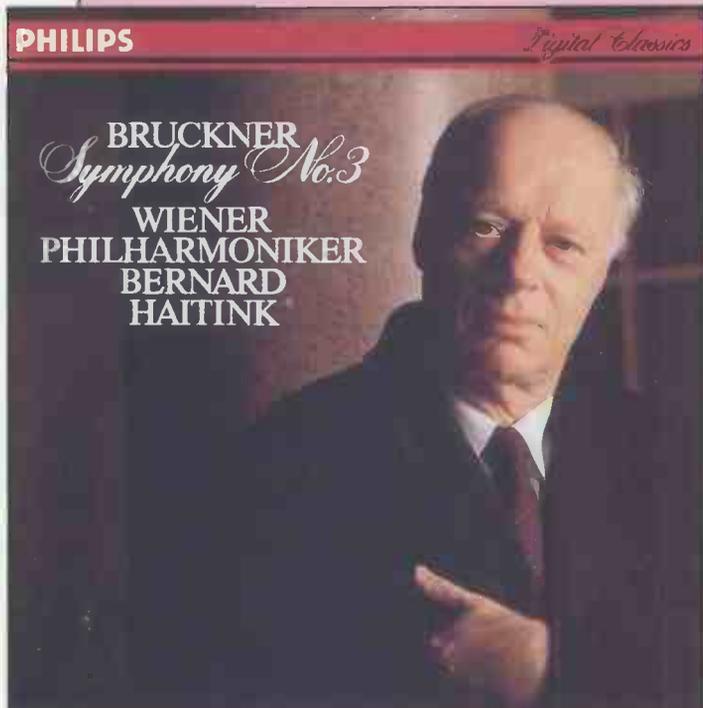
premiere was a shambles. It was not until Hans Richter's performance of 1890 that the stature of the work was finally revealed.

Bruckner had revised the score in 1876-77 and again in 1889-90 and it is the first of these editions that Haitink has selected, surely rightly.

Even the most ardent Bruckner enthusiast would not deny that the structure of the third has its weaknesses, but the work maintains an inexorable progress from tremulous opening to triumphant conclusion. Any flaws pale into insignificance in the face of playing

and conducting such as heard here.

It is appropriate that Haitink's new recording has been made with the Vienna Philharmonic: it was the VPO's Otto Dessoff who turned the work down in 1874 (as he had done the First and Second Symphonies). Hearing the VPO in this magnificent Philips production, you could be forgiven for thinking that the orchestra wanted to belatedly make up for the harsh judgements of its erstwhile chief conductor. With its combination of beauty, precision, passion and whole-hearted involvement, I do not expect to hear much better orchestral playing than this, or a more persuasive interpretation. And Volker Straus's production allows the performance just the kind of expansive, full sound stage it requires. Record of the month, and a surefire contender for record of the year, too.



**ANTON BRUCKNER**

Symphony No3 in D minor  
Vienna Philharmonic Orchestra, conductor Bernard Haitink  
PHILIPS DIGITAL CLASSICS 422 411-2  
(DDD/61.41)

● He was gauche, ingenuous, and socially inept; so desperately unconvinced of his own abilities that he endlessly revised his works in response to the most ill-judged criticism. Yet Anton Bruckner, son of a schoolmaster from Ansfelden near the Austrian city of Linz, had it within him to create music of epic scale and powerful spiritual intensity. There are passages, notably in the Fourth, Seventh, Eighth and Ninth Symphonies when Bruckner, for me, comes closest of any composer to unlocking the gates of heaven. It is music of near religious ecstasy, the visionary



**ANTONIN DVORAK**

Serenade for Strings in E Op22  
JOSEF SUK Serenade for Strings in E flat Op6

**LEOS JANACEK**

Suite for Strings  
Granada Chamber Orchestra,  
conductor Misha Rachlevsky  
CLAVES CD50-9013 (DDD/79.05)

● Founded in 1989 by its Soviet-born chief conductor, Misha Rachlevsky, this Spanish ensemble has rapidly acquired a formidable international reputation. It certainly offers fine, spontaneous playing in this triptych of string works by Czech composers.

The programme is also a welcome break from the traditional couplings which usually pair the Dvorak work with the Tchaikovsky Serenade or his own Op44. Full marks to Claves here for an imaginative and generous selection.

The Dvorak of course is essential to any classical collection, if only because it counts among the most cloud-free music ever written. Right from its delicious opening, there is happiness in every bar and the fund of melodies to be expected from this incomparable tunesmith.

Yet the other two works are not overshadowed. The Janacek is a taut, incisive work in six short movements, one of his first compositions of note and a conscious break with the Romantic tradition. Its darker, plaintive elements mark it out as a work of considerable depth and a good emotional foil for the Dvorak.

Josef Suk was a pupil of Dvorak (he also became his son-in-law) so an influence is only to be expected. But his Serenade also has a symphonic feel redolent of Brahms and, if more restrained and less original than the other works here, still earns its place on merit. A well-planned recital, finely played and recorded.

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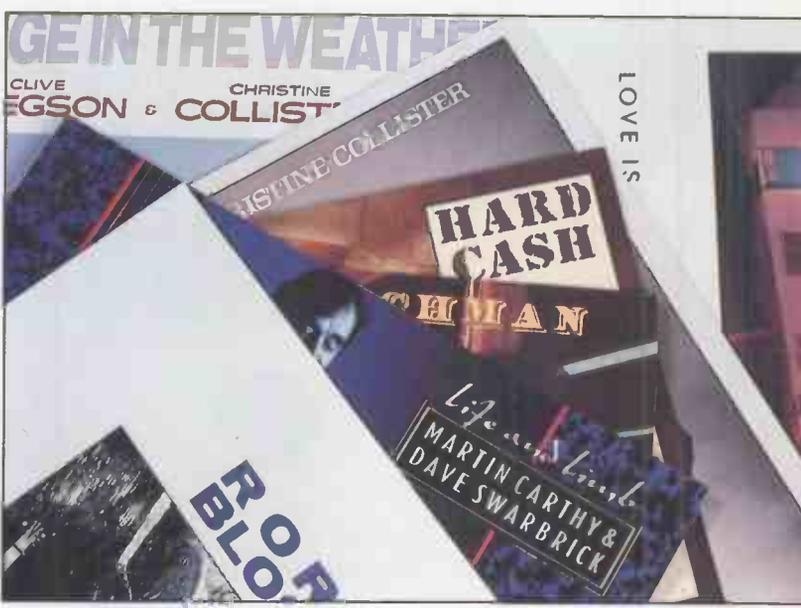
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