

£2.95

DECEMBER 1988

HI-FI CHOICE

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

10 TUNERS
UNDER REVIEW

72 CASSETTE DECKS
-SUMMARISED

LISTENING TO 5 HIGH QUALITY
LOUDSPEAKERS

ASPIRATIONS
- HI-FI IN THE HOME

45 TURNTABLES AND
25 TONEARMS - SUMMARISED

114 CARTRIDGES
- SUMMARISED

74 CD PLAYERS
- SUMMARISED

117 LOUDSPEAKERS
- SUMMARISED

PERSPECTIVES
- SATELLITE TV EXPLAINED

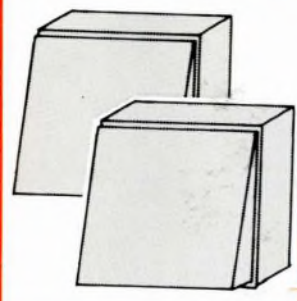
144 AMPLIFIERS
- SUMMARISED

20 CD MIDI SYSTEMS ON TEST

TEST SUMMARIES ON OVER 800 HI-FI PRODUCTS

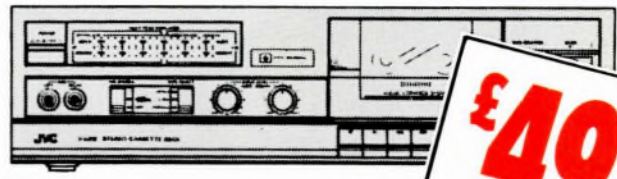
The Original

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



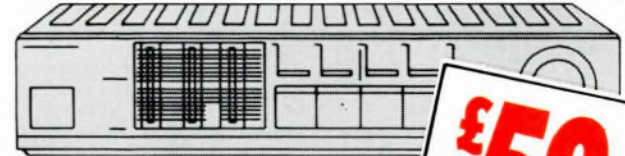
FISHER STEM77 ●Bookshelf or extension speakers ●35 watts power handling ●Black finish ●Spkr wire supplied ●W170 x H190 x D190

£9
Per pair



JVC TDX102 Cassette Deck ●Dolby B NR ●S/N 58dB ●Crosstalk (1kHz) 60dB ●Freq resp 40Hz-15KHz ●Black finish ●Metal ●435 x 115 x 237 (Also TDX202 £89.95)

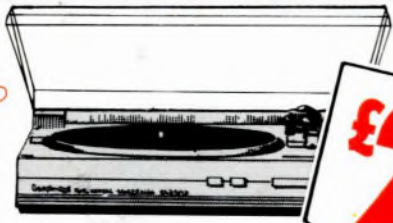
£49



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

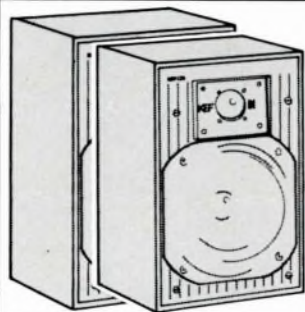
£59

FACTORY REPACK



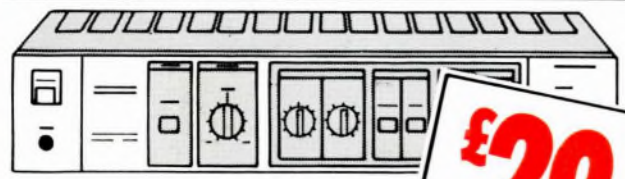
GOODMANS GSP308 turntable ●Belt drive ●DC motor ●static balance tonearm ●W&F 0.1% ●Black finish ●345 x 92 x 324 ●Cart £5 extra.

£29



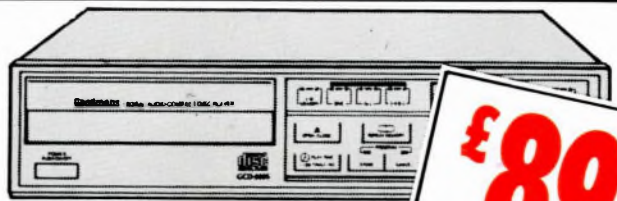
KEF C10 Speakers ●60 watts per channel ●Shelf or wall mounting ●Impedance 8ohms ●Rosewood or walnut finish ●W205 x H300 x D172 (Also C20 £99pr., C30 £119pr.)

£59
Per pair



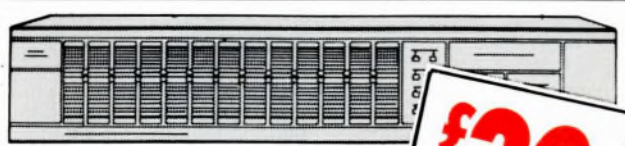
SANYO JA220 Amplifier ●20 watts per channel ●THD 0.9% ●Freq resp 20Hz-20,000Hz ●Silver/black finish ●420 x 80 x 220

£29



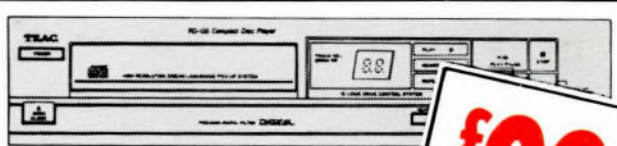
GOODMANS GCD500S Compact Disc ●LED digital display ●Music search ●Fast forward/rev ●Black finish ●Repeat/memory function ●350 x 80 x 310

£89



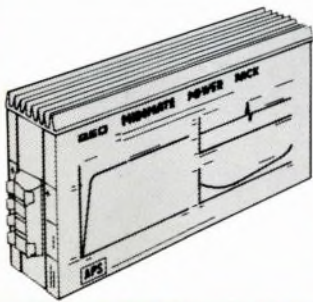
GOODMANS GSQ5200 equaliser ●12 bands ●12dB cut/boost range ●LED illuminated controls ●Black finish ●345 x 65 x 278.

£39



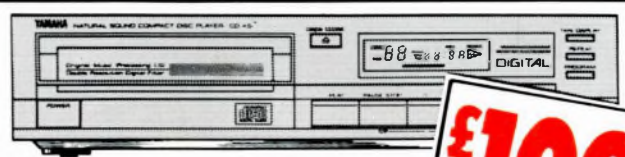
TEAC PD-135 Compact Disc ●Digital display ●16 random programme memory ●16 bit linear ●3 way repeat ●Black finish ●435 x 85 x 290

£99



QED MIDIMATE Power Amp ●40 wpc ●Add-on power & sound quality booster for midi or rack systems ●Boosts by up to 4 times normal power ●Black finish ●265 x 62 x 132

£39



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

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REINDEER'S MOUTH..



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A handpicked selection of the magazines recommendations, independent reviews and our considerable experience of value for money quality product, at typical Richer prices

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KENWOOD

NAD 5120
 £89.95
 Free Cart.
NAD

DUAL CS503 I
 £109.95
Dual

DUAL CS505 III
 £134.95
Dual

ARISTON 'Q'
 £144.95
ARISTON

CASSETTE DECKS

SONY TCFX150
 £89.95
SONY

AIWA ADF360
 £99.95
AIWA

YAMAHA KX200
 £119.95
YAMAHA

ONKYO TA2120
 £119.95
ONKYO

DUAL CC8010
 £119.95
Dual

NAD 6220
 £149.95
NAD

KENWOOD KX660HX
 £169.95
KENWOOD

MARANTZ SD45 II
 £199.95
marantz

COMPACT DISCS

MARANTZ CD273
 £129.95
marantz

ROTEL RCD820
 £139.95
ROTEL

YAMAHA CD29
 £169.95
YAMAHA

DUAL CD1030RC
 £169.95
Dual

KENWOOD DP880
 £249.95
KENWOOD

MARANTZ CD65 II
 £249.95
marantz

MARANTZ CD65 II SE
 £299.95
marantz

TUNERS

KENWOOD KT660L
 £129.95
KENWOOD

NAD 4220
 £139.95
NAD

ROTEL RT850AL
 £159.95
ROTEL

HITACHI FTMD5500
 £169.95
HITACHI

AMPLIFIERS

ROTEL RA810A
 £99.95
ROTEL

YAMAHA AX300
 £99.95
YAMAHA

ROTEL RA820BX2
 £109.95
ROTEL

NAD 3020E
 £119.95
NAD

KENWOOD KA550D
 £129.95
KENWOOD

ACOUSTIC RESEARCH A05
 £169.95
AR

SPEAKERS

GOODMANS MAXIM II
 £69.95 Pr
Goodmans

VIDEOTONE MINIMAX II
 £79.95 Pr
VIDEOTONE

ROTEL RL810
 £99.95 Pr
ROTEL

ROTEL RL850 II
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ROTEL

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TANNOY

TANNOY M20 GOLD II
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TANNOY

MISCELLANEOUS

BEYER headphones
 £4.99
Beyer

AUDIO TECHNICA AT95E cartridge
 £9.99
audio-technica

ORTOFON OMP10 cartridge
 £9.99
ortofon

GOLDRING EPIC cartridge
 £12.95
GOLDRING

ORTOFON VMS20 cartridge
 £17.95
ortofon

SENNHEISER HD420SL II headphones
 £39.95
SENNHEISER

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

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BRISTOL: 20 Cotham Hill Tel: 0272 734397 50yds Clifton Down Shopping Centre. Opposite 'Crookers' Pub.
CARDIFF: 5 Central Square Tel: 0222 383311 Near the train and bus stations.
EDINBURGH: 1b Chambers Street Tel: 031 226 3544 Near the Royal Scottish Museum
GLASGOW: 24 Gordon Street Tel: 041 221 9147 Near the central station
LEEDS: 55 The Headrow Tel: 0532 455717 Opposite Lewis's dept. store
LIVERPOOL: 69B Church St. Tel: 051 708 7484 Corner of Parker St.
LONDON: 2 London Bridge Walk, SE1 Tel: 01 403 1201 (10 lines) 403 4710 On the walkway (not in A-Z) over Duke St. Hill.
STOCKPORT: 4 Wellington St. Tel: 061 480 1700 100yds. Stockport Station (opp. Station Approach) 10yds off the A6.
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WE LOOK FORWARD TO SEEING YOU!

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

HI-FI CHOICE

ISSUE NUMBER 65: DECEMBER 1988



Cover photograph of the Goodmans 5300 CDM (see page 64) by Chris Richardson.

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BACK ISSUES

Fill in this page for back issues of the World's No. 1 guide to buying hi-fi.

MENU

I couldn't help but feel sorry for our reviewer, Alvin Gold, when I saw the stack of boxes which had arrived at our photographic studio. Have you any idea what 20 packaged-up midi systems look like? I counted almost 100 boxes – two Transit van loads. Where had Alvin been keeping them all these weeks? Had his family been relegated to a tent in the back garden?

Testing 20 midi systems is a mammoth task but, as usual, Alvin has done a thorough evaluation of each one and found that sound quality varies enormously from one model to another – sometimes even when different systems come from the same manufacturer. If you're shopping around for a compact all-in-one system this Christmas you owe it to yourselves to take the time and trouble to listen to a few before making a choice. Don't be wooed by the sight of sophisticated-looking 'graphic equalisers' and loads of flashing lights; it's the *sound* of the system that counts. And if your local shopkeeper is reluctant to provide proper demonstrations of various systems, our advice would be to take your business elsewhere.

Also in this issue we've reviewed a handful of separate tuners, tested by Norman McLeod. Being as he's a broadcast engineer, Norman's first question when looking at a tuner is, "How well does it work as a radio?" All the models have undergone thorough lab testing, after which they've been auditioned by a listening panel to evaluate sound quality. We're sure you'll find the reviews interesting reading.

Next month's major review project is loudspeakers – essential reading if you want to improve on the often mediocre speakers which come supplied with midi systems! Paul Messenger has been busy supervising the laboratory measurements and listening tests on 30 new models – so busy, in fact, that he's not had time to do his usual Personal Messages column this month. With apologies, he promises that all will be back to normal for our January issue.

In addition to the results of our tests on loudspeakers, next month's issue will also include reviews of 10 CD Personal Stereos.

John Bamford

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06273

SELECTOR

Class: High (CrO₂)
EQ: 70µs

(90min)

(45min.)

Compact
Cassette

Input: -20dB

Frequency response



1kHz: +5.0dB (0dB=250nWb/m)
-61.0dB (TRACK WIDTH 0.6mm)

TDK CORPORATION

W. U.K.

SA-X 90

IEC II/TYPE II
HIGH
POSITION

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

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

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

Look out for the new wrappers and improved shell design too.

Put an SA-X in your player and we think you'll agree that the results, quite simply, are stunning.



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

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

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

 **TDK**

The dream midi (for those who wouldn't dream of buying one).

Pioneer's new System 300 looks like a midi system. Yet it sounds like the highest quality separates.

Which isn't surprising when you discover that it's composed entirely of top quality Pioneer components in a space-saving midi format.

Remote control adds to the convenience (and the motorised volume control means no loss of sound quality).

These other features might make you think again about buying a midi:

- Optional matching 6 disc CD multiplay
- Top quality Prologue speaker technology
- Computer controlled tuning system (CCTS)
- High specification integrated amplifier.

Call Teledata on 01-200 0200 for further information.

 **PIONEER®**

Wait 'til you hear Pioneer



System illustrated shows optional compact disc player and graphic equaliser.



PRODUCTS

BOXES OF BLACK STUFF

Cambridge Audio has produced two digital to analogue converters for CD players. The add-on decoders are the £299 *DAC3* and the £450 *DAC2*. They are designed to be compatible with all CD players and according to Cambridge will cope with all sampling frequencies. The *DAC3* is a 16-bit 8x oversampling unit with two digital inputs (for CD and DAT) and a volume control allowing direct coupling to a power amplifier.

The more expensive 16-bit 16x oversampling *DAC2* is heralded to "even improve the sound quality of the Cambridge *CD2* player". This has four inputs for digital sources as well as two digital outputs. It also boasts "total independence" from the mains by virtue of two transformers with isolated power supplies. The *DAC3* offers a headphone socket which is driven by a 5watt Class A amplifier.

Production of the Cambridge *T40* tuner, shown at Penta, has now been postponed.

ANNIVERSARY GOLD

Audio Technica is introducing 'limited edition' samples of its popular *AT-F3*, *AT-F5*, *AT-OC7* and *AT-OC9* moving-coil cartridges. Each will be gold in colour, subjected to more than usually stringent quality controls, yet sell at the normal price - through British dealers only, in celebration of the 10th Anniversary of AT's UK operation. A new £186 tonearm is also on the 1988 agenda, featuring a (now not so new) universal plug-in headshell and a medium 12g effective mass. Meanwhile Audio Technica Japan is now 25 years old, and plans a very special *AT-ART1* cartridge using very exotic materials and stylus profile.

Armless promotion: Audio Technica celebrates ten golden years.



The converter from Cambridge promises to improve the CD track record.

THUS SPOKE

Zarathustra Designs has produced a couple of exotic turntables to supersede the rare *Soliloquy* reviewed in the second *Collection* edition of *Choice*. The *Zarathustra Series 4* and *5* motor units cost around £1,500 and £2,500 respectively and are described (by the makers of course) as: "musical instruments of the highest calibre, created . . . in celebration of the inspiration that is music".

The main difference between the models is 22 kilos caused by the massive slate plinth and slabs of glass surrounding the '5'. The *Series 4* enjoys the same engineering in all other aspects of the '5' (ie: three helical compression ring suspension, induction-hardened silver tool steel bearing and 11kg machined non-magnetic stainless steel platter to name a few) but its lack of protection makes it less



Heavyweight: Zarathustra against the green flash.



suitable for those with small children. (As if you could afford them after buying it!)

Further details from Zarathustra Designs, Gosford Camp Cottage, Longniddry, East Lothian, Scotland, EH32 0PX. Tel: (087 57) 662.

TIME DELAY

Dynavector Systems has just launched a remote control four-channel power amplifier incorporating time delay circuitry. The *SSA-504* amplifier, although sexy looking, would be much like any other surround

*Mirror to the real thing?
Dynavector thinks it's cracked it.*

sound system if it were not for the use of the analogue circuit patented by Dynavector and named 'Super Stereo'. The circuitry, developed over three years, operates in a different way to digital time delay (which the SSA-504 also uses) by taking account of the individual characteristics of notes.

The absorption rate of walls and objects in any room is greater at high frequencies than low frequencies which 'bounce about the room'. "In other words," Dynavector's Taro Tominari told us, "bass sound energy delays behind higher sound energy in the actual concert hall." The system reduces the time delay of music as the frequency of notes increases in a bid for higher fidelity to live music.

The power amplifier also allows the user to tailor his sound according to the environment he wishes; there are three settings for time delay with a Reverberation dial to adjust front and rear balance. The atmosphere of live music is said to be more realistic through this amplifier because of analogue circuitry. Digital time delay systems can not take account of the different characteristics of musical notes or instruments. However, learning to use the analogue circuitry may take some getting used to and this is why a digital system is also employed.

HAPPY BIRTHDAY!

Ortofon has released a limited edition cartridge to celebrate the fact that the company is 70 years old. The £600 MC70 is said to be similar to the MC3000 but has a different shaped stylus and modified rubber bearing resulting in a slightly different (but similar quality) sound according to Ortofon. Only 800 are being made, and each is numbered as is its presentation case. This latter is a smart darkwood hinged affair and not as whacky as the MC 3000's casket which could be accused of exciting more glee among users than the contents itself, being made like a miniature packing crate complete with crowbar . . .

CD ON THE MOVE?

They're coming down in price! This is the latest CD personal on the market - the £130 D6800 made by Philips. It will play both three and five inch discs, and features include music search,

No, not the Choice 'Independent' labs, but Ortofon founders Axel Petersen (lft) and Arnold Poulsen in October 1918.



track programming and scanning, and a novelty - twin headphone sockets. Now, instead of annoying people on public transport you can invite them to share your audio bliss!

WOW! ONE FOR SHAZ!

The company said it would never make it, but Denon seems to have succumbed to market pressure from the bubble-gum (some might say bubble-head) generation who 'though called Sharon or Dave have money to spend on twin cassette decks. The DRW 750 however, is said to perform as well as two DRM07s although it naturally has the crucial elements, such as one touch hi-speed dubbing.

Other features on the twin are



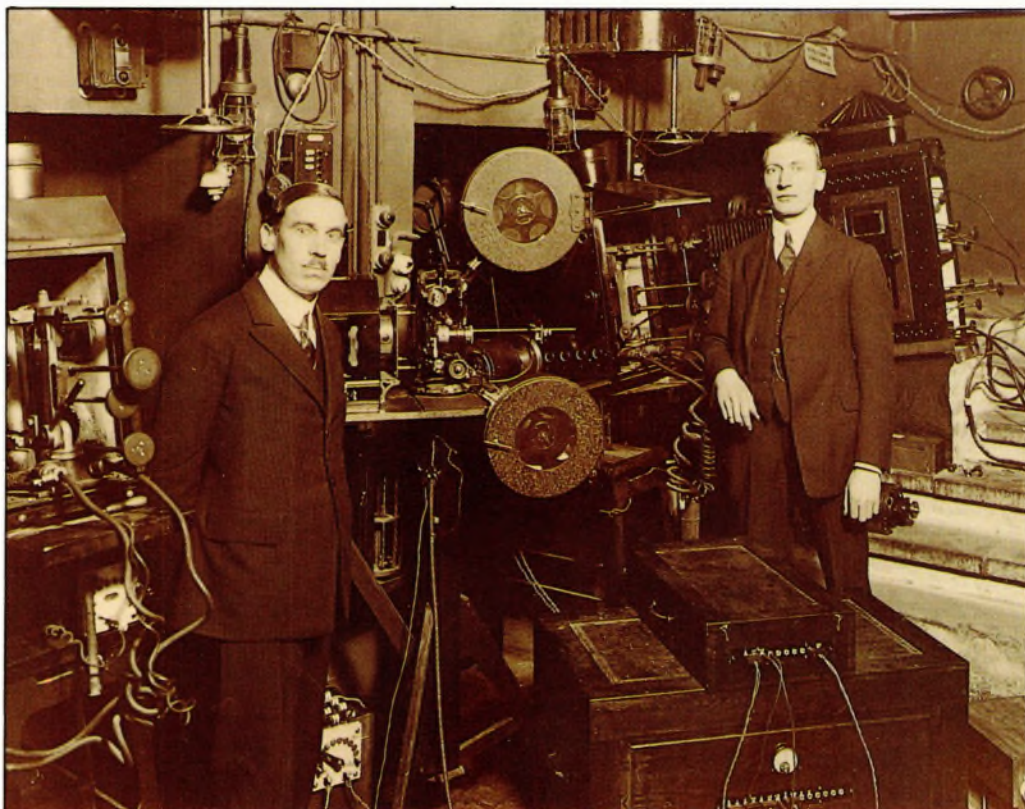
No free bottle of musk, but hi-speed dubbin' from Denon (yeah).

Dolby B and C, HX Pro, 20 per cent variable bias control, hyperbolic SF heads and, thankfully, no auto-reverse mechanism. Wh'appen to de graphic equalizer?

SANYO STACK

Sanyo has introduced two new

CD midi systems in its Architect series. The £600 77CD and £800 88CD are remote control with the unit able to programme video and TV units as well. Advantages of the more expensive system are listed as: more power, a 'seven band graphic equalizer' over five, a fully automatic turntable as opposed to a semi-automatic,



Dolby B and C and logic controls on the cassette deck.

Both machines come with their own speakers and are available now.

MONSTROUS IMPROVEMENT?

Mentioned occasionally in despatches, CD damping rings have until now been the preserve of 'hi-fi groupies'. Monster cable has now launched its version of the damping mat – the *CD Soundring* which costs up at £15 a dozen. Damping rings are said to improve the sound from a CD by reducing the amount of play in the disc as it spins. The idea is that by making the disc more stable the laser has an easier job of sampling the pits. A couple of clear CD mats are on the market but Monster's is made out of the kind of red rubber used to sleeve the handles of cricket bats. The drawback is that you lose some of the label side of the disc although you can write on the *Soundring* in ballpoint pen!

Initial tests on the *Choice* reference system (ahem) confirmed that the *Soundring* reduced sibilance and harshness, improving the bass and control at the same time. But can you afford it?

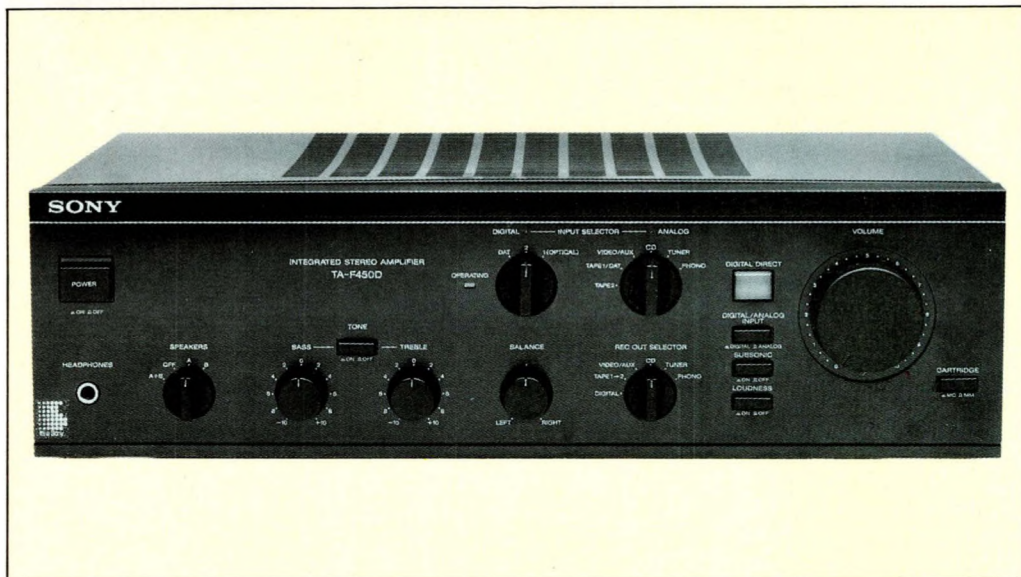
SUBWOOFING

Goodmans intends to introduce a low cost passive subwoofer system to satisfy the bass cravings suffered by fans of miniature speakers such as the Maxim (and Wharfedale Diamond of course, not to mention half a dozen other popular under-£100 loudspeakers). Priced between £80 and £100, the 24x8x10ins *Subwoofer* (as it's to be known) contains two 6.5-inch drivers and can be used vertically or horizontally against a wall/floor junctions. High efficiency 1/4-wave resonator loading is tuned to 50Hz, and provides appropriate sensitivity for use with 86-88dB/W loudspeakers, fed via high pass crossovers built into the subwoofer unit.

BUSINESS

PRO DAT

Aiwa has decided to follow Sony's initiative in selling its own DAT machines, albeit to a professional market. Aiwa machines have been available from such outlets as Playback in Percy Street, off Tottenham Court Road for 18 months but not officially supplied by the firm in this country. Sales of the £1,000 *XD001* are estimated at around 300 units so



Sony's TA-F450D – forget you ever read about it in Hi-Fi Choice.

far which is all lost revenue to Aiwa.

However, DAT (Digital Audio Tape) machines will be sold through limited outlets in a bid to control the medium and curb any piratical activity. Playback and Sterling Audio Systems in Swiss Cottage are named dealers. Patrick Chambers for Aiwa, told us that DAT machine sales would be monitored by checking invoices. If anyone appeared to be stockpiling machines (around 100 would be needed for organised piracy work) then Aiwa say they could nip it in the bud. All machines are copyguarded to prevent direct digital copying from a CD.

PERREAUX BOUGHT

Isbey Industries, the New Zealand distribution company and retailer of specialist audio products has bought Perreaux Sound Limited. The Company's new name is changed to The Perreaux Corporation. The move comes with the promise of new Perreaux products, and new outlets will be found using some of Isbey's resources. The North American market is the prime hunting ground but Britain will also see Perreaux activity in the form of some new pre and power amplifiers, a tuner and a CD player "over the next six months".

A SONY APOLOGY

In last month's issue we published a review of what we thought was the Sony *TA-F450D* integrated amplifier with on-board D-to-A converter. Much to Sony's embarrassment, the amplifier we tested turns out to have been a 220V sample of a German model designated *TA-F500* with 16-bit 8 x oversampling

which had been 'mocked up' for previewing at the May Trade Shows. Sony UK inadvertently sent it to us for review, when in fact the UK version of the amplifier – which is now to be called the *TA-F450ES* – will employ 18-bit DACs with 8 x oversampling.

Sony UK apologises for the error and is submitting a new sample which we'll be testing as soon as space permits.

TECHNOLOGY

TIME BACK

Sanyo has come up with an innovative way of saving tape by using an integrated circuit memory chip in its latest 'electronic notebook'. The £180 *TRC 1250* machine breaks new barriers by allowing the user to record sound that has occurred up to 16 seconds before he hits the 'record' button. The IC Pool memory constantly monitors through an inbuilt microphone on the *TRC 1250*. So far Sanyo has released only one machine, a pocket sized (85 x 127 x 33mm) compact cassette model, but as the technology (and holding time of the chip) improves there is an obvious avenue for those wishing to make high quality recordings of wildlife for example.

CATASTROPHIC POTENTIALS

Turntable manufacturer Manticore, who recently took over the Logic operation, is issuing dire warnings of possible safety hazards in the construction of electronic speed control circuit boards. Any readers running electronically driven Logics should contact Manticore on (0767) 318437 as soon as possible.

IN BRIEF

Last month's report that high-end distributor Absolute Sounds would be handling service arrangements for the Martin-Logan range of electrostatic loudspeakers was followed by a confirmation that the firm will now be distributing Martin Logan in the UK.

Cello, maker of extremely esoteric amplification systems, is reportedly finalising deals for formal representation in this country again. The unconfirmed reports suggested Cello will be back in the new year.

Bishops Stortford, in Hertfordshire, has a new hi-fi dealer. Chew and Osborne, established in Epping and Saffron Walden, has opened a branch in South Street selling a wide range of equipment from Ariston to Yamaha.

Distributor Zenonlec, of Newbury, Berkshire, is importing the Tiffany range of plugs and connectors. Tiffanys' use of gold and silver has led to their being used by audiophiles and manufacturers alike in the search for the sonic grail.

Griffin Audio, of Birmingham, is holding a musical evening on December 1st showing off the new listening room as well as the new *Ekos* tonearm and *LK280* power amplifier from Linn Products. Free tickets: 021 692 1359.

Four moving coil Denon cartridges priced £70 to £100 are to be distributed through Veda Products.

Naim's new tonearm and other equipment will be shown off on free musical open days/nights (November 29 and 30) at RPM in Clapham.

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PURE CLASS

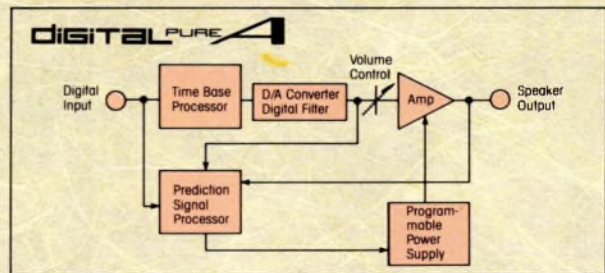


If you regard power with refinement as more of a necessity than a luxury, then consider JVC's revolutionary new AX-Z91BK integrated amplifier.

It's in a class of its own; Digital Pure-A, to be precise. JVC have solved the fundamental problem of amplifier design – how to achieve Class A sound reproduction, considered to be the purest form of amplification, with the efficiency of Class B.

The digital Pure-A circuit predicts the power demand and automatically increases or lowers the supply voltage as required, allowing the amp to operate as Class A, but without the consistently high voltage demand. Which means the purity and power of a traditional pre-amp with the flexibility and convenience of today's high technology.

This application of digital technology is typical of JVC's **SUPER DIGIFINE** series of hi-fi separates – high performance combined with ease of operation. Many of



the features are now computerised and can be handled from our exclusive COMPU LINK remote control.



FOUNDERS OF THE FUTURE

For the majority, of course, JVC's digital sound reproduction will probably remain out of reach. But for the purist, hearing anything less is an unacceptable price to pay.

SPECIFICATION · 2 x 100 watts · 8 ohms at 1Khz (DIN)/2 x 120 watts · 4 ohms at 1Khz (DIN) · Digital Pure-A Circuit for class-A operation · Dynamic Super-A with Gm driver (for analogue signal) · "D/A CONVERTER DIRECT" to amp connection · Built-in D/A converter with quadruple oversampling digital filter · Three digital connections: optical, electrical (coaxial), in/output for DAT · Low noise motor driven volume control · Gold-plated terminals.



At first glance it looks like a black Ittok, (above) but close inspection reveals it's the new Linn Ekos tonearm.

AND THE SHOW GOES ON . . .

This year's Heathrow Penta Show, sponsored as usual by *Hi-Fi News & Record Review* magazine, proved beyond doubt that it has become the UK's premier hi-fi exhibition. Although reports have it that public attendances were down on last year, the show was bigger than ever – covering some three quarters of a mile of corridors, according to one estimate. And the majority of exhibitors wore beaming smiles as they claimed that business had been very good indeed.

The show was held just as *Choice* went to press last month, hence we were able to publish a 'stop press' story in our November issue cataloguing most of the new products we'd seen. This month we thought we'd expand on what we viewed to be the highlights of the Penta Show . . .

The major talking point of the show was undoubtedly the Roksan room (see pic). The company had commissioned the design and manufacture of an entire room set. The result was pure theatre and it took people's breath away – especially since the lack of air conditioning caused the temperature in the room to go through the roof! That aside, Roksan's room set showed imaginative marketing which will doubtless prove to be well worth the effort. Imagine what fun hi-fi shows would be if more companies took the trouble to do something different to attract the crowds. As an aside, the chairs which had been specially sculpted by a north London firm proved so popular that Roksan sold no less than 32 of them, including a batch of eight to Naim Audio!

It's perhaps inevitable that the

new products causing most excitement and discussion at the show were high end components. Rotel were showing the fabulously styled Jeff Rowland Research amplifiers and new-look Oracles along with Infinity speakers, the Path Group were making good sounds with a massive pair of Stax electrostatics driven by Aragon power amps and the Stax *Quatro II* CD player, and Absolute Sounds took everyone by surprise by unveiling a new *SP15* two-box preamp from Audio Research. Penta was also the official launch platform for Duntech speakers from Australia and a new Sonus power amplifier, the £1,500 *Amator Power*.

Still in the land of the largely unaffordable, Esoteric Audio Research were previewing the \$6,000 *EAR 52* preamp (it uses 52 valves!) and a less ambitious £3,500 model called *Glass 88*, along with a massive line source speaker (£7,000) billed as the first model in their *Studio Phase Series*. And Voyd Turntables had visitors glued to their seats as they listened to the *Voyd Reference* which comes with a huge two-box power supply and costs just a fiver short of £5,000.

Linn Products weren't exhibiting at Penta – they were holding off until the Bolton show a couple of weeks later to launch their new *Ekos* tonearm (£895) – but our camera spotted one in action in the Creek Audio Systems room. Another new product which prompted heavy discussion in the hotel bar was the *Sumo Aria* loudspeaker on show in the Acoustic Gold room. Likely to be priced under £1,500, *Aria* is a 'travelling wave' single



Monitor Audio's R1200/Gold MD (above) made an impressive debut, (below) Roksan's theatrical room set took people's breath away.

driver, full range dipole with a radiating surface of stretched Mylar which stands about as high as a small Apogee. Apparently it was making good sounds too . . .

Of course, not all the new and exciting products were in the high end arena. Wharfedale announced a new *505* loudspeaker priced £169 which sounded remarkably good for the price, Monitor Audio were wooing people with their £700 floorstanding *R1200/Gold MD* model, and Yamaha were previewing a cut down version of the *DSP100* digital sound processor called *DSP100* (£400) which should prove popular. It's

expected in shops by Christmas.

Hot on the heels of the Arcam *Black Box*, Musical Fidelity was demonstrating the *Digilog* outboard DAC, while Cambridge Audio had two DACs at the show (see separate news item). And analogue front ends were standing up for themselves too, with new turntables from Source Odyssey and Alphason, and a very smart-looking Kuzma *Stabi* which we spotted sporting the new *Stogi Reference* arm.

We can't remember the last time we saw so many new products launched at a UK hi-fi show, and if you didn't get to the show you really missed a treat.

SEE MORE IN THE MUSIC THAN



Photo courtesy of English National Opera



LaserDisc

The CLD-1200 is compatible with all PAL-standard video discs bearing the CD Video, LaserVision or LaserDisc marks. LaserDisc™ is a trademark of Pioneer Electronic Corporation.

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There are the new 20cm and 30cm discs, packed with compilations, concerts, feature films and special interest programmes, offering up to two hours of dynamic digital sound with brilliant pictures - all the way through. Plus the familiar 12cm-sized CDVs with up to six minutes of video and a further 20 minute CD audio-only selection.

Rock and romance. Classics and comedy. Blues and ballet. Movies and much, much more.

But the real beauty of the golden disc is that it can be played on the finest home audio-video product ever invented - the Pioneer CLD-1200 CD/CDV/LD combination player.

A perfect synergy of sound and vision. Combining the precision of digital CD sound with Pioneer's famous state-of-the-art laser optical technology to bring you a whole new dimension in home entertainment.

But, as if that wasn't already enough, the CLD-1200 is great for playing your conventional compact discs, too - right down to the newest 8cm mini-CDs. No adaptor required.

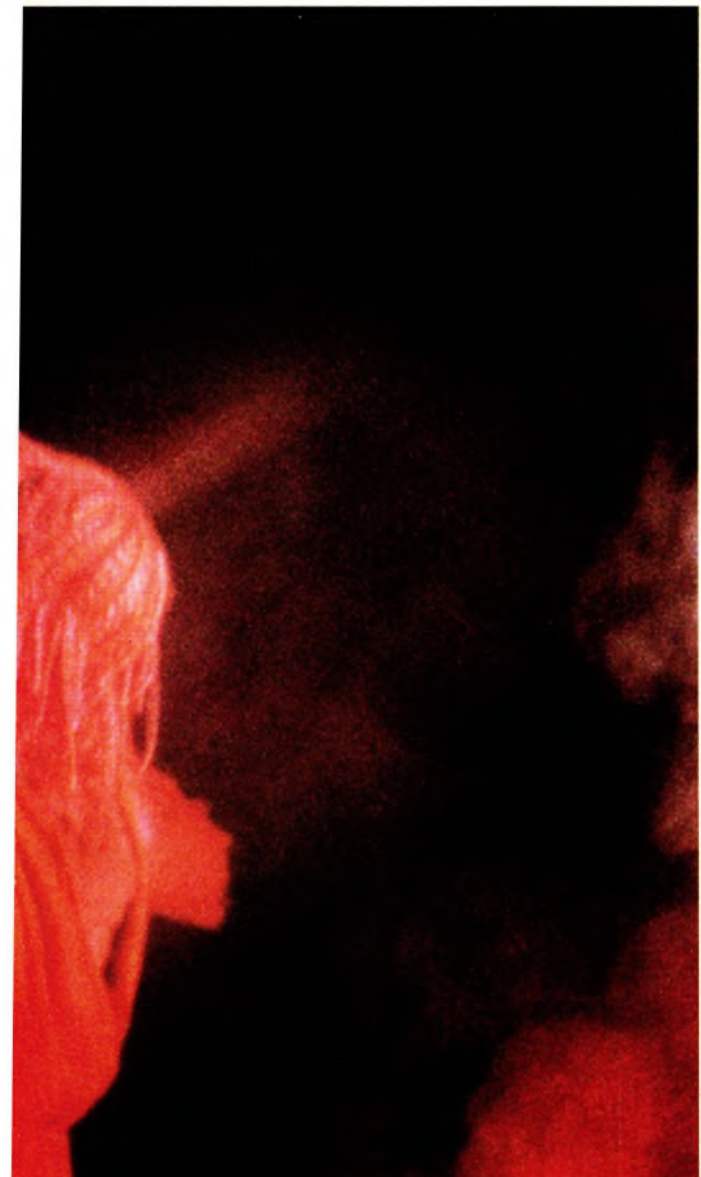
There are no concessions to convenience, either. Infrared remote control, direct programming, on-screen display, simple and comprehensive connectors. The door to a new world of sound and vision has never been easier to open. If you have a TV and a hi-fi system, you're already two-thirds of the way to the future. The Pioneer CLD-1200 is the next bold step.

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CHOICE SESSIONS

Things we hear . . . This month, our eyes and ears are focused on CDV; Alphason's natty arm lift device for manual turntables; Naim Audio's compact IBL loudspeaker.

UPLIFTING DEVICES

Jason Kennedy gets in the groove with Alphason's new arm lift.

One of the more affordable but no less interesting objects spotted at the Chicago CES this year was Alphason's new arm lift. This simple magnetic device is designed to address one of the ergonomic drawbacks common to 'hi-fi' turntables – ie their inability to pick up the arm when the stylus reaches the end of a side. How many times have you put on a record, been distracted and returned to find your £100 stylus wearing itself out in the lead-out groove?

Thus Alphason has come up with a simple, cheap and sonically acceptable device to pick the arm up as it reaches the end of the



disc. It has two parts – a plastic circlip with a magnetic tongue that fits onto the tonearm close to the bearings, and a magnetic lifter which is stuck onto the plinth at a suitable point for lifting the arm when the stylus reaches the lead-out groove.

These sort of accessories have appeared in the past but for various reasons, including impracticality, are no longer available, and the question must be, does this latest offering actually work?

On second attempt, yes. However, the first time I tried to use the armlift on my *Xerxes/RB300* combination I encountered great difficulty fitting the plastic circlip onto the tonearm, and ended up losing, along with some patience, the tiny magnet bonded to it. Alphason's Mike Knowles was duly consulted, and he suggested I leave the clip on the plastic stretcher device (supplied with the lift) whilst I have a cup of tea. This served to stretch the clip making fitting a lot easier.

Next came the fiddly bit – setting up the pick-up device, which is a neatly made little stand with an adhesive base and an adjustable part which houses jaws containing a pair of tiny magnets of opposite polarity. The idea is that when the magnet on the clip is taken into these jaws, by the tangential motion of the arm, the lower magnet repels it and the upper one attracts it, thus picking up the stylus by about three or four millimetres. Getting the height and positioning of this

component correct is therefore quite crucial. Choose a record with a short lead-out groove and follow the instructions to the 'T'. Once stuck down, the lift should work silently and effectively. It's probably worth checking that the downforce at the stylus hasn't changed, though the position of the ring means that the effect will be negligible.

Given the sensible design of this device I didn't expect or observe any affects on sound quality. For this reason, and because it works, the Alphason arm lift can be wholeheartedly recommended. However, owners of particularly meaty arms may encounter difficulties fitting the arm clip. How much does it cost? About 15 quid.

CDV – THE PRODUCT

Will CDV players form the heart of home entertainment systems in the nineties? Jason Kennedy explores this new medium.

Late last year in the Kensington Roof Gardens Philips held a glamorous party to promote their new toy – CD Video. Software was limited at the time and very little hardware made it into the eager hands of hi-fi reviewers. The medium was pushed at hi-fi shows and the like but failed to really hit the market, possibly because compact disc players were selling so well, but mainly due to a lack of public awareness. This year CDV is back with a vengeance and consequently review samples are now available.

For those not au fait with the medium, it's a cross between video and the compact disc. Both digital sound and (analogue) video are stored on a disc very much like a CD, but gold rather than silver in colour. The discs come in three sizes – five, eight and 12-inch and the size of the disc is a rough indication of the video track length. Standard CD-sized discs contain three sound-only tracks and one three or four minute long video track. The eight and 12-inch discs are often double sided and the latter capable of storing an hour of video, so are eminently suitable for opera and the like. The music can be played by a conventional CD player and CDs will likewise play on a CDV player.

The *CDV475* is one of Philips' first offerings in this market and retails for £499, which includes a £150 premium for the video part of the package. However, in the light of recent CD player reviews the purely sonic performance of the 475 would have to be fairly high to warrant the £350 price tag. It is, after all a fairly ordinary four times oversampling 16-bit unit and I should imagine that the video element of the machine must account for at least half the price.

It's a straightforward and simple machine

to operate with only limited controls on the front fascia, but quite an informative display that details elapsed time and track indexing. The majority of the controls are found on the technofear-inspiring remote handset which has a ten digit keypad for track accessing, programming, repeat and VCR style frame control for active discs. An active disc apparently contains less video time but allows for freeze framing, scanning etc. Unfortunately, there were none included in the package so I was unable to try them out.

The back of the machine is fitted with RCA phonos for remote in/out, video out and digital and analogue outputs for your amplifier, these last three being gold plated. On the video side there is a big A/V euroconnector for SCART connection to the TV, but if you don't have the appropriate leads (which aren't supplied) then use the standard RF coaxial sockets.

As I don't own a television the Philips *CTV1550* CDV-ready TV was supplied for the review. It is large and grey but reasonably attractive if not up to *Trinitron* standards. It has a matching SCART socket for direct connection to the CDV player which supposedly offers better picture quality, though the material I used failed to reveal as much. However, it does mean the RF coaxial socket is left free to attach to a VCR or aerial. I own



neither but managed to get three channels with the aid of a coax lead and a coathanger! However, I couldn't tune in any semblance of BBC 1 and missed *Witness* which was a bore!

When the CDV player is plugged in via the SCART lead and a disc is played the TV automatically selects the appropriate channel. It doesn't switch off its own (mono) speaker though, but this can be done with the TV's remote control.

The software supplied in the Philips dealer pack contained mostly pop videos from the likes of *Curiosity Killed the Cat* (whatever happened to them?) and *Cameo*, whose *Word Up* video was very entertaining. Also included was a stylish classical video of Joshua Bell (a violinist) playing Brahms and featuring Karen Black, a very glossy package aimed at the yuppie who aspires to appreciating classical music.

The picture quality available from these discs was as good as broadcast TV and probably better than VHS, but there is, of course, the element of software dependency to consider. The sound quality is exciting by A/V standards and the potential for slightly more ambitious footage such as rock concerts is awesome, assuming a reasonable standard of recording in the first place.

In order to assess the *CDV475* purely as a CD player, (it's certainly intended as a substitute rather than an addition) I borrowed one of the more portable Best Buy rated CD players from our last review group. The Toshiba *XR.9318* fitted neatly into my backpack and for a \$150 machine made some quite acceptable sounds. Using conventional compact discs I compared it with the CDV player, using Audio Innovations tube amplification and Snell loudspeakers on the 'humungus' Pirate four-legged stands. The result was pretty much a draw; the Toshiba gave a little more ambience and depth to some discs but on the whole was a very similar sounding player.

The *XR.9318* rated *Fair+* when MC reviewed it so the *CDV475* must make that grade at least. It reveals fair dynamic range and produces a controlled and powerful sense of speed but does hint at a slight harshness at higher frequencies, though not to the extent that it's wearing over a period of time.

JB was interested in finding out whether CDVs sound any different to conventional CDs and did some listening with a *Swing Out Sister* disc on both formats. He concluded that in that instance, there appeared to be little or no audible difference.

No doubt piracy-paranoid software manufacturers would like CDV to replace video tape in the future, but that is hopefully well enough established to be safe. But didn't we think that about vinyl? Its success, as with all new formats, will rely heavily on the available software - prices will range from \$4.99 for a five-inch disc to \$19.99 for a double sided 12-inch.

Polygram has released a fair selection of pop and classical discs but at this stage it's hard to gauge whether other manufacturers will join in. Polygram is a sister company of Philips, so one can assume that if Sony brings out hardware, its recent acquisition, CBS, will follow up with software. And Pioneer has already brought out a player showing confidence in the market.

So, here we have what could be a major A/V entertainment source that combines stereo digital sound with a high quality video picture and competes directly with CD players in the non-audiophile domestic market. Philips is quietly confident and is hinting at a weighty announcement in the near future. I guess the hope is that the CDV player will form the heart of home entertainment systems in the 'nineties - stranger things have happened...

USER FRIENDLY

Evelyn McDermott has been looking for a compact loudspeaker which produces a big sound. He's found exactly what he was looking for in the £690 Naim IBL.

There are many 'affordable' speakers in the

\$250-\$400 bracket (see *Hi-Fi Choice* Issue No. 59) that combine compact dimensions with clarity, resolution, and high volume capability. At the other end of the market there are large, often idiosyncratic designs such as the Roksan *Darius*, Linn's venerable *Isobariks* and radiating panel units, the latter usually emanating from the USA. But these exotica are bought mainly by a dedicated minority for whom family and space considerations take second place to hi-fi purity.

This has left something of a vacuum in the 'mid price' range; that is loudspeakers costing up to \$750 or so. These have often appeared as rather in-between products: they may offer more in terms of bigger cabinets and better drive units, but at the same time they often appear to lose something in clarity over smaller, less ambitious designs. Another factor has been that for those of us brought up on a strict hi-fi hierarchy, extra funds go first on improving the front end or amplification, and only then on loudspeakers.

But recently this market niche has become more competitive. An initial jolt was the arrival of the Spica *TC-50* from the US, followed closely by the introduction of the sensation creating Acoustic Energy *AE1*. At about the same time, Linn's *Sara* received a substantial redesign which led to positive press reviews.

And recently came the latest offering from Naim: the *IBL*, or Integrated Box Loudspeaker, of which I have been sampling the delights at home. Here at last is a conclusive reason for moving up to this price range. For not only do the *IBLs* project the sound in a highly dynamic yet relaxed fashion, but they also fit discreetly into a domestic environment. For the 'now generation' where sharp suits, Filofaxes and cordless telephones are de rigueur (at least according to Ron Todd) an expensive hi-fi product must meet high visual aspirations.

In this the *IBL* succeeds entirely, for it is such an elegant miniature. Its slim and tapered cabinet reaches almost down to floor level, and its integral stand plays an impor-

tant part in the overall sound quality. At only 80cm high it will fit under any shelf or mantlepiece, and its foot-print occupies less than one square foot of carpet. To put its trim dimensions in context, even miniature models such as the Celestion *SL600* and Acoustic Energy *AE1* take up more space once sited on suitable stands. The *IBL's* tweeter sits closer to the floor than most stand-mounted speakers but the front of the cabinet is gently sloped backwards, to direct the sound earwards and to help maintain phase coherence. As icing on the cake, perhaps Naim will now clothe the speaker in finishes other than black ash.

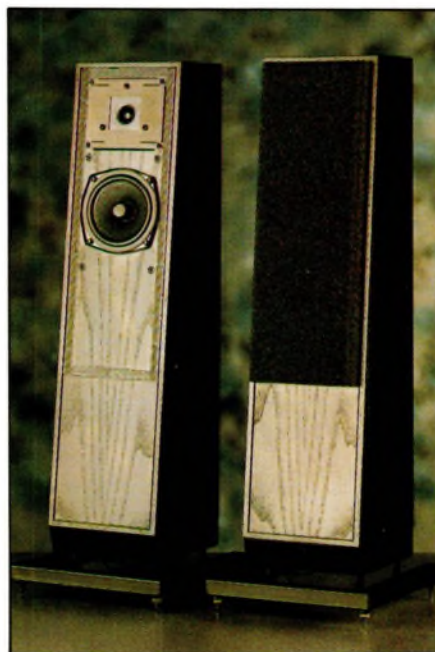
Good looks are of course only part of the equation at nearly £700. It is the way music is portrayed with effortless dynamics and solidity that distinguishes the *IBL* from lesser designs. This was readily apparent on recent minimalist opera recordings: Philip Glass' *Aknachten* (CBS) and John Adams' *Nixon in China* (Nonesuch). The *IBLs* retained the full drama and weight of combined orchestral and choral crescendos. Bass quality remained consistent at all times. In contrast, the sound of most small speakers tends to lighten and to become confused as the sound level increases.

The *IBL* is inherently simpler than the *SBL*. Like the *SBL* it is a two-way design, but whereas the *SBL* is three boxes cunningly designed to look like one, the *IBL* actually is one box, yet effectively it is at the same time a box within a box. The eight-inch bass/mid range unit is mounted in a small, rigid chamber. High rigidity reduces colorations and ensures that dynamic resolution is not impaired. On the other hand, a small box on its own can lead to a lightweight sound. So the bass chamber vents into a larger chamber via a mesh filter. This part of the cabinet extends down to the floor. The net result is a sizeable volume capable of producing generous levels of controlled bass. The cabinet is screwed to a dedicated steel stand. I thought I could feel some compliance in the stand mounting, perhaps another cunning design aspect.

Naim also pay particular attention to high frequencies. In the Roksan *Darius* the tweeter is suspended on springs, and in the *SBL* it is housed in its own enclosure. In the *IBL* the modified Scanspeak has a mounting plate with a degree of compliance deliberately built in. This helps isolate the tweeter from cabinet resonances.

Some other subtleties: the back of the speaker is rebated to add rigidity; attached to the speaker units are small weights which control ringing; the bass unit features a heat dissipating proboscis, known as a 'phase plug'. Finally the relatively simple crossover is mounted externally in piggy-back fashion. It can be easily removed and active electronics substituted though obviously this increases the system cost substantially.

Here then is a compact design offering real sound quality benefits over cheaper competitors. The other speakers I've mentioned all have their positive virtues and should all be on a short list for auditioning at this price level. But in my sitting room what the *IBL* offers is a relatively short step down from the likes of the Roksan *Darius*, yet it takes up hardly any space at all.



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READERS WRITE CHOICE ANSWERS

DIGITAL SHAME AND THE BLACK BOX

Having had the pleasure of reading several of your issues, I hold *Hi-Fi Choice* in high regard. One of the most interesting reviews was that by Alvin Gold of the A&R Arcam *Black Box* DAC unit printed in the *Collection*. This is surely an exceptional and versatile product and one which I am seriously thinking of buying. I am a great admirer of British audio equipment and the British 'sound' and often buy equipment when I visit London.

Following the review of the Sony 333ESD compact disc player (issue 58) I went searching for one and eventually found an example that had been discounted as an 'old model'. Having studied both your and another magazine's reviews of the *Black Box* I see that neither mention using it with my player

and would be interested to know whether the performance of the 333 would be significantly improved by adding one of these devices. As one of many German *Hi-Fi Choice* fans I would like to thank you for your efforts.

DR. MIHU,
DORTMUND, W. GERMANY

The Sony CDP 333ESD rated very highly when we reviewed it and adding an alternative DAC such as the Black Box is not really going to improve it dramatically. It will change the sound, perhaps to something that is subjectively more attractive, but it is unlikely to bring about a major increase in fidelity. You really need to listen to the combination yourself, and there is an A&R distributor in Germany, in Verbringen near Stuttgart (Tel: 7031271030) who will be able to point you to a local dealer.



Can the Black Box improve Sony's 333ESD?

THAT OLD SAW

Could you please update that old saw that goes something like – the cost ratio for a balanced system is 5:3:2 for a system consisting turntable:amplifier:loudspeakers. How do compact disc players and other source units fit into this? A toe in the hi-fi waters some eight years ago led me to purchase a system consisting of Trio KD1033 turntable, Eagle R7200 receiver and PWB electrostatic headphones. (Well, well – ed.) Is any of this still any use?

A. C. NIELD,
WEMBLEY

This particular old maxim is a new one to us, but would seem to make some sense, although such guides should be used only as guides and not hard and fast rules. If you ask a cross section of dealers you will undoubtedly get a good variety of alternative ratios, and if you cross the Atlantic you'll find that the ratio

is reversed (speakers are still king in the US). If you want an update we would suggest something like 4.3:2:1 for front end:amplifier:loudspeaker:stands and cables, but this is more relevant to sub £1,000 systems than their high-end relatives.

As for your system, if it fulfills the function of being musically entertaining and you don't crave higher fidelity then it is as useful as a hi-fi system can be. Obviously it could be upgraded if the funds and need are there. We gave your receiver a Best Buy when it was reviewed and it should stand you in good stead for a front end upgrade which would bring the most dramatic improvement in sound quality. Check out the Directory for our recommendations on turntables and CD players. Then listen to a complete system that suits your budget and decide whether you need to upgrade or not. But if you enjoy what you've got, don't bother.

HAS HE GOT IT RIGHT?

I was interested to read George Perry's letter in the September issue entitled 'Have I got it right?' (sorry mate you 'aven't) and your reply about craving for nostalgia and that 'sixties sound. (Where are you Arthur Brown? Still in your wigwam?)

Of course, it wouldn't occur to you to suggest a change of turntable (what's that, he doesn't like a Linn! Send in Peter Belt and sticky squares), and arm as well as the cartridge. I wonder if the Decca Maroon is the answer to George's prayer. The mistracking on this tied up oddity of a cartridge is quite uniquely bad. However, a Shure is a better bet, the Ultra 500 in particular (shame about the price).

MIKE JONES,
LONDON NW3

A change of turntable would give you a different sound but swapping front ends is an expensive hobby and not one that we would advocate. Besides, with appropriate ancillaries the LP12 could be cajoled into producing appropriately laid back sounds. We would also defend the Decca where replay of rock material is concerned. Given a good tonearm and reasonable turntable Deccas bring home the impact and feel of a recording better than most moving magnets you can think of, but obviously personal taste comes into the equation and alternatives should always be auditioned.

A QUESTION OF TASTE

I am about to purchase my first hi-fi system. After reading *Choice* I have decided on a Michell *Synchro* motor unit with a Rega *RB300* tonearm. I haven't as yet made up my mind about a cartridge and the options that appeal to me are the Denon *DL110*, Audio Technica *AT-F3*, Linn *K9* and Ortofon *MC10 Super*. My shortlist for amplifiers goes something like: Musical Fidelity *B200*, QED *A240SA*, Incatech *Claymore* and Cambridge Audio *P40*. And I've narrowed potential speakers down to the Celestion *DL8* and Rogers *LS6*. Inevitably my question is which combination should I opt for?

P. WEBSTER,
SCUNTHORPE

Which indeed? Your best bet is to find a dealer who stocks the front end, (the RB250/Moth arm has become something of a stock item on the Synchro) and listen to a few of the alternatives. All the cartridges you list received the same sound quality rating but their characters are subtly different; the same goes for the amplifiers whose characters range from the muscular (B200) to the refined (A240).

Of the speakers you mention, we have a slight preference for the Rogers which was considered to offer good value for money and received a Best Buy tag, but listen to an alternative to see if you agree.



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THE WOLSTENHOLME EFFECT

Some months ago I read, in another magazine, of some modifications John Bamford had had carried out on his Musical Fidelity preamp; this work had been done by Les Wolstenholme of Avondale Audio. It involved replacing the integrated circuit phono stage with discrete components and replacing the in-board transformer with a meaty separate power supply. I contacted Les and asked him if he could do the same for my Meridian 101B and it turned out he could. I sent him the unit and he carried out the mods and I'm absolutely delighted with the results. It has made a terrific improvement to my system in all areas.

I use a Garrot Decca Microscanner cartridge and I

asked Les to leave the loading at 13.5kohm as Bob Stuart (of Meridian) had designed the module specifically for this cartridge. However, when the preamp was returned, despite it sounding excellent, there seemed to be a loss of sparkle and liveliness in the treble (the raison d'être for owning a Decca). I mentioned this to Les who asked me to return the module. It came back by return of post with the loading adjusted to 27kohm, which did the trick and I'm now enjoying the most wonderful realistic soundstage through my Swallow ALS2 active speakers.

I must say I'm very impressed with Les Wolstenholme's modifications and would recommend him wholeheartedly as an honest and extremely competent engineer.

JIM DEVLIN,
WATTON, NORFOLK.



Meridian mods: give your amp some one off improvements.

THE NVA COVER UP

First off, a belated thank you for the £17 record vouchers (a subscription offer) which I hope I used wisely.

Regarding your regular reviews, which I find instructive, there seems to be an obvious exception, namely Nene Valley Audio. I am the chairman of a hi-fi club in Norwich which meets regularly on the premises of Sound Approach, a local audio shop. Recently we had a demonstration of NVA equipment by the company's founder, Richard Dunn, who gave us an interesting and informative talk and we were all impressed by the lucid and revealing sound quality of the amplifiers.

I have searched in vain for reviews of this equipment but only found them in *Hi-Fi Review* – which seemed to be quite favourable. Surely this omission is not a political thing! I would have thought that a good amplifier is a good amplifier regardless of who makes it. After considerable heart searching I bought an NVA 230 which is a CD oriented version of the integrated amplifier. To say I'm

pleased would be an understatement. The amp has a controlled and yet sweet, detailed sound which works very well with my Monitor Audio R852 MD loudspeakers and Nakamichi OMS4E CD player.

I would be interested to know why NVA appears to have been 'blocked out' of reviews and advertising in *Choice*.

ALEN EDWARDS,
NORFOLK
PS Some receiver reviews would not go amiss.

Since this letter was received we have reviewed the NVA turntable and both their interconnect and loudspeaker cables. But the reason that NVA equipment has received so little attention in the past is not because it has been blocked out but rather that the company itself has deliberately maintained a low profile. (Any creditworthy company can buy advertising.) There are a good many British hi-fi companies, mostly obscure but some quite well known, who would rather not risk having their equipment reviewed for fear that it would come out badly, or because they couldn't cope with demand if it

came out well. Then again, older companies whose earlier products took a hammering in past reviews have a tendency to avoid the press – the adage 'once bitten twice shy' is particularly appropriate here.

But NVA seems to have been braving the waters (flute and the reviews in this and other publications must be increasing demand for its product and thus paying off. We will most definitely be chasing NVA for product in our next amplifier issue due out in February next year, so let's hope product is submitted.

PS. Receiver reviews are in the pipeline.

DECISIONS DOWN UNDER

I am a regular reader of *Hi-Fi Choice* and it's my opinion that your equipment assessments are both accurate and fearless – good stuff!

At the moment I am hovering around a decision to purchase a Sugden A48 III amplifier. I am not aware that you have examined this amp, but it is possible you have some knowledge of it and I would certainly be interested in your opinion.

In Australia the A48 III sells for approximately the same price as the Musical Fidelity B200 and the Audiolab 8000A, both of which rated *Good plus* on sound quality when reviewed by *Choice*. I would greatly appreciate your briefest opinion as to whether you rate the Sugden as better, worse, or equal in sound quality to these alternatives. I will be using bi-wired Musical Fidelity MC-4 loudspeakers

Regards from the Antipodes.
BOB BARROW,
VICTORIA, Oz.

The conclusion to our assessment of the A48 II, way back in 1981, was somewhat cool (although we shall endeavour to get new product from Sugden for our next Amplifier tests in the March issue, on sale February 10th.) but we would be surprised if the A48 III is not at least as good as the two amplifiers you mention. Looking at the specs you sent it would appear to offer plenty of scope for future upgrades as it has outputs for a separate power amp and even bridged operation, the latter being a potentially useful and rare option. As for making a final decision – use your ears, and see which they prefer.

STYLUS SPECULATIONS

I have recently discovered *Hi-Fi Choice* and find it fascinating reading. As a result of various

articles I would like to upgrade my equipment and should appreciate your advice.

My existing set-up consists of a Thorens TD 124/SME 3009/Technics EPC 205 front end feeding a Technics SUV4 amplifier driving KEF Concerto loudspeakers. I have decided to buy a Mission Cyrus 2 amplifier and Tannoy M20 Gold loudspeakers. Presumably this will produce a considerable improvement in sound quality, especially in stereo separation and midband projection.

Can you suggest a suitable cartridge to replace the Technics that would work well with the above components? I have a budget of £75 and listen to a wide variety of classical music.

V. C. FABER,
CAMBERLEY, SURREY

You appear to have decided to go for the Mission and Tannoys before you've even heard them and although they will undoubtedly improve the sound there are a variety of highly rated alternatives that would be worth listening to. Tastes in hi-fi vary almost as much as they do in music, so it's worth making a comparison.

Which cartridge you select depends on which version of the 3009 you have. If it's one of the Series III models which have a low effective mass then an A&R P77 or Ortofon MC10 Super would be appropriate. However, if it's the R version then something like a Denon DL110 or Goldring Eroica L would be a good choice.

Alternatively, if you want to extract greater fidelity out of your system you might do well to replace the record player rather than the speakers. Your KEFs,



A good choice for the R version – the Denon DL110.

though quite old now, were something of a classic in their time and would probably reveal front end improvements quite adequately. See if you can find a dealer who will bring a turntable such as the Systemdek and suitable amplifier to your house to try out with them. An increasing amount of dealers are prepared to do this and you should be able to find someone in your area.

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ASPIRATIONS

Taking advantage of Bang & Olufsen's expertise in link systems a hotel chain owner was able to make music throughout his sumptuous house. Text: Dan Houston. Photographs: Chris Richardson.

STEREO

ON THE

Hill



The B&O Pentlab's 'intelligent display' (above), with (right) discreet wall-mounted monitors providing the water music.

The owners of this month's Aspirational interior only recently moved into their new home in Northwood on the outskirts of North West London. The home, and its hi-fi, is the product of 15 months' meticulous planning and work and the house has now been entirely and comprehensively re-decorated to the tastes of the new owners. Hardwood doorframes, tailored pile carpets and hand marbled ceilings are just some of the touches they decided to add. The garden was also re-landscaped and now includes a thatched summer house within the grounds.

Now the workers have finished, leaving a home in the palatial style influenced by the owners' Asian heritage. Colossal glass chandeliers, an indoor fountain and lavish ornaments such as an archway of elephants' tusks greet or stagger visitors as they enter the main hallway and reception area. On one side a drawing room with its own bar leads through to the recreation area. This comprises indoor swimming pool, Jacuzzi, snooker room, gymnasium and sauna room offering a complete way to



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relax. There are even three showers in the area so nobody has to queue! On the other side, a dining room, the kitchen and 'family room' more or less make up the ground floor layout.

All the hi-fi in the house is from Bang & Olufsen dealers Rex Radio, of Maida Vale in London. They also provided the televisions, all of which have satellite facility. Rex Radio's Russell Medcraft spent many man hours crawling among the rafters and even through the air conditioning flues to get wiring from the sound sources to the various speaker outlets.

There are three Bang & Olufsen hi-fi systems on the ground floor, all of which are linked to the main system in the lounge. The lounge set-up is the B&O 5500 system consisting of CD player, Beogram parallel tracking record deck, Beocord cassette deck and Beomaster receiver. A Beovision LX2502 TV set is positioned to be viewed only from the bar stools creating a more formal atmosphere in the rest of the lounge where guests are entertained. Positioned near to the wall either side of a window the imposing Beolab *Penta* active upright loudspeakers convey the sound in the lounge. Speaker cable is concealed beneath the carpet and connected under the loudspeaker so no wiring is visible.

Pentas have a handy little display panel halfway up their height which tells listeners which source they are using and at what volume level (from 0-60) the system is operating. (They go quite loud.) If you wish to change sources remotely from radio to cassette, or CD, or record, then the speakers also tell you whether there is any programme in the requisite machine. For instance, if there is no disc in the CD player the *Penta's* display panel lights up

with 'No Source'. Otherwise the system takes a few seconds to go from one medium to another.

The 5500 system also comes with its own remote control module which looks more like a lap-portable computer. It allows you to fine tune as well as operate the system from your listening position and appears to do everything except make tea! (They're probably working on that!) However, the Beolink 1000 remote control handset is preferred. The handset is a masterful piece of electrical wizardry allowing control over all the Beolink products from radio, TV, video recorder, satellite receiver, teletext, CD player, cassette deck, and turntable. The idea is very simple; one key has a multitude of functions and you use the same logic for all media. For instance, the dual chevrons allow you to search through radio stations in radio mode, through a disc in CD or to rewind and wind through a tape. The result is an easy to use handset which is scalloped to be cradled in the fingers while your thumb keys in instructions. Another natty point is its infra red signal which is beamed out from all around the top of the handset; no more stretching the wrist and taking aim!

The handsets can be used throughout the house to operate the various media outlets. They also allow an obvious and piratical opportunity for some fun in changing programmes; imagine putting on your favourite Motorhead track while mother listened to her tenderest moment of Mozart? (And you could blame someone else!) To avoid such upsets between civilised folk the sensor does tell one whether the system is in operation or not.

The main system can be controlled from



Chinese lacquer table and sideboard (with B&O speakers above).

the dining room, kitchen, family room, study and from anywhere in the recreation area by means of a Master 2A Control Link. This consists of a slimline sensor mounted on the wall and a separate plain grey control box which can be hidden away. The sensor would usually receive remote orders but can be manually (touch) controlled as well in simple on/off fashion and also acts as a timer. The room speakers can be programmed to begin playing music (or radio) at a certain time. Touching the sensor for more than three seconds will shut down the system.

At either end of the swimming pool discreet, white B&O *CX50* speakers hang just under the ceiling, so as you complete your lengths you are swimming into stereo. In both the seating area next to the swimming pool and in the snooker room there are B&O *CX100* loudspeakers which are a slightly meatier version of the *CX50s* and have three drive units: woofer, midrange and treble.

The glass-walled snooker room houses a Beocentre 9000 system linked to the main system in the lounge so the 5500 can be heard here, but which also allows one to play something different. Russell Medcraft said that the opportunity existed for linking the two systems (so that the 9000 system could be heard throughout the groundfloor) and all he had to do is "solder a couple of wires together". This will probably happen when the family are used to the existing facilities.

The family room, on the other side of the house from the snooker room, has a system which is not integrally linked with the lounge system – so you can't hear it outside the room although you can hear from the link-up what is happening in the lounge. The room boasts the only non B&O piece of equipment – a Sony *Profeel* television – and has a slightly less formal atmosphere than the other downstairs rooms. The 5000 sound system here is the owner's original and so is not new. It is remote control but cannot be controlled by the Beolink 1000. The *RL 140* panel loudspeakers can be



The main living room houses the hi-fi (of which only speakers and remote control unit are visible).



B&O at bathtime (left), while (right) the staircase gets you twisting by the pool



SOUND AND STYLE



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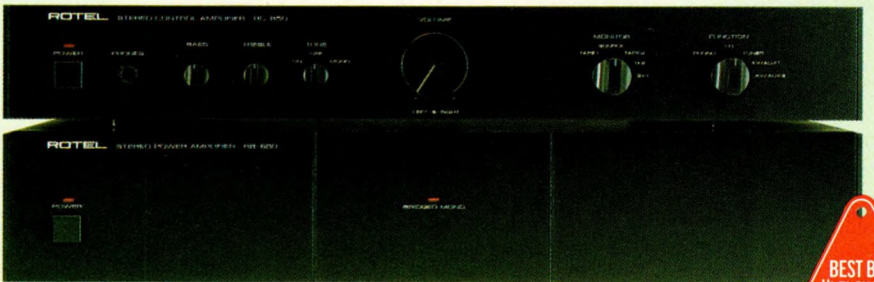
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switched over to the 5000 system in the lounge however, by using the 1000 which then controls them through the wall sensor in the normal way using Russell's own modified link 2b.

The owner's study is not often used but also offers the 5500 system through CX50 loudspeakers and an infra red sensor fitted to the wall. The wood-panelled study is on the ground floor and houses a large writing desk, computer and television with glass cabinets displaying a variety of brass figurines and ornaments.

Upstairs there are three more Bang & Olufsen 9000 systems, in the master bedroom and in each of the owner's sons' bedrooms. In both these and in his daughter's bedroom MX2000 TVs on Pivotelli wall brackets allow for individual entertainment. The upstairs of the house is finished in a similar style to the downstairs; tailored woollen carpets with a pile so thick you could lose your watch, hardwood joinery and a huge 'waterfall of glass' chandelier as you ascend the staircase. The computerised lighting switches set in brass allow control of the lighting as you move through this house. From one room, at a touch, you can tell the lights in the next to light up (which they do slowly) while the lights dim and go out behind you. Different levels of light can also be set from these panels. The system in the master bedroom is slung underneath the B&O LX2802 whiteline television and uses the TV speakers. This is unusual as people would normally try to improve their television sound by linking it to their hi-fi speakers. With B&O the sound quality compatibility allows you to make your hi-fi more compact and play it through the TV.

The system here is also linked through to the marble-walled bathroom and dressing room where pairs of CX50 loudspeakers are again placed high up on the wall. You can either hear the sound from the television in these rooms or you can play one of the sources from the 9000 system. Again, operation is by the Beolink 1000. According to Russell, this system could also be integrally linked with the downstairs set-up if the owners wished. Eventual link-up of this nature would mean that any system could be heard anywhere in the house, the obvious advantage being that the record or CD library could then be kept in one place.

Another possible improvement could be made by introducing power amplifiers into rooms so individual volume levels can be set. B&O already have the ability to carry out that sort of work and have just introduced a lighting and curtains facility which can be operated with the Beolink 1000 remote control handset. This will allow the listener to draw the curtains, select his music preference and dim the lights appropriately without moving more than his thumb! Makes you think Ian Fleming was on the B&O board doesn't it?

B&O equipment is always recognisable

by its slimline style and layout – there are no switches or knobs on the equipment fascia even though everything can be manually overridden. And the Danish company is rightfully associated with style and ergonomics; they have honed and perfected the art of getting a lot into a small space since their days of covertly making shortwave radios in briefcases for the SOE in World War Two.

Although the equipment may seem a tangle of unbelievably complicated variations, it is a surprisingly logical system to use once you crack the code as it were. With ten minutes practise the solid remote handset feels very easy and its operation is logical at least! Another sensible move on the part of B&O was to keep all the internal language of their equipment compatible. They've been doing this since 1983 and now the plan is to make the external lan-

These versatile active loudspeakers have hidden cable terminals; all wiring is under the carpet.



Harmony of function and form: The B&O lineup presents itself.

guage – that of the Beolink 1000 and its subsequent kin – the same for B&O generations to come. This does mean that you can't mix 'n' match components from other manufacturers... but that's marketing!

The equipment:

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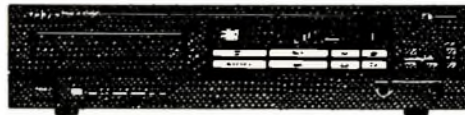
Worm's eye view of one of the imposing Pentababs.



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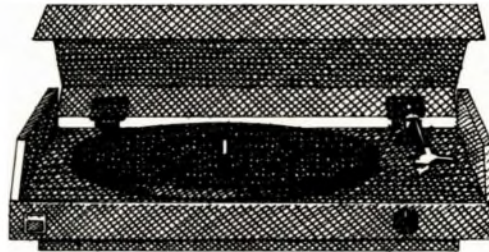
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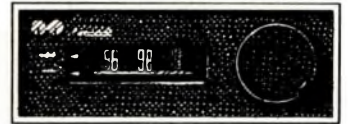
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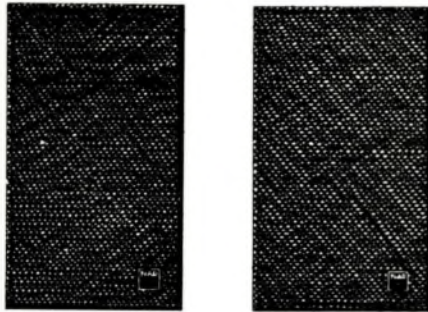
Arcam FM/LW/MW Tuner



NAD VP (vinyl playing) System



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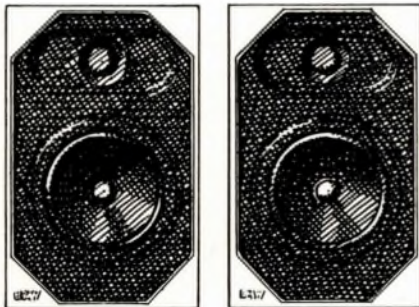


Marantz SD35 Cassette Deck



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*Sennheiser HD450
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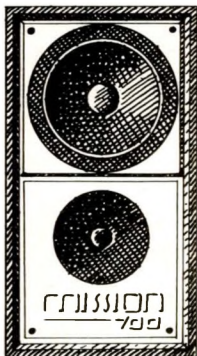
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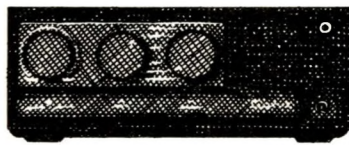
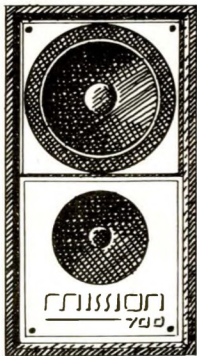
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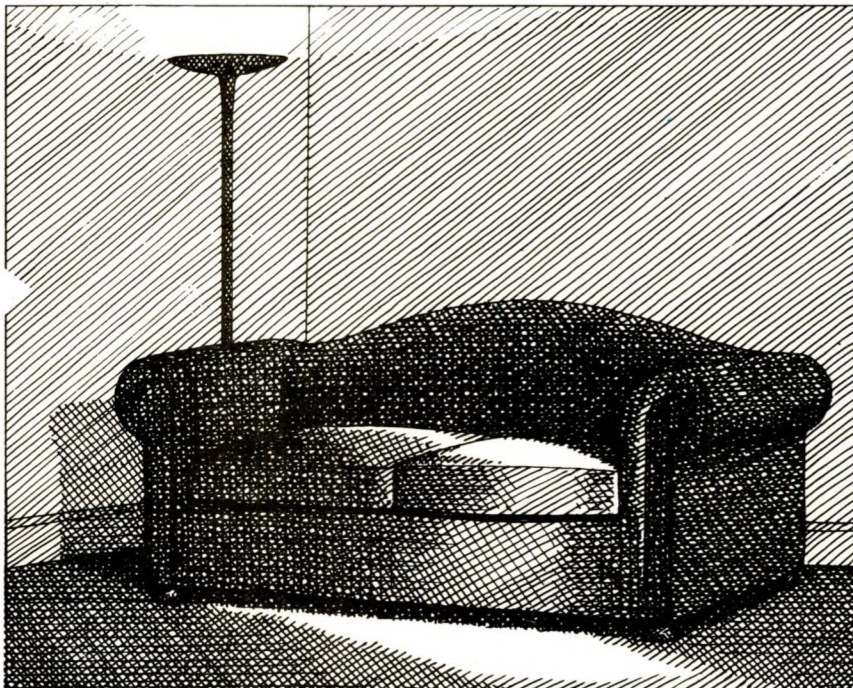
Mission 700 Speakers



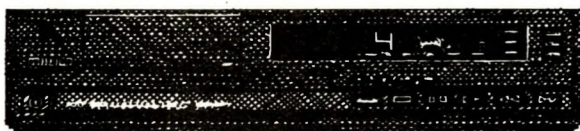
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PERSPECTIVES

Paul Messenger stargazes on the home entertainment of the future.

The Satellites

ARE COMING

Improvement in the technology of power sources, in rocket payloads and in the technical efficiency of the transmitters are all factors which are allowing satellites to evolve from a tool of the telecoms, broadcasting and defence industries to a device which could soon affect all our leisure lives. The greater the power transmitted, the smaller the aerial or dish needs to be to receive the transmissions, and the more acceptable direct domestic satellite reception becomes.

Satellites have been flying over our heads for more than 30 years, not that you'd necessarily have noticed the fact while undertaking the trivial round down here on earth. No less impressive, it was only a few short years between the mindless 'beep beep' of Sputnik 1 (invented by the Russians but immortalised by The Allisons) and the arrival of the first TV pictures from space, courtesy Telstar (invented by the Americans but immortalised by the Tornados). Three thousand launches later there are tons of junk and dozens of operational satellites up there, with just the occasional media reminder – when launch vehicles explode or nuclear reactors crash unpredictably to earth.

Then quite suddenly, in the Summer of '88, our TV News screens filled up with the sight of Rupert Murdoch and Alan Sugar – Britain's two favourite buccaneering entrepreneurs – posing awkwardly side by side amongst billowing clouds of dry ice, in front of a video backdrop of an Ariane rocket taking off. Satellite TV is about to affect all our lives (they hope).

The only satellites currently operating are low power devices needing large (1-1.5m diameter) dishes. These are intended primarily to service cable operators and telecommunications or broadcast custom-

ers. Over 40 satellites are theoretically receivable in the UK, though more than half transmit on the C-band, at a lower frequency than (and therefore incompatible with) the Ku-band transmissions intended for European use. TV programming on Ku-band is restricted to a handful of satellites, two or three of which operate English language services.

Assuming that launches proceed on schedule, the British consumer will shortly receive a barrage of publicity from programme and hardware suppliers exhorting participation in the 'satellite revolution'. The minimum offer is expected to be four advertising-supported Sky Television channels receivable from February 1989 on apparatus costing £250 and requiring line-of-sight towards the southern horizon. Additional channels may well be available from the same (Astra) satellite, but might require additional 'descrambling' electronics, probably via subscription rental. An alternative (or additional) offer of three part-subscription-funded BSB channels using similarly priced but more compact and higher quality equipment should be made towards the end of 1989.

RECEIVING SATELLITES

You can of course go out and buy satellite receiving equipment and put it into action today if you want to. The entry price is around £500-£700.

This will buy a dish 1-1.5m in diameter (considered the minimum for receiving the lower power communications satellites), some sort of fixed mounting bracket, and the technical gubbins that sits at the focal point of the dish – a 'feed horn', polarotor and LNB (low noise block). Then there's the 30 metres or so of low loss cabling with specialist connectors

that link the dish assembly to a satellite frequency tuner, and thence to the TV set – probably combining with the terrestrial TV aerial lead.

The full flexibility and convenience of a polar mount capable of tracking the geostationary arc and picking up a range of satellites, all controlled remotely from the comfort of one's armchair, can easily take the price to £1,000, while a larger dish diameter can help pull in a wider range of satellites under more adverse atmospheric conditions.

Dish sizes and receiver package prices have dropped steadily over the past few years, reflecting improvements in technology at both ends of the transmission. However, anyone attempting to receive these low power 'comm's satellites should note that the programme providers are doing so for the benefit of cable networks, not for the individual eavesdropper. Some channels (notably the movies) are therefore scrambled, and decoders are only available to subscribers in certain countries. Similarly, there's no obligation to maintain continuity of programming, and technical hiccups do occur.

Recently the Intelsat VA satellite tilted so that the centre of its footprint shifted from around Birmingham to the middle of the Bay of Biscay. According to a report in *New Scientist*, viewers in Scotland complained for months while satellite receiving sales to UK expatriates in Spain boomed until someone realised what had happened. The tilt was readjusted and now there are lots of complaining would-be viewers down in Spain. A compromise setting centred on the English Channel may be adopted!

The promise for 1989 is that Amstrad, Alba and others will make available £200

(+ \$50 installation) packages, using 70-90cm dishes for receiving the 4 channel Sky Television PAL service from the medium power Astra satellite. Ferguson, Tatung and Nokia will be producing BSB MAC receiving equipment for later in '89. Grundig and Sony are also making noises, and no doubt some of the smallest specialist companies currently involved in satellite kit will also be closely involved.

WHY SATELLITES?

Why do televisions need satellites – or vice versa for that matter? Haven't we got on very well for 50 years without them? Up to a point we don't need satellites, at least for direct-to-home broadcasting. But satellite TV is one of several possible alternatives which could increase both the quality of broadcast signals and the number of TV channels available. Whether the GBPs is interested in either improved technical quality or more channels remains in some doubt, but the hi-fi enthusiast is certain to find some of these future possibilities interesting.

The big advantage the satellite offers over terrestrial transmitters is that it operates from such a great height that a single satellite transponder (the transmitter element) can line-of-sight transmit to a complete continent if so desired, with much less problem from the 'shadow' effect that makes terrestrial transmission so difficult in mountainous terrain.

The big disadvantage is that satellites can only transmit at very low powers – typically less than 100watts compared to the tens of kilowatts used terrestrially – as they usually rely on solar cells and rechargeable batteries as the power source. Furthermore, they have a limited working life of maybe a decade, and are expensive to purchase and launch – current DBS satellites cost around \$80m, the launch another \$50m.

WHERE SATELLITES?

Any particular satellite in geostationary orbit can be received by a permanently fixed, very carefully aimed 'dish' aerial on earth. Comparatively simple so-called 'polar' mounts (not to be confused with the polarotor on the LNB that adjusts to the particular polarisation characteristics of the wanted incoming signal) permit the dish to track across the visible arc of the geostationary orbit and select from several satellites.

Quite unlike terrestrial radio or TV reception, the dish must be installed very precisely indeed – it is aiming for something not unlike a 60W light bulb, sited some 20,000 miles away. A dish needs an unobstructed view to receive satellite transmissions; viewed from the Northern hemisphere, the geostationary arc lies with its highest point due South, and satellites beaming TV signals at Europe may be sited up to 35 degrees East or West of due South. Satellite transponders beam signals

a little like a searchlight, creating a reception 'footprint' area on the ground. The size of dish needed depends on both the latitude of the site and its position within the footprint of the wanted signal. Larger dishes are usually needed in the North of England than in the South, for example.

WHAT SATELLITE? (SATELLITEREALPOLITIK)

The telecommunications satellites are already up there, and have already been mentioned. Key 'birds' are Eutelsat-1 F1 and Intelsat VAF11, operated by European and International PTT consortia respectively. But some years ago a number of governments in Europe (and Japan) laid plans to launch satellites with more powerful transmitters, designed to be received directly by the consumer on small (perhaps as little as 25-40cms diameter) dishes. These are known as direct broadcast satellites (DBS), and typically carry three or four channels of television. This approach suited governments anxious to retain some control over television, yet anxious to increase the number of channels to a limited degree.

These 'high power' satellites have so far failed to perform as hoped. Some of those that have launched have failed to operate correctly due to various technical failures (Japan, W. Germany) while others have suffered launch delays, so as yet DBS is

still unproven commercially, though the (second) Japanese satellite has attracted some 700,000 viewers in a fairly short time with only a single extra channel on offer.

A French DBS TDF-1 is due to be launched in October 1988 and the Scandinavian Tele-X in Spring 1989; both are struggling to find channels to broadcast. A second (hopefully operating properly this time) West German TV-SAT is due in Summer 1989, and the British BSB (British Satellite Broadcasting) DBS in August 1989.

However, a challenge to nationalist hegemony is being mounted by the privately funded Luxembourg based SES (Societe Europeenne des Satellites) consortium, which will transmit no fewer than 16 channels from a single Astra satellite, albeit at a medium power level that is expected to need dishes of 60-70cms diameter. Astra's launch is scheduled for mid-December 1988, with programme broadcasts commencing around February 1989. Eutelsat is responding with two 16-channel medium power satellites scheduled for 1990 launches, providing direct competition for Astra.

MAC OR PAL?

Besides competition between high and medium power satellites, there is also shortly to be competition between two different methods of television transmission



Alan Sugar (left) now best FALs with Murdoch.



All current European colour television sets are designed to receive signals encoded in the PAL (phase alternate line) format (or its close if slightly incompatible French relative SECAM). This 30 year old system still serves terrestrial transmission well, but does have certain limitations that new technology can improve.

Some years ago European broadcasters agreed that the extra bandwidth made available by satellite transmission should be used for a higher quality transmission standard known as MAC (multiplexed analogue components). MAC offers inherently better picture quality with reduced colour distortions and 'fringing', and is more effectively encrypted by programme providers operating a subscription service.

Furthermore, the MAC format sets out a hierarchy of further step by step enhancements towards higher definition television, and can 'piggy back' a number of channels of 'digital radio' (or TV soundtracks) – similar to CD digital audio but with the lower sampling rate of 32kHz, permitting a 15kHz high frequency limit.

But MAC is also incompatible with PAL. Existing sets fitted with SCART interface sockets (some 25 per cent of the large screen TV population and 50 per cent of models currently sold) will work with add-on MAC receivers. TV sets without base-band entry sockets – those relying on a single coaxial aerial feed – will need to use MAC-to-PAL converters as well, which will probably be costly and will also sacrifice any MAC quality advantages.

SATELLITES PROGRAMMING

Predicting the future content of direct-to-home satellite channels prior to launch is naturally next to impossible. We know that the Murdoch organisation plans to transmit four unscrambled PAL channels from Astra, with competitively priced receiving packages from Amstrad, Alba and perhaps others, in the hopes of securing a large audience quickly and hence obtain a profitable advertising base.

'Sky Television' plans to upgrade the



current *Sky Channel* general entertainment channel and add movie, news and sports channels. (The current *Sky Channel* is a low cost, downmarket mix of ancient US series, obscure sport and movies and pop promotional videos.) It remains to be seen whether sufficient finance will be available to improve the programme standards and market the concept, even with the assistance of hardware manufacturers.

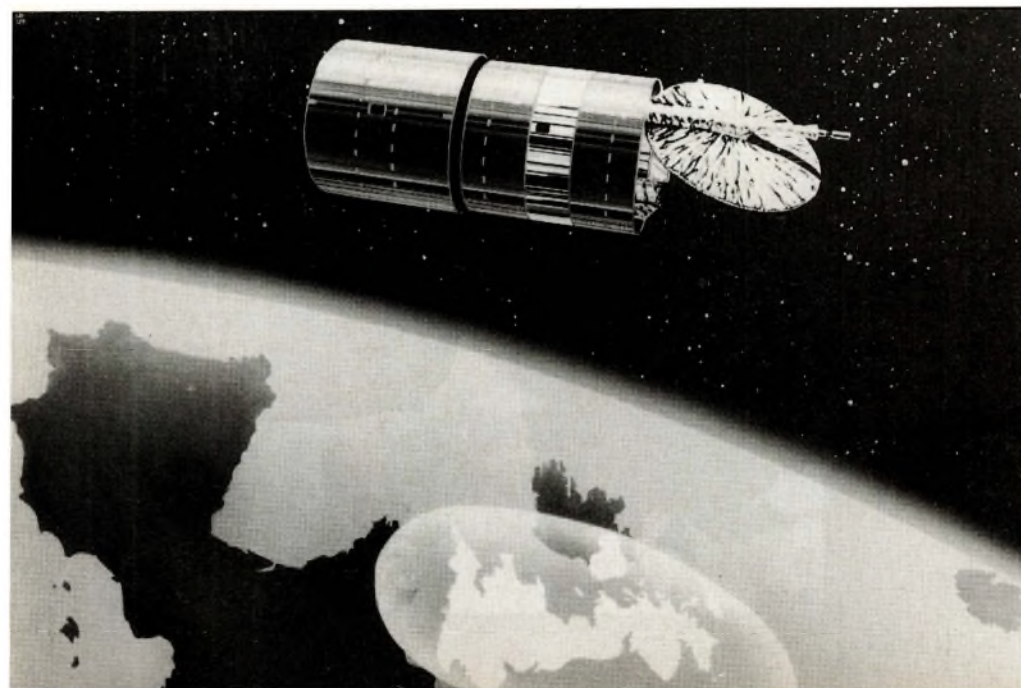
It is not yet known what other channels will use the remaining seven (or more) Astra transponders expected to carry English language programming, and which of these will be in PAL or scrambled in MAC (for a subscription service using decoder rental). The Maxwell/W.H. Smith consortium presently controls some six channels currently supplied to cable operators – Premiere (premium films), MTV

Europe (pop videos), Home Video Channel (non-premium films), Screensport, Lifestyle (magazine) and The Children's Channel. These may be broadcast scrambled and in MAC format from Astra – or wait for transponders on a medium powered Eutelsat satellite due to be launched early in 1990. The US-originated CNN (Cable News Network) is another possible Astra user.

Following some nine months behind Astra (if schedules are kept) will be the launch of the high power, three-channel UK DBS being planned by British Satellite Broadcasting (BSB). BSB has ambitious plans for programming to rival the main UK networks, with Now (news, sport, live events), Screen (subscription films) and Galaxy (general entertainment). The service will be transmitted scrambled in MAC, requiring subscription for decoder rental. Receiving equipment will be more compact than that for Astra, but will cost about the same.

SATELLITE ALTERNATIVES

That covers, albeit briefly, about all we know about the current satellite race. But satellite is not the only means of delivering a wider range of TV programmes. Cable is the obvious and altogether most elegant alternative – albeit only for the minority living in cabled areas. After five or more years construction and operation, the 20-channel interactive high technology broadband networks so far pass only 344,000 homes, and have achieved a low subscription penetration of 14 per cent – 48,568 at July 1st 1988. (Indeed the penetration rate is higher amongst the older low-band 'upgrade' networks which only distribute four channels, but at a correspondingly lower cost.)



However, one positive sign is that the total represents a doubling over the previous twelve months, and an increase in penetration over the 13.1 per cent of the previous year. Furthermore the cable industry is at last attracting investment, particularly from cash-rich, successful American cable operators, so there is some hope of escape from the doldrums, perhaps with a little help from the higher profile that satellite TV is bringing in its wake.

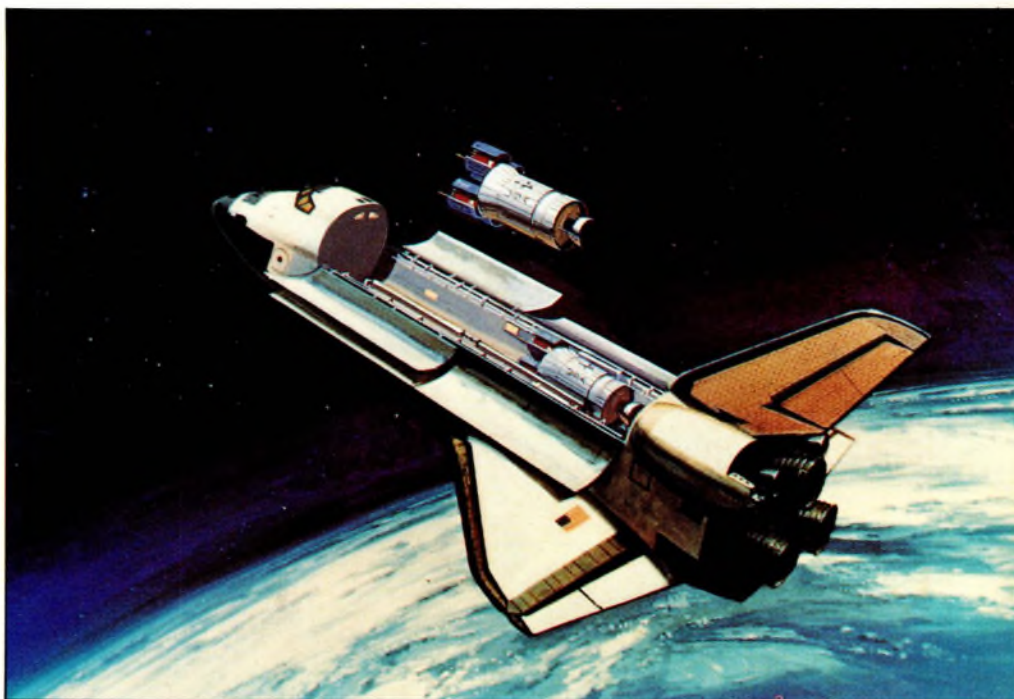
Microwave TV (also known as MMDS or MVDS) is the technological wild card that could potentially trump the others, as a low cost/low risk alternative to either satellites, cables or even traditional terrestrial broadcasting. Whether called multi-channel or microwave multi-point video distribution systems, the proposal to add extra terrestrial TV transmission up in the gigahertz band using satellite-style reception equipment could provide the many more channels that cable and satellite offer at significantly lower cost – admittedly lacking cable's interactive capabilities but allowing local programme insertion unavailable with satellite.

For the UK, MMDS is being touted as a temporary safety net for struggling cable companies, allowing immediate one-way area coverage as an interim measure while

costly cable laying proceeds, or permitting 'pseudo cable' operations in smaller towns.

Experiments are going on using the 2.7-2.9GHz, 11-13GHz and 27-29GHz bands, each of which has its own distinct characteristics and limitations, and any of which

could find useful roles in the future. For the moment this is all strictly experimental stuff whilst companies are lobbying for spectrum availability. A limited compatibility with satellite receiving equipment is possible, but by no means likely.



Carrier Comparisons

TERRESTRIAL TRANSMISSIONS

Established for decades and already covering nearly all UK households, there's no technofear or compatibility problems, even though a decent roof aerial is usually essential for good reception. Terrestrial transmissions are currently limited to four channels by the scarcity of spectrum space, though the government has discussed the possibility of creating a fifth channel. There would be some practical and political difficulties in doing so – opposition would come from interests using or hoping to use that sector of the spectrum, and new, additional aerials would probably be needed – but just the possibility should be enough of a threat to keep Murdochvision in line with government wishes. NICAM stereo sound is expected to enhance the appeal of existing terrestrial networks before too long.

LOW POWER SATELLITES

Intended to service cable headends, several low power satellites in different orbiting slots transmit some 20 channels to Europe. Direct reception is possible, but only using largish dish aerials (1-1.5+m diameter in UK); simple one-satellite receiving systems could cost £500, but the equipment for covering several satellites conveniently can easily cost £1,000. General entertainment programme quality is definitely below the UK network standard,

relying on much old material, though certain services (news, sports, childrens and music TV channels) fill popular niches. Some services are encrypted ('scrambled') in order to protect the interests of cable franchises.

MEDIUM POWER SATELLITES

The medium power satellites will carry some 16 channels each, and are expected to require 60-70cms diameter dishes for UK reception. Astra is expected to start transmitting programmes in February 1989. Consumer electronics companies Amstrad and Alba intend to offer Astra/PAL reception packages from about £200, plus £50 installation charges.

DIRECT BROADCAST SATELLITES

The UK BSB DBS is due to start transmitting three high power channels in late 1989, using the high quality MAC transmission format and encryption and charging subscriptions for viewing. The dish size is estimated at 30-40cms diameter, with the possible (but as yet unproven) alternative of a compact 25cm diamond-shaped 'squaerial', but any cost savings here will be offset by extra processing electronics necessary to handle the MAC transmissions, and probably stereo digital audio soundtracks and/or radio channels as well; £250 is again the target price for receiving kits, with Ferguson, Nokia and Tatung pitching.

MICROWAVE TV

Microwave TV is a blanket term for an as yet unproven technology that could pro-

vide something of a cross between cable and satellite services – operating locally like the former, but with the latter's basic technology. Potentially more practical and cost effective than either of its rivals, it is also last on the scene and so will have to struggle for a foothold.

CABLE TV

Successful in the US, though not yet in Britain, modern wideband cable is the ultimate programme delivery system for urban areas, independent of atmospheric variations and incorporating a two-way interactive telecommunication element, plus the ability to carry local area programming. Cable laying is very expensive and slow, however, and so far subscription conversion of UK homes passed has not been encouraging – perhaps because of the quality of programmes, perhaps because of insufficient marketing effort/funds. UK wideband cable operators will be required to carry BSB DBS programming.

VIDEOCASSETTE RECORDER

The videorecorder is qualitatively different. Purchased primarily to time-shift network programmes, this in itself is effectively equivalent to adding extra channels of television. Furthermore the large population of machines has created a substantial market for prerecorded material, mainly feature films, available soon after theatrical release for rental, and later for purchase. Hi-fi VCRs with additional Dolby stereo deprocessing apparatus can create full surround sound effects with major feature film releases.



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From your, the customer's point-of-view, that means our shops are ready to help each other when it comes to obtaining an item of equipment you especially want to listen to. Each one stocks a range of equipment - much of it British-made-tailored to the requirements of its own customers, but there is a standard of service that's common to all.

The three years that Hi-Fi Experience has been operating have shown us that, with increased leisure time, people everywhere are putting a higher value on good hi-fi. In addition, we've all lately come to expect better service regardless of what we're buying, and there was an urgent need for hi-fi retailing to reflect that trend and finally move away from the 'boxes over the counter' approach of a few years ago.

At Hi-Fi Experience we decided to offer a new level of service, one that would apply without qualification at all our shops, regardless of where they were or how big they were. That meant stocking only equipment we were satisfied with, in terms of sound quality, construction, reliability and after-sales service. We had to be able to demonstrate that equipment to the best of its capabilities, and that meant implementing an ongoing programme to ensure our listening rooms and setting-up procedures met that requirement.

There is a constant effort to improve the comfort and ambience of our demonstration rooms, to make selecting and comparing equipment as relaxed and enjoyable a process as possible.

Of course, the best equipment and the best demonstration facilities would count for nothing if we didn't believe we also had the best staff. Good staff is a product of good training, and we invest heavily to ensure the people you will encounter in our shops know their equipment, and how to get the best from it. We undertake the kind of staff training courses that are far-from-commonplace in hi-fi retailing.

It's all part of an effort to offer you a level of service that's way above the rest, but should you find you don't get that level of service from one of our shops, let us know and we'll do something about it. We have confidence in ourselves, and we want you to have confidence in us.

Each of our shops will do some things slightly differently: we encourage an individual approach to customers' requirements. But the minimum we expect from each one is good demonstration facilities; comfortable, well-furnished places in which to listen; an exchange-if-not-entirely-satisfied procedure; and fair prices. We also hope they'll convince you that good hi-fi can look good, too, and that you don't need the likes of a Gold Visa card to obtain it! All our shops offer sound-value, inexpensive equipment which will form the basis of a reliable system for years to come.

It's worth adding that Hi-Fi Experience plc is a member of the British Audio Dealers' Association (BADA) as are some of our shops on an individual basis. All, however, trade within the terms laid down in BADA's charter, and most often exceed them.

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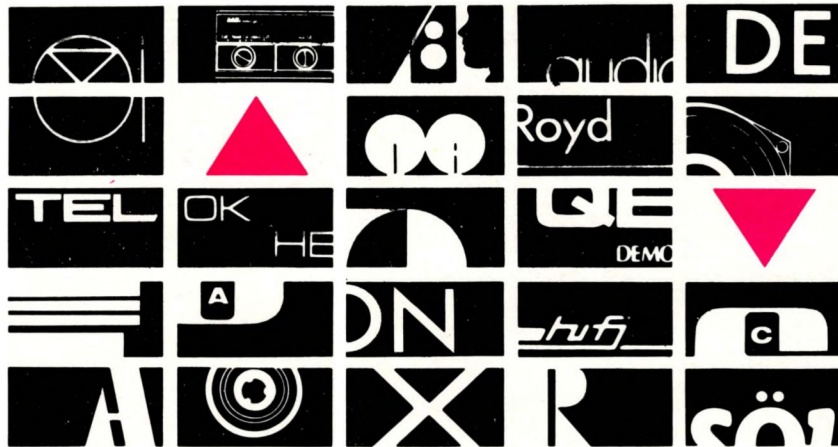
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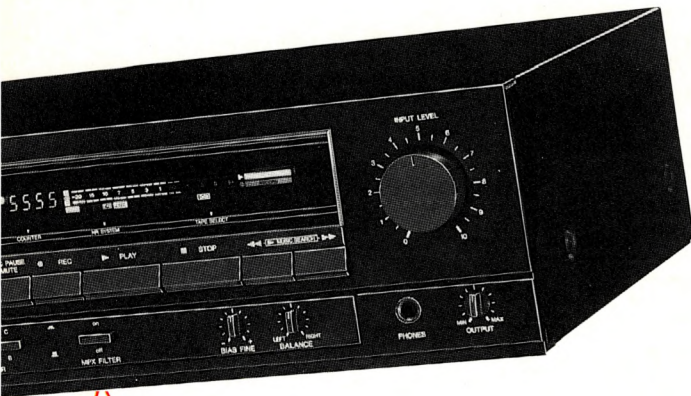
Hi Fi Choice



DR-M12HX/R £219.95

“...the DR-M12HX proved extremely easy to use and provided fine sound quality both with recordings and pre-recorded tapes. . . it offers good results in every respect.”

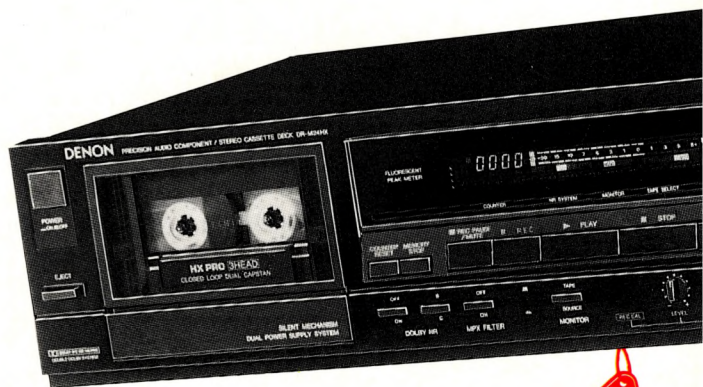
Noel Keywood, Hi Fi Review.



DR-M24HX £289.95

“This is a very clean, open and spacious sounding recorder with an attractive range of facilities. The sound is very positively presented, to the point of being larger than life at times. A deck of breeding, and very well built to boot.”

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LOUDSPEAKERS

John Bamford has been listening to five floorstanding loudspeakers in search of the 'ideal' sound.

GOING FOR

Broke

If you picked up this month's issue of *Choice* because you're thinking of treating yourself to a new hi-fi system for Christmas, the loudspeakers featured here may well be regarded as the stuff of which dreams are made. It goes without saying that anyone prepared to devote a sizeable chunk of their living space to a pair of large, floorstanding loudspeakers must be pretty serious about hi-fi, especially since to accommodate high quality monitoring speakers you also need a high quality hi-fi system to drive them.

It can't be stressed too strongly that once you move up to the heady heights of expensive loudspeakers such as the five models discussed here, the rest of your system is immediately put under a magnifying glass. The speakers may well be responsible for the scale of the sound in your living room, but it's important to understand that loudspeakers can only reproduce the signal provided by the rest of the equipment. Use a pair of accurate and revealing speakers with a poor quality turntable (or CD player) and cheap 'n' cheerful amplifier and all you'll end up with is a very accurate rendition of a poor quality sound. Think about it for a minute and you'll realise how logical this is.

So why bother with large, highly revealing speakers if all they're going to do is show up faults in the rest of your system? The fact is, of course, that the majority of hi-fi enthusiasts simply don't bother – especially here in the UK where our homes tend to be too small to accommodate large floorstanding models. Hence the proliferation of high resolution 'compact' loudspeakers designed in this country such as Celestion's *SL600* and *700* models, the Epos *ES14* and, more recently, Acoustic Energy's *AE1* and *AE2s*. Indeed, with good design, a small 'bookshelf' loudspeaker can be made to produce a large soundstage which belies the speaker's diminutive dimensions, while research into improved cabinet construction and hi-tech drivers has enabled designers to produce small speakers which are extraordinarily detailed and 'accurate'.

But what small loudspeakers can never do is recreate the *scale* of a live musical event. Whether you're listening to the Royal Philharmonic or David Lee Roth, if you want

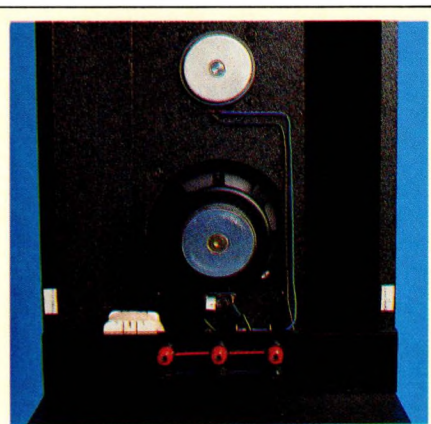
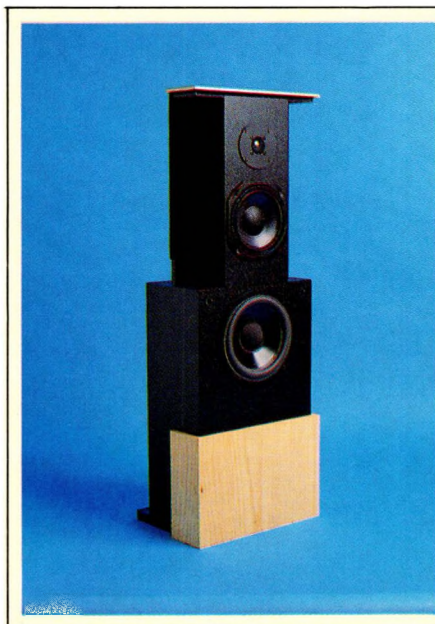
a life size image of the musicians performing in space you really do need large loudspeakers which are capable of reproducing very low bass frequencies, as it is information down in the region of infra bass which gives us clues as to the nature of the location in which the musicians are performing. To create the 'feeling' of the concert hall your hi-fi system has to be capable of resolving extremely low level information which is very low in frequency. And once you've heard a system which recreates this large-as-life image there's really no turning back . . . Which in a way is how this mini-feature on five floorstanding loudspeakers came about.

As well as needing a high quality hi-fi system (ie an *expensive* system) with which to drive large and revealing speakers, one also needs a fairly large room, preferably a room in which you can move a lot of air without incurring the wrath of your next door neighbours. Around 12 months ago I finally completed the conversion of the basement of my house into a listening room which measures approximately 27 by 14 feet – and during the past year I've been experimenting with more loudspeakers than I care to remember. I

thought that once I had a large room where I could make as much noise as I wanted, making good sounds with a hi-fi system would be a piece of cake. I couldn't have been more wrong. The bigger your system gets, the easier it is to become dissatisfied with it. At least that's been my experience.

As you can imagine, because I'm the editor of *Hi-Fi Choice* my system changes almost week by week while I constantly evaluate new products. (It's a hard life!) However, the following is a shortlist of some of the system components used in the evaluation of these loudspeakers:

Townshend *Rock* turntable with *Excalibur* arm and Audio Technica *OC9* and Koetsu *Red* cartridges; *The Voyd* turntable with Heliuss *Cyalene* arm and Audio Note *10 Limited* cartridge; Denon *DCD 1500*, Pioneer *PD-91* and Marantz *CD-65DXIII* CD players plus Musical Fidelity *Digilog* outdoor D-to-A converter; amplifiers – Musical Fidelity *MVX*, *P270* and *A370*, Pink Triangle *Pip*, Audio Innovations *Series 1000* and *The First Audio Amplifiers*, EAR *802/509s*; and a host of various cables and equipment stands. Even the cheapest combination comes to a few thousand



SD Acoustics OBS. Midrange and treble units are mounted on an open baffle, while the crossover can be 'split' to allow full tri-wiring or tri-amping. Price is £695 finished in light ash, black ash, or American walnut veneer.

pounds. As for the cost of the building work on my listening room, I dare not put a figure to it in case my bank manager is a closet *Hi-Fi Choice* reader!

SD ACOUSTICS OBS

Launched earlier this year, the *OBS* is a £695 open baffle design which this Surbiton-based company has been developing for over three years. *OBS* uses an eight-inch bass driver housed in a separate vented enclosure, with a six-inch midrange unit and aluminium dome tweeter mounted vertically on an open baffle. The speaker stands 39in. high by 15in. wide, while the bass enclosure measures just 8in. deep. Consequently *OBS* has a surprising small 'footprint'.

You won't need a huge room to get good results from *OBS*, but to give it its best the speaker does need to be positioned well away from the rear wall. Used in free space the speaker sounds wonderfully open and relaxed, with a sweet and strain-free top end which integrates well with the mid and bass. In fact *OBS* is a beautifully integrated loudspeaker, not hugely demanding of partnering equipment yet capable of responding to improvements elsewhere in the system.

SD Acoustics were pioneers (in the UK, at least) of the split crossover concept, allowing the separate arms of the crossover network to be individually grounded at the amplifier output terminals where earth is potentially closer to the nominal zero volts. Bi-wiring – or, as with *OBS*, tri-wiring – has proved to be a useful upgrade for many enthusiasts all for the cost of additional runs of speaker cable. And if you want to go the whole hog at a later date, you can always upgrade by doubling up or even trebling up on your power amplifiers (bi-amping/tri-amping). However, this should not be confused with 'active' amplification, where you also employ two (or three) power amplifiers but you dispense entirely with the speaker's crossover network and use instead an active crossover which splits the audio frequencies in the signal path between preamp and power amplifiers. In a true active system, therefore, each power amplifier is dealing only with a dedicated section of the frequency spectrum.

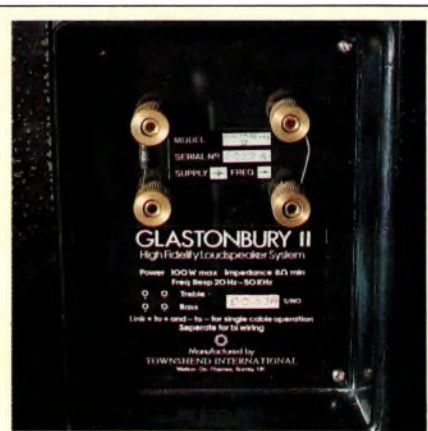
The sound of *OBS* is orderly and well structured, with little muddling of instruments or image specificity, only a rather 'warm' veiling in the bass and midband which made me comment to a friend recently that I thought the *OBS* sounded like a valve amplifier! I can imagine *OBS* sounding nicely balanced and not at all 'hard' with otherwise hard sounding transistor electronics, which is surely bound to make it extremely popular.

The visual design is spot on too, and I think as more people get to see and hear these speakers SD Acoustics are going to be hard pushed to make enough of them.

Far from the perfect loudspeaker, *OBS* nevertheless provides fatigue-free listening and produces a wide and deep soundstage in a big room coupled with reasonable image 'height'. Musicians aren't life size, but they're a heck of a lot bigger than you'll hear from the majority of £695 loudspeakers. At the price, *OBS* is hard to fault.

TOWNSHEND GLASTONBURY II

We now move up in price to £1,400 where we



Townshend Glastonbury II. The aluminium cone bass/mid driver is used up to 7.6kHz, and the flared port tuned to match the driver's free-air resonance circa 27Hz. Crossover may be split; in normal use one of the links is a resistor to allow tweaking of the tweeter output level.

find what is arguably the most individualistic speaker design to have been launched in the UK for decades. The designer is an Australian called Max Townshend, the company is called Townshend International, and their home is Walton-on-Thames. A few years ago the company produced a short-lived, very expensive speaker called *Glastonbury*, hence the *II* suffix to this model launched late last year.

Glastonbury II uses an extremely heavy enclosure made of a painted aluminium outer skin (the baffle is steel) layered internally with carpet and then several layers of gypsum. No robots here, it's all done by hand, the construction of each enclosure involving no less than six separate pours and a full week drying out in special 'ovens'. Two drivers are used, a Japanese leaf tweeter which is claimed to extend the frequency response of the speaker up to 50kHz, and an aluminium cone 7½-inch bass/mid driver developed by UK designer Ted Jordan. The 6dB per octave crossover, which is split to allow bi-wiring, doesn't bring the tweeter in until 7.6kHz. Additionally 100hm and 5.60hm capacitors are supplied which allow listeners to trim the treble balance to taste.

In addition to utmost cabinet rigidity, *Glastonbury II* is all about correct bass loading, the flared port (which is also flared inside the cabinet) being individually calibrated for each enclosure to match each and every drive unit.

The result is a slim and compact speaker which stands just 3ft. high by 11in. wide and 18in. deep, yet is capable of reproducing astonishing levels of very low bass. And because the cabinet itself radiates so little sound, *Glastonbury II* can be pushed into the extreme corners of a room and angled sharply inwards towards the listening seat to create a truly massive soundstage which you'd swear you could walk into. That's when you've got your system just right, and the speakers are sounding on-song.

I've managed that with *Glastonbury IIs*, and there are times when I've considered these speakers to be the best in the world. I've confounded many visitors too, several people having been forced to scratch their

heads when they've realised that what they're listening to is nothing quite like what they've heard before.

It happens mostly with good quality vintage analogue recordings, where musicians can be heard to be performing in a most believable acoustic and you can hear 'right into' it. But the speaker is also ruthlessly revealing of the electronic 'hash' of the majority of modern multitrack recordings, to the extent where you can hear individual songs on your favourite LPs or CDs compressing and distorting during complex passages and opening up again when the music is simpler – say when you've a solo voice and guitar, or simple keyboard. Cymbals have a natural ring and timbre, drums sound good and bad depending on how they've been recorded, and time and again the transparency of *Glastonbury II* takes my breath away.

When *Gramophone* reviewed *Glastonbury II* just a few months ago the writer said he thought this speaker to be the most exciting development he'd heard since the Quad *ESL 63* electrostatic. And this from a commentator who will have used compact disc



exclusively rather than vinyl in his assessment. But then detailed and controlled bass is this speaker's forté – and if CD can knock the pants off most record players in any one area, it's in bass performance.

I don't go around telling everyone I meet that they'll love *Glastonbury II*s, because I know that many hi-fi enthusiasts are looking for something the *Glastonburys* don't give. Max Townshend will have it that those listeners are therefore looking for something that *true* high fidelity can't provide. High fidelity is not about boom and tizz, it's about faithfulness to the original sound – that's the Townshend philosophy and if the sound of the *Glastonburys* disappoints it's because they're exposing the poor sound of the majority of commercial recordings.

For my money I think the *Glastonbury II* is a fabulous loudspeaker and it should be heard by anyone shopping in this price area. You'll need a home dem to really hear what it can do; in a hi-fi showroom it will probably sound lacklustre and uninteresting. But make sure your dealer does the transporting, as each enclosure weighs the best part of a hundredweight.

KEF 107

Choice has never formally tested *Model 107* in the three years since KEF launched the speaker – and since I've always been intrigued by what the *107* might do in my listening room this seemed like the perfect opportunity to cajole KEF into lending me a pair.

For those not familiar with KEF's £1,890 domestic flagship speaker, it's a three-way design which employs four drive units and includes active low level equalisation in the form of a small control box called KUBE (KEF Universal Bass Equaliser). KUBE must be wired into your system either via the tape monitor loop of your amplifier or in-line between preamp and power amplifier(s). This little box of tricks actually comprises part of the speaker's crossover network, including fixed equalisation which is calibrated at the factory for each pair of loudspeakers to provide frequency response shaping and sensitivity matching between each pair to better than 0.5dB.



KEF107. Active bass equalisation in the form of the KUBE control box allows unprecedented flexibility in room/system matching. Top enclosure housing mid and treble units can be rotated to achieve precise stereo focusing, but results in it being non too rigid.

Snell Type C. It doesn't look like a lot of speaker for £2,350 – but looks can be deceptive. Type C is a three-way design, but with crossover splits to allow bi-wiring only, not tri-wiring. The 'C-Frame' from RE Designs lifts the cabinet off the floor and holds it rigid.



KUBE also provides variable equalisation via three control knobs marked *Contour* (for adjusting the level of bass relative to the midrange/treble to suit your room and/or taste), *Extension* (for setting the bass speakers' cut-off frequency – you can choose between 50, 35, 25 or 18Hz), and *Qfactor* (to adjust bass damping).

The 72litre low frequency enclosure houses two 250mm drive units which are linked by a force-cancelling rod and mounted by what KEF describes as 'Coupled Cavity' configuration. Bass energy is vented upwards at the top of the enclosure to obviate floor reflections. Meanwhile the midrange driver and cone tweeter are housed in a separate 8.5litre 'pod' which has been carefully sculpted to control diffraction effects. This top enclosure can be rotated to achieve precise focusing of the stereo image, independent of the orientation of the main cabinet – which is a useful touch and aids transportation and packaging too – but the result is that structural integrity is compromised and the top enclosure is free to wobble around.

I'm hoping I can have a little more time at home with *107* because it's proved as interesting a loudspeaker to listen to as I'd hoped it might. Bass frequencies do different things in different rooms, that's for sure, but even when comparing different systems in the same room, it can be difficult to determine *exactly* what's going on at very low frequencies.

I've spent many hours experimenting with the *107*s and can only come to the conclusion that in terms of LF performance they are the most accurate speakers I've ever auditioned. Certainly they go *lower* than any other speaker I've tried in my room, so low that they actually revealed a problem in my system which all other speakers had failed to expose. (One particular amplifier I'd been using proved to be unstable below around 30Hz.)

An interesting trade off, however, is that when you hear a speaker which is so clean and controlled and extended in the bass the effect is curiously undramatic. The *107* displays little punch or wallop, rather the bottom end simply goes down and down and

down... It's singularly unimpressive if your idea of good hi-fi is sonic fireworks. But once you've come to terms with the disappointment there's no arguing that the *107* is a seamless performer, the bass and midrange and treble being quite superbly integrated.

Where *107* will disappoint listeners most – especially rock music fans – is that it lacks a degree of get-up-and-go. Treble is clean and very civilised (though perhaps a shade dull for some tastes) yet along with the midband it lacks the resolution of, say, the Snell *Type C* and Townshend *Glastonbury*. Neither does it track faithfully and dynamic swings in some recordings – one 'virtue' being that its tendency to blandness shows poor recordings in their best light.

In some ways the *107* is the best speaker I've ever used at home, in others it clearly ain't. If you're looking for a civilised and vice-free sound you'll love it, especially if you're a CD user. And I was about to add that *107* is the sort of speaker you can install in your home and then forget about hi-fi while you get on with the business of enjoying music. Trouble is, have you got the self-discipline to stop playing around with the KUBE controls? I couldn't keep my hands off them...

SNELL TYPE C

Doesn't look too promising, does it? The drive units are crude-looking paper cone types, and how can a speaker possibly work when the midrange and treble units are separated from the woofer by acres of baffle?

But work the *Type C* certainly does. I found the best way to prevent visitors poking fun at them was to keep the grille covers in place. It's funny how, when they don't know what they're listening to, everyone seems to like them!

Despite the decidedly low-tech appearance of Snell loudspeakers, rest assured that this Boston based company puts a lot of design effort into each model. From the 'baby' *Type K* through to the *Type III*, *Type E*, *Type C* and massive *Type A* there is an uncanny similarity to the sound and – fundamentally – the way in which the speakers present the music. Alvin Gold once penned a review of the *Type C* in which he described

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New Hi Fi Sound, March 1988

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Hi Fi News, December 1987



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What Hi Fi, December 1987

“... 505-3 sounded better separated and slightly more vivid.”

What Hi Fi, December 1987



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how the speaker, rather than highlighting small musical details in the manner of many high resolution small loudspeakers (the equivalent of audio microscopes), went back to basics and got the underlying structure of the music right. And this is it about all Snell loudspeakers. Even the little *Type K* (priced £449) displays a believable weight and solidity that makes musical events come to life.

What you get when you spend more money and move up in the Snell range is increased scale and improved bass extension. By the time you've spent £2,350 on the *Type C* model you've got a very big sound indeed, with a tall and wide image that really gives the impression of 'being there'.

Surprisingly, though, despite having heard *Type Cs* sounding articulate and transparent in other systems, I've had all sorts of problems with them in my room over the past few months. For good image depth they need to come away from the rear wall (no problem in my room), and in order to get the best from them you need good quality amplification. (No problem again, I've had to hand the top-of-the-range valve amps from Audio Innovations, a subsidiary of Brighton-based company Audio By Design Ltd who import Snell speakers from the US.) The two products go together like bread and jam. (Perhaps I should say champagne and caviar...)

What was bugging me was that the speaker sounded slow and 'thick' in the mid-band, with a 'cuppy' coloration that made it difficult to hear into complex musical passages. This was not a characteristic I'd come to expect having used smaller Snells at home in the past. Guy Adams of Voyd Turntables heard the sound they were making at my house one evening, left for home with a confident air that all would soon be well, and returned a few nights later with pair of pedestal plinths in the boot of his car designed especially for the *Type C*. Made by R E Designs, a Brighton-based company which manufactures heavy-duty stands for the entire Snell range (you can use them with other speakers as well), the *C Frame* as it's called weighs an absolute ton and has a weighty £219 price tag to match. But with spikes underneath to help hold the speaker rigid, it works wonders for the *Type C*. As Guy said once we'd re-sited the speakers, "It sounds as though the bass driver is now much lighter and faster and better controlled by the amplifier." He was right. What was even more surprising was the way in which the *C Frame* seemed to improve clarity and definition in the midband and treble too.

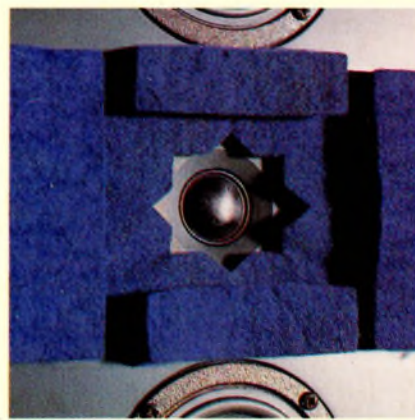
If I've failed to adequately describe the sound of the Snell *Type C* it's because I find it hard to put into words. It can't be described in terms of 'smooth treble' or 'liquid mid-range' because it's just not that kind of speaker. What the Snell does do is bring music to life: the sound might not be the most civilised I've heard but it's the speaker's essential musicality which makes it command the asking price.

Snell speakers can be hard to track down in the UK as distribution is limited to only 15 dealers. But when people hear them, the majority can't help but fall in love with them.

DUNTECH PCL 500 MARQUIS

Launched in the UK just a few weeks ago at

Duntech PCL500 Marquis. *Effortless control and astonishing SPLs are its forte. Once again, crossover is split for bi-wiring/bi-amping. Absorbing material on the front baffle reduces diffraction distortion – you've seen this in other speakers, but Duntech owns the patent.*



the Heathrow Penta hi-fi show, Duntech loudspeakers are a new line for specialist importers Absolute Sounds. Duntech Audio is based in Adelaide, south Australia, and the company claims to produce the world's most accurate loudspeakers.

It's a bold claim, indeed, but then Duntech International – of which Duntech Audio is just one division – is a bold company. Company founder John Dunlavey began as far back as 1963 designing electronic equipment and specialist antennae systems in the US. His company achieved international recognition in the 'sixties and 'seventies and Duntech antennae are now used on most US navy and coast guard ships, in embassies, and in the US President's emergency communications system at the White House. The company also designed systems for the Mercury, Gemini and Apollo spacecraft.

Duntech moved to Australia in 1981, and these days the company is seen to be working at the cutting edge of technology in its research into things such as air-to-air collision avoidance systems and alternative energy sources. As the *raison d'être* of the company is scientific methodology, the loudspeakers it produces are the result of meticulous research and development into design, manufacture and measurement techniques to determine 'accuracy'.

Of course, whether or not a loudspeaker measures like the perfect transducer does little to determine exactly how it will behave in *your* room as part of *your* hi-fi system. The 5ft high *Marquis*, which at £3,500 in the UK is Duntech's smallest floorstanding model (though the company does manufacture a compact 'bookshelf' monitor), nonetheless does sound like an extraordinarily transparent and accurate monitoring speaker. Using two 210mm bass drivers, two 100mm midrange units and a 26mm tweeter where each driver is housed in a separate, sealed enclosure, the sound it produces appears remarkably clean and vivid and superbly dynamic. If one word sums up the sound of the *Marquis* it's 'control'. Imagine a Linn *Isobarik* with deeper bass, slightly 'creamy' and warm midrange and bright (but nonetheless civilised) top end and you're hearing what

the *Marquis* is all about.

Its imposing size enables the speaker to create lifesize images of musicians, transients are razor sharp, and the bass, while less extended than that of the KEF *107*, can be likened to that of the KEF in its sense of ease and even nature. I haven't had to tweak around with the *Marquis*, which is just as well since it's impossibly heavy to move around the room and I've only had the speaker for a fortnight. Positioned at one end of the room, about a metre away from the rear wall and 9ft apart, the speakers were toed-in towards the listening seat and fired up in anger. The sound gelled first time, and since then has steadily improved with the addition of carpet-piercing spikes and improved system ancillaries.

Sensitivity is very high at 92dB, consequently Audio Innovations triode coupled monoblocks drove the Duntechs with ease, while for ear-bleeding rock concert levels the speakers revelled in the power of the Musical Fidelity *A370*.

The price is high, but if your system is good enough and you're looking for superb control and high resolution they are nigh-on unbeatable. I'll miss them when they're gone.

THE PERFECT LOUDSPEAKER?

This was never intended to be a comparative review, as the speakers I've been experimenting with cover a massive price range. Instead it hopefully serves as a taster of what you get at different price levels.

I strongly maintain that loudspeakers are an individual choice, determined by the type of system you own and the nature of the environment in which they're to be used. And that's not to mention personal taste.

What I'm looking for in a speaker, I guess, is the clarity and 'punch' of the Duntech *Marquis*, coupled with the musicality and openness of the Snell *Type C*, the bass extension of the KEF *107*, the inviting midband and superb imaging of the SD *OBS* and the natural, reach-out-and-touch realism of the Townshend *Glastonbury*. Too much to ask? I daresay it is, as every loudspeaker performs in different ways in any given set-up.

But it sure is good fun trying them all out!



MARKET RESPONSE

Dan Houston polls dealers on the current state of the CD midi system market, covering factors such as reliability and the best sellers.

The CD midi system market is a huge concern, commanding just under a third of the total audio equipment budget. Estimates by the Audits of Great Britain company, sponsored by major manufacturers such as Sony, put the total value of CD midi systems sales (both one piece and separates) at £181 million, with around 660,000 units sold this year. Everybody's buyin' 'em folks!

The chances are that if you've bought this magazine you're interested in buying a midi system and the purpose of this article is to give readers a different perspective from the reviews you'll find later. *Market Response* is a distillation of dealers' comments on, and experience with, the CD midi systems they stock. In it we look at matters a reviewer cannot judge, such as reliability from the various brands, what happens if your system breaks down and how much money (in dealers' opinions) you need to spend to get something worth having. We also include a best sellers list which is a stab at discovering which systems are most popular at present, both with independent specialist hi-fi dealers and through some of the major multiples.

The midi system has certainly replaced other kinds of system, such as racks and music centres, as the obvious choice for system buyers. Brema (British Radio and Electronic Equipment Manufacturers Association) told us that midis accounted for 88 per cent of the total one-piece system market. It represents an all-in-one compact package with a carry home quality that makes buying hi-fi an easy experience. There is no need to sip coffee and listen to 'salespeak' on wow and watts before making a choice on a collection of visually incompatible separate components. The system's there and it's great, or is it?

The majority of the specialist dealers we approached for this survey agreed that in terms of sound quality the midi did not compare with well-put-together separates. And this was also the

reason given by many dealers who replied to our questionnaire, saying they did not stock midi systems. Mike Corrin, of the Island Compact Disc Centre in the Isle of Mann, told us he felt very strongly about CD midi systems and always told his customers that they were 'c...p'. "They then have to buy a real hi-fi, or they start saving, or they get very upset and leave," said Mike who is a champion of the British hi-fi cause.

The problem with the 'separates are better' philosophy is that separates certainly are perceived as more expensive to Joe Public (or Mrs J. Public). Even the cheaper CD midi system

selling alternative speakers. Many dealers would not do this but you could still use the system's own speakers in the kitchen or bathroom, say. One exception to this rule is the Goodmans *Maxim 2* loudspeakers which are sold with the *5300CDM* system reviewed this month. The speakers are a Best Buy in their own right.

Of course, as Kerry Krawczyk of Superfi in Nottingham pointed out, separates can offer better value for money in the long term as you can add to them and they generally last longer. Particularly at the lower end of the price scale, once an element in the one-piece goes the whole thing is

pensionable age. "Midi systems are not selling less but over the last year the components are selling more," Mills said.

We asked dealers how much they thought one had to pay to get a 'decent sounding midi system'. The answer ranged from £500 to £1,000 with a mean average of £733! This is a lot higher than the £540-odd figure we quoted in January's issue on the same subject.

Around 40 per cent of business in CD midi systems will take place in the months November through February so that we have roughly two thirds of the turnover in that third of the year. Many specialist dealers also told us their sales would treble or even quadruple in that period.

TROUBLE AND STRIFE

Several dealers said the reason people bought a midi system as opposed to separates was for the style of the thing. Hi-fi separates are seen as sprawling ugly boxes which dominate whole alcoves in living rooms, offering guests a tantalising view of their spaghetti-wired derrieres.

In trying to get a profile of the sort of people who buy a midi system as opposed to separates (are they all under five foot two?) we discovered that the decision to 'go midi' is often taken by the distaff side of the household. "The man chooses the sound; the woman chooses the looks," was how one dealer described the, presumably doppel-ganger couples buying midis from him. We were told that although men might prefer the diverse and esoteric appeal of separates their wives would not allow it. But given the fact that the hi-fi industry is one of the few remaining strongholds of chauvinism this can be taken as you like. Anyone, it seems, can buy a midi system; the hi-fi literate – those who buy for sound quality and performance – are the minority and don't buy midi systems – full stop.

RELIABILITY

The least reliable component in the CD midi system appears to be the compact disc player itself.



Goodmans Maxim 2s: The best of British Loudspeakers in a CD midi system.

offers the whole gamut of space-age features from high-speed twin dubbing, graphic equaliser, remote control and digital tuning which are naturally seen as offering value for money. For the same price you may only be able to buy three desperately plain-looking pieces of specialist hardware and the only friends impressed with minimalism are the black-clothed type who know where the 'Acid House' is.

Several dealers mentioned that buying British loudspeakers with a CD Midi System was a good way to upgrade on sound quality. Many systems were let down on sound quality by their appalling loudspeakers and some dealers told us they would discount the price of the system if they were

defunct and in this way the midi system is inflexible.

Of the dealers we spoke to by telephone some half dozen had noticed a trend away from midi systems to separates. One dealer told us that during the last year his midi market had declined by 50 per cent, while the turnover of separates was increasing by the same amount. Dealers do not necessarily make more money out of separates sales either. We heard from several that it was easier to sell cheaper separates systems on sound quality than a proposed midi system; especially when the customer gave the dealer a chance to demonstrate the difference. Richard Mills for JVC told us we would be wrong to think the midi system was of

Manufacturers are quite a way along the reliability learning curve where CD players are concerned but the return figures on CD players are much higher than with cassette or record decks. Problems are usually with the player's radial focusing mechanism which needs to travel in an arc to let the laser 'read' the disc. Replacement can cost nearly as much as a new CD player. Cleaning the cassette deck heads is also a good way of keeping your system out of the repair shop and dealers said many midi system owners were unaware of the importance of doing this.

Reliability is related to build quality and that is related to price, so most problems are occurring in the bulk end of the market. If something does happen to your CD midi system, and you have to take it in for repair, then we calculated an average return time from dealers of about two and a half weeks. There were stories of longer waits and one respectable West End outlet told us that if parts had to come from Japan it could easily take seven months!

If there's a chink in the Japanese armour it is with their service departments when irregular faults occur in a machine. Inside the guarantee period dealers found they could get results with persistence but many confided that the larger firms were just not interested in taking stuff for repair. A couple of dealers pointed the finger at Sony who has farmed out its service departments to private companies. "They'll fight tooth and nail to avoid taking stuff back," we heard from one embittered dealer, "three months turnaround on Sony gear would be good!" On the other side of the coin Aiwa and Technics were cited as being quite fast at repairs.

We asked dealers what percentage of CD midi systems arrived from the manufacturer as faulty. The idea is to get some feedback on the quality control situation in the market at present. However, a proportion, maybe as much as half in some cases, of faults will be attributable to damage in transit. From our calculations 3.43 per

cent arrive damaged. This is not a disastrous figure and consistent with our findings from surveys on separates.

Dealers appeared quite reluctant to comment on reliability this month. Many replied that they simply did not have problems with CD midi systems and all was lovely in that garden. From the comments we did get Pioneer came out top with 34 points, Kenwood second with 21 followed by Technics, Aiwa and Marantz. Aiwa, perhaps because they were stocked by more dealers than other brands, also fared worst on unreliability. That's human experience and unreliability is difficult to gauge because the more product you sell the more likely you are to find faults. Other adverse comments on reliability were levelled at Philips, Alba and Sony.

THE BEST SELLERS

Specialist dealers were asked which were their best selling systems in two price categories. The results are calculated on a points system and totalled. Ten dealers told us they didn't think it worth stocking systems under this price level.

Systems under £400

- | | |
|------------------|----|
| 1) Sony C100 | 42 |
| 2) Sony C200 | 29 |
| 3) Philips 485CD | 18 |

- | | |
|--------------------------|----|
| 4) Aiwa X33CD | 13 |
| 5) Pioneer S2 | 11 |
| Systems over £400 | |
| 1) Pioneer System 100 | 34 |
| 2) Aiwa V770DX | 22 |
| 3) Sony C500 | 22 |
| 4) Marantz MX673 AV | 15 |
| 5) Kenwood M31 | 15 |

We also approached the head offices of Argos, Boots, Dixons and Laskys (Rumbelows would not participate!). From their comments we have worked out a best sellers list according to the number of outlets they have.

Sony's C100 system again came top with 3,126 points followed by its C200 sister with 2,269 points. The Pioneer S2 System rated 2,174 points and Sony's FH 404 got 1,790 points.

Market Response should be seen as an opinion poll rather than 100 per cent accurate portrayal of the marketplace at present. To achieve the fairest results we approach a number of dealers in a random fashion sending them a questionnaire and backing up the findings, to put some flesh on the bones as it were, with telephone canvassing. The nature of the survey also means that it only covers the most common brands.

PARTICIPATING DEALERS

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

- Active Audio Ltd, Derby, Derbyshire.
- Aerco Ltd, Woking, Surrey.
- A. Fanthorpe Ltd, Hull, Humberside.
- Analog Audio, Finchley, London N12.
- Argos Stores head office.
- Bartletts Hi-Fi, London N7.
- Boots, High Street, Kensington, and head office London.
- Chew and Osborne, Saffron Walden, Essex.
- Comet Ltd, Kingston, Surrey.
- Debenhams, Oxford St., London.
- Dixons Group, based in London W1.
- ENL Nottingham, Nottingham, Notts.
- Framptons, Plymouth, Devon.
- Harrods, Knightsbridge, London.
- Hi-Fi Centre, Wilmslow, Cheshire.
- Island Compact Disc Centre, Douglas, Isle of Mann.
- John Lewis PLC, Oxford St., London W1.
- Laskys Hi-Fi, 59 stores in South East.
- Murray Hi-Fi, Stockport, Cheshire.
- Norman Audio Ltd., Preston, Lancs.
- Now That's Hi-Fi, Portsmouth, Hampshire.
- Rumbelows, Edgware Road, London.
- Spatial Audio Visual, Tottenham Court Road, London.
- Stereo Stereo, Glasgow, Scotland.
- Standens of Tonbridge Ltd, Kent.
- Superfi, nine shops based in Nottingham.
- Witney Audio, Witney, Oxford.

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



Sony's best selling C100 midi system.

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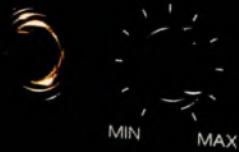
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CD-93.

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

"This is undoubtedly a CD player with real class." **HI-FI CHOICE, MAY 1988.**

CD-73.

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

HI-FI NEWS & RECORD REVIEW, APRIL 1988.

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

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NEW HI-FI SOUND, JUNE 1988.

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SP9



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Music is easily recorded and reproduced using our century's technology, yet is also easily corrupted in the reproduction. Our memories for sounds are good in many ways, yet extremely feeble in others, and in the absence of the 'real thing' we may be quite able to accept a poorly-concocted fake.

By itself this hardly seems important. If we're that easily fooled by the faking process – if we can 'hear through' failings in the reproduction process to the music beneath – why do we need to worry about the quality of the reproduction?

First, although we may not find it easy to pick out the specific faults with reproduced sound, the fact remains that poor sound soon becomes tiring and unrewarding to listen to. Secondly, poor sound usually means *incomplete* sound. If musical information is missing, we're simply not hearing all the music, and again the act of listening becomes tiring and unrewarding.

It is for these reasons and these reasons alone, that pursuing audio excellence is a worthwhile exercise. For countless thousands of people, a 'hi-fi' midi or rack system has become merely an ornamental centrepiece of the house rather than a tool for playing music, because after the initial excitement had passed, there was little joy left in listening to music. This is the effect of poor sound-reproducing equipment. But there are hi-fi systems which *will* give you musical enjoyment and enduring pleasure.

For many people interested in listening to music in the home, a packaged audio system of the type usually referred to as a midi system is the obvious choice. There is no doubt that choosing your own separates to make a working system has its satisfactions, and under ideal conditions will provide the most worthwhile and musical results. But it is also liable to end up with a rather Meccano-like

appearance and wired up with 'a plateful of spaghetti', to use Sony's memorable description.

The integrated system avoids these problems, with components of matching appearance, sometimes with a piece of furniture to subdue the 'hi-tech' look of bright chrome, control knobs and displays. Choosing a one-make system might appear to guarantee optimum electrical and mechanical matching. But appearances can be deceptive and many apparently well-matched systems (in the technical sense) are anything but.

Increasingly, integrated systems are physically smaller than in the past. Typical component widths have reduced from 43-44cms to 33-35cm now, and this review concentrates on the latter – hence the midi in the title.

COMPACT DISC PLAYER

The digital compact disc is a fairly recent development in audio – a means of storing information in digital form on a small (12cm) disc, recorded on one side only and giving continuous playing times equivalent to both sides of a long playing record strung together. The information is stored in a spiral arrangement of 'pits' which are read by a laser which follows, but does not touch the surface of the record. Very low background noise and great linearity of frequency response (up to the cut-off point near 20kHz) are the hallmarks of the system, together with a degree of robustness not associated with conventional records. Small scratches, dust and fingerprints should not affect sound reproduction. CD reproduction is free of the 'pops and clicks' which mar LP sound.

In the few short years compact disc has been on sale, it has grown in strength to the point where it is beginning to rival the more traditional sources in popularity. Many systems (including all those reviewed)

are now available with compact disc, and there are cases (eg Proton) where CD is pushing the traditional record player off the scene altogether.

Compact disc is the easiest source of all to operate. All a CD player needs is a mains feed and one of the inputs on the system's amplifier. If no dedicated CD input is fitted an auxiliary or even a spare tape input will suffice. So owners of old systems wishing to add 'stand alone' compact disc players to their existing equipment will be able to do so if such an input is available – and if not, 'input expander' accessories are available, from QED and others.

TURNTABLE

The usual type of system turntable is a simple design which includes auto-return at the end of side, and a magnetic cartridge. Recent design trends look worrying; there is an almost universal use of flimsy plastic mouldings in areas of structural importance (eg headshells) whilst the weight and build quality of the turntable chassis has tended to become lighter and stay static, respectively.

Quite a number of turntables are fitted with so-called parallel tracking arms, where the whole arm slides along a runner parallel to the line the stylus describes as it plays the record. Parallel tracking arms are invariably associated with fully automatic operation and in some cases, programmable track-search facilities.

A significant number of turntables incorporate the new T4P or 'P'-mount cartridge fitting, where the cartridge plugs into the end of the arm using the terminal pins. These cartridges all have a common specification which means no alteration to any of the arm settings is required no matter what cartridge is fitted. With some turntables, cartridges are not interchangeable at all, and where this is the case, it's indicated within the reviews. The ability to change cartridges

provides an easy, if limited route to improving system performance at a later date.

There is a remarkable uniformity in the types of cartridges fitted. Nearly all are standard magnetic designs, bearing the rack maker's name in most cases, but often recognisable as coming from Audio-Technica.

CASSETTE DECK

There have been changes in the cassette decks supplied with systems too, especially in peripheral areas like transport control and record level meter designs.

Ignoring the sub £450 systems for a moment, the archetypal cassette deck looks something like this. It will have two transport mechanisms, one for recording and playing back in the usual way, the other for playback purposes only. Using the two in combination allows tapes to be dubbed, or played back from one deck and recorded onto the other, and played back one after the other (often known as sequential play or – perhaps confusingly – as continuous play). The dubbing can be done in real time, that is at normal playback speed, but they also allow double speed dubbing. However, there are severe tradeoffs when using this high speed alternative, and sound quality always suffers severely.

Cassette decks may also have a range of buttons to operate the transport, a number of controls to set the tape type, the recording levels (with the aid of record level meters), and the noise reduction system.

Better sound quality is the aim of Dolby C noise reduction system which works very much like the familiar Dolby B but with twice the noise reducing effect. Dolby C is fitted to the more expensive decks whilst Dolby B is almost universal as it is needed to replay pre-recorded cassettes which are invariably recorded to the B format.

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instructing the deck what kind of tape you've inserted, cassette decks are learning to recognise tape types for themselves using the notches on the rear of the cassette housings for the purpose. Another much less welcome trend is automatic record level control, or ALC. This means no record level adjustments and is an undoubted boon from the convenience point of view. But the trade-off can be severe, taking the form of a loss of dynamics and increased background noise, this is because the ALC shunts the record levels up and down continuously in an attempt at making everything sound the same volume!

Elsewhere cassette deck design has become relatively static. The most popular feature is one or other variety of programme search where the deck 'listens' for gaps between tracks when in fast wind/rewind mode, switching through stop to play when it finds the gap. This is of obvious use with popular rock music (or when tapes are used to store a number of computer programs!), but the system tends to break down when presented with material with built-in gaps or long quiet passages. Speech and much classical music are examples of such programme-search-busting material, and for this reason we were disappointed to see the eclipse of normal memory search features linked to the tape counter.

Tape acceptance in most cases is standardised for the three major types: ferric (or standard bias, Type I), chrome (or high bias, Type II) and metal (Type IV), though some are unable to make recordings on the latter.

TUNER

The tuner provides the means of listening to radio broadcasts, and is commonly capable of reception over the three main broadcast bands of interest to UK listeners – FM, MW and LW.

Only FM broadcasts on VHF are inherently capable of high-quality results in stereo. FM can give a smooth, even frequency response to about 15kHz, which is close to the limit of most people's hearing. FM is also the only band where stereo broadcasting takes place. The snag with FM, apart from the relatively complex circuitry necessary to make it work effectively, is the fact that it is a short distance medium with a typical range of only 30 miles or so from the transmitter. Although indoor strip (wire) aerials are usually provided for FM reception, the use of such

devices tends to be unreliable if good, hiss-free reception is required. This comment holds especially in the case of stereo reception which requires typically ten times the signal needed for good mono reception. So where a portable (mono) radio may work perfectly adequately with a rod aerial, a stereo tuner will normally benefit from a multi-element (typically four or more elements) aerial mounted on the roof – or something similar. It's worth taking some time and trouble over the aerial, and employing a specialist local aerial erector who knows the neighbourhood reception problems. Aerial fitting is not usually expensive, note that even a high-quality, expensive tuner will not give of its best from an inadequate aerial.

A good aerial will provide more than just quiet, hiss-free reception. It will also provide a generally more reliable result, free from impulsive 'crackling' interference and other problems.

The two AM bands, medium and long wave, offer longer distance reception and provide the only way of listening to BBC Radio 4, for example, when the VHF band is given over to educational broadcasting. However, AM sound quality has very limited treble, and a generally uneven, closed-in kind of sound. The aerials supplied with the tuners – usually a ferrite loop or rod – are about optimum. They may need to be swivelled for the best reception, but attempts to increase the signal level by adding an external long wire aerial are often met with increased interference too. Although reception and sound quality on AM are 'iffy' at the best of times, there turned out to be quite remarkable differences between the best and worst of the tuners tested.

The tuners tested were all of the digital or quartz synthesiser type. The very useful feature of preset timing is associated with the digital tuners which lend themselves naturally to this kind of facility. Digital tuning can also mean more accurate tuning, though there was evidence from the tests that this was not always the case.

Many synthesiser tuners also had other problems, in particular background whistles and buzzes in the less well engineered examples. The better synthesiser tuners were free of this defect, however, and were particularly easy to use in preset mode.

AMPLIFIER

Aptly thought of as the heart of

any system, the amplifier accepts the low-voltage outputs from the turntable, CD player, cassette deck and tuner, and boosts them to a level suitable for driving loudspeakers. It also performs a variety of subsidiary functions such as tone controls, filtering and so on.

Although the amplifiers built into the systems came in a wide range of power outputs, this was usually related to price, the more expensive ones generally going louder – though not necessarily sounding better! Where loudspeakers were supplied with lower price systems, their high sensitivity generally made up for the limited power of the amplifier, so that the maximum available volume was still quite adequate.

A pair of conventional high-fidelity Heybrook HB200 loudspeakers (see Technical Section) was also used during the listening tests, and in most cases the systems were fully able to drive these to high enough volumes to satisfy most requirements. The moral of this is obvious enough – it usually makes little sense to choose a system simply on the basis of its power output unless you've an unusually large room to fill with sound, or you throw a lot of parties!

Sound quality and power output apart, the more up-market amplifiers tended to accumulate additional input facilities and more complex tone controls, often described as graphic equalisers. But many of the features on offer are less than they seem. Leaving all theoretical considerations aside, a system that works well in the first place will not benefit greatly from using tone controls. Graphic

equalisers, which are effectively a number of such controls, each responsible for a narrow band of frequencies, are merely gilding the lily.

LOUDSPEAKERS

The loudspeaker is not, as is often thought, the determining factor for sound quality – the system as a whole is as good as its weakest link, no more. But the loudspeaker does have the crucial role of translating the electrical signal from the amplifier into the vibrations in the air we call sound. The simplest loudspeaker consists of a box housing a single drive unit, but most of them divide the sound into two bands, and channel the low bass frequencies to a large coned unit capable of moving large quantities of air, and the high frequencies to a smaller unit capable of responding quickly. A third midrange unit of intermediate size is sometimes used as well, but it's worth making the point that it's extremely difficult to make a three-way loudspeaker work as well as an equivalently-priced two-way one.

There is one crucial factor that determines how well a loudspeaker additions – and this is how it's used. It is important to support loudspeakers properly, preferably on tall, open stands of the type stocked by most specialist hi-fi dealers. It's equally important to place them correctly, which often means well away from walls and other obstructions. Occasionally shelf (or wall bracket) mounting gives good results – let your ears be the guide – but placing loudspeakers on the floor and/or behind furniture is a virtual guarantee of unsatisfactory sound.



Don't be taken in by superfluous gadgets such as graphic equalisers. They do nothing to improve sound quality

AIWA X-55

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



The £380 X-55 looks pretty conventional and in the main that's precisely what it is. But there are a couple of unusual or surprising details, and one major additional feature – a built in clock and timer.

The timer shares the tuner display window, with a small cluster of controls alongside to set up everything – the clock with some difficulty, the timer with greater ease. The timer has three modes: of the two main timers, one is a 'one shot' type which can be used to make a recording off air of a specified duration at a predetermined time. The other operates similarly, but does so once every 24 hours. The two timers can be set independently and used in combination. There is also a 'sleep' function which shuts the system down after a period variable up to 99 minutes. One might be tempted to consider the system as a particularly luxurious bedside clock radio, but on consideration it lacks one vital ingredient – remote control.

The X-55 is available with or without a CD player, at £379.95 and £229.95 respectively. The turntable and CD player are separate items, though the record deck is dependent on the main system unit for power and connects via a special ribbon cable link. There would therefore be no possibility of upgrading this in the future.

System build quality is in the lower 50 per cent, the system having adequate finish but very poor control feel. Aesthetics are on the sober side, and a far cry from the more stylish

systems of old. It looks pretty anonymous in a group of CD midi systems, but should fit OK in most domestic situations.

The turntable and loudspeakers are built in Taiwan, but the main unit and CD player are made in the UK, though from what I've seen the Aiwa plant is little more than a screwdriver assembly operation. The basic technology is certainly Far Eastern except for the CD player, which has a strong Philips flavour

PX-E55 TURNTABLE

The PX-E55 is fitted with a rather better mat than usual, which helps damp the thin moulded plastic platter. The player is belt driven and has the usual pivoted arm and magnetic cartridge – not interchangeable in this instance. Despite the prominent 'Automatic Turntable System' label, the PX-E55 is strictly auto-return only. Cueing and other controls are on the front panel, and accessible with the cover shut. The dedicated nature of the system prevented some of the usual tests being performed, but wow and flutter levels and low frequency drift are quite reasonable.

CX-55 MAIN SYSTEM UNIT

Radio reception is handled by a three-band digital tuner. This lacks full random preset programming, but can still remember eight FM and eight AM frequencies. The controls are all large and clear, but the display, which

also acts as the clock/timer readout, could prove a little confusing. Technical standards are high: I encountered no reception problems with this tuner on any waveband, and FM noise levels are low and mostly free of 'whistles'.

The cassette deck is an odd mixture. There are two transports (naturally), one recorder and one player, with the usual facilities for dubbing at normal or double speed. Record levels are set automatically. Both decks have full autostop, and manual tape type switching for playback purposes. And despite discrete 'Metal' labels on both transports, the deck is not only incompatible with metal tape recording you can't even record with chrome (Type II) tape either which is both unusual and limiting. Little is done to warn the user of this limitation – I could only find a short two line note on page 32 of the instructions and a hint, no more, in the specifications. The equipment labelling is highly misleading, even though there is a microscopic 'pb' next to the word 'Metal' near the tape selector. Measurements confirm the lack of serious under the skin engineering.

Finally, the amplifier section provides 15 watts/channel. It is fitted with a 5-band graphic equaliser and has an extra auxiliary input. There are even facilities to connect extra loudspeakers for surround sound use, but this is simply a Hafler type matrix, effectively wiring loudspeakers in or out of phase across the two front live terminals.

DX-M45 CD PLAYER

Perhaps helping to increase the Eurocontent, Aiwa has chosen to adopt a Philips mechanism. I recognise a number of Philips components, including most of the key ones (not least a now outmoded drawer mechanism), but the user interface is strictly Aiwa. The usual track skip and cueing are fitted, but the latter is not audible. Memory and repeat are both available, and the display reads track and index numbers or elapsed track timing, but not together. The frequency response shape looks unusually uneven, but this is certainly due to the amplifier rather than the player itself.

SX-55 LOUDSPEAKERS

If the cassette deck appearance deceived, so also does the loudspeakers; the SX-55 gives every visual indication of being a three-way design, but in reality the third unit is a port dressed up like a tweeter. That apart, there's little to distinguish it from other loudspeakers supplied with low cost audio systems – except that its frequency response is even more erratic and peaky than usual, if that's possible...

HOW IT SOUNDS

The loudspeakers are, in a word, awful. Initial impressions were of a hollow and coloured sound, with obvious signs of phasing – the 'gritty' combfilter-like effect caused when two drive units are not properly integrated. Further proof of the phase problem was found in quite sharp tonal balance changes encountered from different listening positions, and nothing changed that fundamental lack of design integrity. Much of the remaining listening was therefore done using the reference pair of Heybrook loudspeakers and Sennheiser headphones.

Aiwa has not been quite so careless with the rest of the system. Curiously, the CD

player didn't sound anything like as solid and as natural as the player in Philips' own system, but in a way it is fitting that this system's resources have been diverted to where they will do more good, and there can be no complaints when other components show signs of having been beefed up in consequence.

There are a few such signs, though not as many as I would have liked. Although no great shakes, the turntable is moderately enjoyable. Vinyl 'roar' is fairly high and the treble tends to sound rather ragged and obtrusive. But there's little of that variable pitch noticed with some competing systems, and the Aiwa is able to make perfectly acceptable noises off conventional LP discs.

Much the same is true of the cassette deck (notwithstanding the earlier comments), and for much the same kind of reasons. However, there is a significant loss of energy and presence in the frequency extremes – treble shortcomings are the more noticeable – and background hiss levels are high even with the Dolby circuit switched on. This is partly because the deck is intrinsically noisy, but also because the auto level control circuit tends to hold record levels down. I was also happy enough with the tuner, despite occasional synthesiser whistles and some flattening of stereo perspectives.

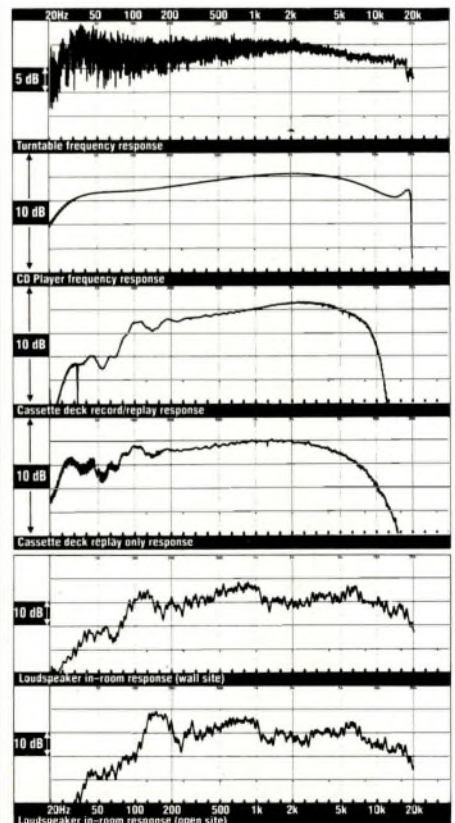
VERDICT

This system is not without its strong points. The cassette deck is more listenable than many, if hampered by its inability to record on anything other than ferric tape, and the turntable is similarly just barely adequate. However, the amplifier is mediocre, and the loudspeakers are execrable. As is so often the case, the CD player and tuner were more than good enough to justify recommendation in their own right, but a CD player and an FM tuner do not a midi system make.

TEST RESULTS

Cost with speakers	£380
Options?	CD Player. (System without CD costs £229.95)
Size main unit	75 x 36 x 38cm (h x w x d)
Size loudspeakers	43 x 25.5 x 17.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.18%
Drift	average
Speed accuracy	n/a*
Arm/cartridge resonance	n/a*
(< 10Hz too low, OK, > 14Hz too high)	
Cartridge channel balance	n/a*
Cartridge channel separation	n/a*
Cartridge tracking ability	n/a*
Tuner	
Sensitivity	very good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.30%
Signal/noise ref 0dB Type II	n/a**
Distortion 0dB Type II	n/a**
Compact Disc Player	
Signal/noise (measured at headphone output)	88dB
Amplifier	
Power output/channel (8ohms)	15 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	high

*not measured due to non standard interfacing
**not measured due to ALC



AIWA X-78

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The days of compact, almost effete looking Aiwa systems seem to be firmly at an end. The X-78 is amongst the bigger and more imposing systems in its price area, and makes substantial demands on shelf room, as the dimensions show. Build and finish are good, and the system is notable for possessing a clock/timer. Like the one in the X-55 system, this has a 99 minute (max) sleep facility and two record timers – a one-shot type and a second which repeats instructions daily.

A neat stick-shaped remote control handset covers everything important except the record deck. The system itself has a full auto source select feature which eases day to day operation considerably.

PX-E88 TURNTABLE

The turntable is neither better nor worse than usual, with construction dominated by the flimsy chassis and the cheapo plastic moulded platter – a cost saving rarity a year or two ago that is now all too prevalent. The only good part is the rubber mat. The arm is an equally typical item, fitted with a non-interchangeable magnetic cartridge. Operation is fully automatic, with all controls placed forward where they won't be impeded by the cover. Tonally the system measures (and sounds) dull, as revealed in the response trace, but the wow and flutter figure is good.

CX-78 MAIN SYSTEM UNIT

Running through the sections in our usual order, the digital synthesis radio reception circuitry has eight FM and eight AM presets, the latter a random mix of MW and LW frequencies. The arrangement is an absolutely standard one; where it differs from the run of the mill is in the inclusion of the timer which shares the tuner display.

The cassette deck has just about every gadget you could think of, with the exceptions of course of precisely the ones that would be of most use to the user whose concerns include decent sound quality. I refer in particular to the deck's inability to use anything other than Type I ferric tapes when recording. All three tape types are accommodated for playback (there's even an automatic tape select feature for the purpose), but neither chrome nor metal (Type II and IV) bias formulations can be used to make recordings, which locks the user out from about 90 per cent of the finest tapes made, not to mention the lower noise levels obtainable from a good modern Type II in particular.

There are (naturally) two transports, one unidirectional for playback only and the other a full auto reverse recorder, both incidentally driven by a very neat and well designed set of transport actuators. A whole raft of special features enable synchronised recording from CD, tape dubbing at normal

speed via the graphic equaliser, or at high speed without, sequential play, quick (optically triggered) end of side reverse, a simple next/last track search and audible cue/review operation (which incidentally is more than the CD player can accomplish!). There's also a device called CHRS which can be switched in when recording from CD. If the tape reverses direction during the course of the track, it goes back to start of track and records it afresh from the start of side two. Finally, Aiwa fit a switchable end-of-side alarm. You see what I mean about everything except what would be most useful? All this and no tape counter!

The amplifier is a little better dressed than usual too. With a substantial measured 50 watts/channel on test, Aiwa provides a spare tape circuit and line input, giving the user much more flexibility than usual. A graphic equaliser is fitted, along with a 'direct' bypass facility to shorten the signal path and give a purer sound on CD and via the so-called DAT input only. Then there are the gimmicks, the most objectionable of which (musically of course) is something called Dynamic Super Loudness (or DSL). It's designed to compensate for the frequency response of loudspeakers, says Aiwa, but naturally it doesn't work in the way Aiwa suggests, or in any other way that could conceivably be regarded as useful for man or beast. Another is a so-called surround sound system – actually just a Hafler like matrix

(see Aiwa X-55 review) – for which Aiwa specify 16ohm loudspeakers, which is presumably to avoid risking damage to the output stage. These will be practically unobtainable except from Aiwa.

DX-M78 CD PLAYER

This player is very similar to the DX-M45 used in the X-55, the main apparent difference being that this one is powered and remotely controlled via the main system unit. Facilities are very simple by CD standards, covering track skip, non-audible cueing, 20 track programmability, repeat and a dual mode display which gives time or track data but not together. The player is based partly on Philips technology, but the frequency response shows quite severe filter ringing within the audio band, which is not what you'd expect of a normal Philips unit.

SX-78 LOUDSPEAKERS

From a distance (and conceivably in the photos that accompany this review) the SX-78s look generously proportioned and designed. They are generously proportioned, though the depth dimension is shallow, but build quality is no better than other typical system loudspeakers – utterly and totally inadequate. The design is port loaded and employs no less than three very basic technology loudspeakers. The frequency response shape is relatively flat (a necessary though not sufficient precondition for decent sound), but there's a sharp measured peak near 3.5kHz.

HOW IT SOUNDS

The loudspeakers are in fact a great deal better than the cheaper ones with the other Aiwa systems, but are still some distance from being acceptable. There's an almost cloying richness, and many rock records which are already heavily compressed and equalised for effect can all too easily sound

highly congested. The ultimate balance does have the beneficial side effect of making the system sound rather larger than it might have done, but does so at the expense of control and stereo imagery – in the second case because the bass and lower mid range, covering the fundamentals of many notes, is thrown well forward, whilst the higher frequency region, where the harmonic overtones of the same notes reside, is recessed and distant. The resultant sound is anomalous and tonally 'heavy'. Some obvious high frequency phasiness merely makes matters worse.

If great care is taken with placing, the turntable can sound reasonably stable. However, the slightest, most microscopic movement in the vicinity of the system is enough to cause severe bursts of rapid oscillation.

The rest of the system is very much better, I'm pleased to report. The baseline finding for the system as a whole is that it comes close to achieving high fidelity standards in the conventional sense. In other words it is fundamentally musical, as it sounds broadly even (neutral) and in control, allowing ready access to the music. It is also tonally a little 'grey' and lacks a true sense of vitality, but this is very common with more complex and ambitious midi systems in my experience. Cheap systems often sound more lively and lifelike, though they may also sound less sophisticated in other ways.

The remaining elements of the system work unexceptionably well, and with a surprising degree of consistency. Thus the cassette deck sounded a little better than expected and the CD player a little worse. They are all good enough for the task in hand.

VERDICT

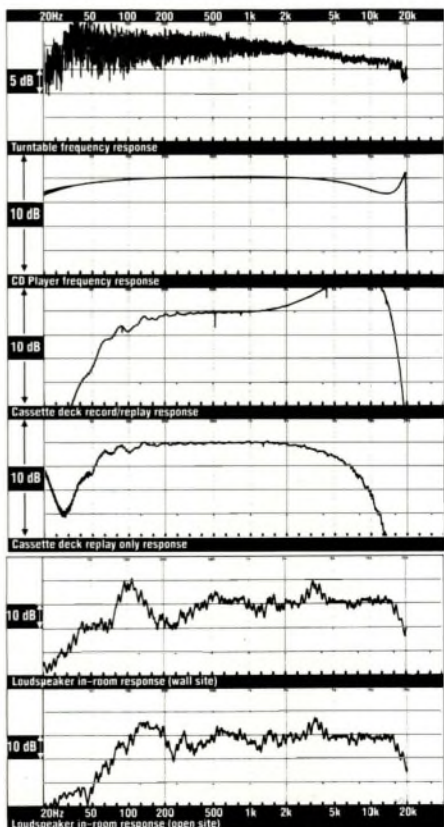
Price saves this system. It's competitive enough to make it worthwhile throwing the speakers away and buying new ones. As

supplied, the SX-78s are tractor tyres on a Porsche, spoiling the ship for roughly half a penny's worth of tar, give or take index linking. But the system as a whole is well worth considering, and is therefore Recommended.

TEST RESULTS

Cost with speakers	£550
Options?	CD Player. (Cost of system without CD is £400)
Size main unit	1rd open, w/o projections 83 x 36 x 37.5cm (h x w x d)
Size loudspeakers	51 x 29 x 13cm (h x w x d)
Turntable	
Wow & flutter wtd	0.13%
Drift	good
Speed accuracy	n/a*
Arm/cartridge resonance	n/a*
	(< 10Hz too low, OK, > 14Hz too high)
Cartridge channel balance	n/a*
Cartridge channel separation	n/a*
Cartridge tracking ability	n/a*
Tuner	
Sensitivity	very good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.20%/0.16% FWD/REV
Signal/noise ref 0dB Type II	n/a**
Distortion 0dB Type II	n/a**
Compact Disc Player	
Signal/noise (measured at headphone output)	> 101dB
Amplifier	
Power output/channel (8ohms)	50 watts
	(1kHz, both channels driven)
Loudspeakers	
Efficiency	medium

*equipment cannot interface with test rig



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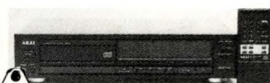
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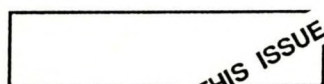
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AKAI M.50CD

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A cursory examination of the £550 *M.50CD* alongside the more costly *M.80CD* shows some remarkable similarities. Both are indeed organised in exactly the same way, with ostensibly similar components from top to bottom, the *M.50* even sharing remote control with its senior partner.

The reality, however (as they say in politics), is different. There are all kinds of minor and major differences, some in surprising areas, and two particularly worth noting. The first is the replacement of the aluminium fascias of the dearer system by similarly styled plastic ones, presumably to reduce costs. Paradoxically, the *M.50* actually gains visually from the substitution – the plastic mouldings are a little cleaner and sharper in appearance than the metal version.

The other change is in the remote control system. This is similar to the *M.80*'s in its ability to address the amplifier, tuner and CD player and inability to control the turntable, but the cassette deck also joins the remote uncontrollables. The manufacturer's claim that the system has a "full feature infra-red remote control" (the exact wording used in connection with the *M.80CD* too) is close to misrepresentation.

AP-M459 TURNTABLE

In common with some of the other components in this system, superficial similarities to the equivalent *M.80CD* component are

confounded on closer examination. The usual lightweight alloy platter topped with rubber is belt driven by a fairly high speed DC motor. The lightweight pivoted arm has little structural integrity, and is fitted with the same low cost *T4P* magnetic cartridge used in the *M.80*'s turntable, though here the control system is auto-return only. Stylus set-down is manual, aided by a cueing platform which is rather too abrupt for comfort.

For some reason cartridge tracking was much worse than with the *M.80*, which is perhaps confirmation of the lack of sample consistency that is part of everyday low cost cartridge life. The response shape is satisfactory, however, and other cartridge parameters are unexceptional. The turntable has barely satisfactory wow and flutter while the medium term speed drift – of the kind generally audible as a meandering of pitch – is even more marginal.

AT-M459 TUNER

This is the *M.80*'s tuner in all but name and plastic fascia. Bands covered are FM, MW and LW and programming allows up to 16 random preset frequencies to be stored. As there are only eight preset keys, it doesn't take a mathematical genius to work out that each key addresses two presets. Circuitry appears to be identical, even the back-lit LCD display is the same. Performance was practically indistinguishable, AM being sharp and articulate but with a little more

interference than expected, and FM being adequately sensitive and selective when bench tested, but a little on the noisy side.

HX-M459W CASSETTE DECK

This is where the *M.50* really begins to diverge from its stablemate. The *HX-M459W* is a twin transport design, but a simple one with the bare minimum of facilities and with very ordinary controls, including simple mechanical selectors for the two transports, which explains the absence of remote control. The quid quo pro of course is that the recorder is very easy to drive.

Both transports are unidirectional, and only one is capable of recording. Dolby B noise reduction is fitted (though not Dolby C), whilst record level settings are manual, assisted by rather limited 5-step (16dB) meters. Sequential play, a mechanical tape counter (for the record transport only) and a dubbing speed switch complete the major feature count. Note that the playback deck recognises tape types automatically, whereas the record deck works with ferric and metal tapes only, but not chrome/Type II – an extraordinary and inappropriate omission. If one tape type must be left out it should be metal, which is expensive and has a very small share of the total market.

The playback only response shape is a little lacking in bass and treble, but the Type I record/replay shape is good. Wow and flutter levels are high, however, putting the deck

out of serious contention even without taking the poor noise/distortion performance into account.

CD-M459 CD PLAYER

Functionally almost identical to the *M.80*'s CD player, the *CD-M459* has a track and time display and track search and scan. An adjustable headphones output is fitted (the *M.80* doesn't have this) and the player can be programmed, though only using the handset. Moreover the *CD-M459* has a digital *electrical* output in addition to the standard analogue output pair – in principle marginally inferior to the *M.80*'s optical provision, but functionally more practical since this player can be used in a standalone role with headphones or another system.

AM-M459 AMPLIFIER

The amplifier performs the basic routing and amplification tasks with remarkably few frills. Socketry other than that required by the remaining system components includes just one tape circuit (notionally labelled DAT/VCR); there's also a removable pre/power link allowing external processors or equalisers to be patched in.

Standard balance, volume and tone controls are available, along with a tone bypass switch (inappropriately labelled source direct, which normally means something rather more). The main functions are remotely controlled, the volume control being motor driven to avoid sonic compromise. Power output measures 40 watts/channel.

SR-U459 LOUSPEAKERS

The loudspeakers are fairly crude in design. Built into a shallow wood box with plastic moulded baffle and mesh cover, there are two cone drivers and what appear to be twin forward facing ports. Beyond this bare description, however, I can add little, since

the units threatened to self destruct if opened. Our measurements suggest it is best used in free field surroundings – the sound is boomy when sited near a rear wall – but they also have a ragged and recessive treble.

HOW IT SOUNDS

No specific loudspeaker positioning is recommended, and indeed even the most careful set-up fails to dent the dismal failings of this design. There is a quality of 'woodiness', whilst the bass is full in its upper reaches, thin lower down and lacking in control. Elsewhere the speaker is dominated by an upper midband rawness of some severity, while the midband itself is bland and unexpressive, the treble dull and undifferentiated. The system sounds very coloured, and this wasn't helped by the ungraceful and unyielding contribution of the amplifier.

The rest of the electronics is a mixed bag. I have no complaints about the tuner, which is capable of clean, neutral FM stereo and serviceable AM. CD sound quality is similar to the *M.80*, despite the lack of optical coupling (itself something of a red herring). The turntable, however, sounds even more wooden than the other components. Vinyl lacks flesh and weight, and I was also disturbed by a rather high level of pitch instability. I also encountered tracking problems of two types: a clouding of the sound at high recorded levels indicative of mistracking, and frequent groove skipping, invariably outwards, towards the record edge, indicative of arm bearing shortcomings on our sample at least.

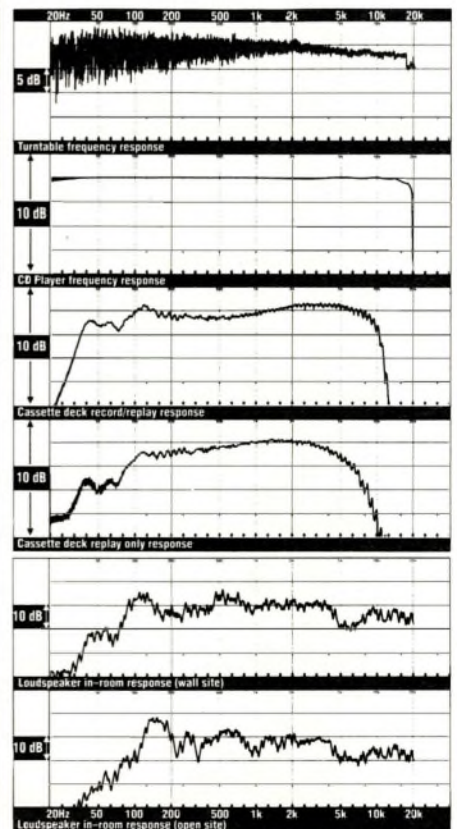
VERDICT

There are some decent ingredients here, and I was impressed by the general standard of the user interface, though less so by the half-hearted remote control system, the mediocre amplifier, turntable, cassette deck and those awful loudspeakers.



TEST RESULTS

Cost with speakers	£550
Options?	none
Size main unit	78 x 35 x 37cm (h x w x d)
Size loudspeakers	42 x 25 x 18cm (h x w x d)
Turntable	
Wow & flutter wtd	0.16%
Drift	average
Speed accuracy	+0.15%
Arm/cartridge resonance	OK
($<10\text{Hz}$ too low, OK, $>14\text{Hz}$ too high)	
Cartridge channel balance	0dB
Cartridge channel separation	-21dB
Cartridge tracking ability	51 μM
Tuner	
Sensitivity	fair
Signal/noise	poor
Cassette Deck	
Wow & Flutter (wtd)	0.44%
Signal/noise ref 0dB Type II	47dB
Distortion 0dB Type II	2.0%
Compact Disc Player	
Signal/noise (measured at headphone output)	95.5dB
Amplifier	
Power output/channel (Bohms)	40 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	medium



AKAI M.80CD

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The styling and control organisation of this ambitious system are impressive, except for the cassette deck, which is messy, obscure and somewhat at odds with the rest of the system. Maybe it was the designer's day off. Elsewhere he has done his job well, and I don't think many people will have problems with the amplifier, CD player, tuner or record deck.

The system also has remote control, but thereby hangs a tale. This is described as a 'full feature infra-red remote control', but the truth is that the turntable has been neglected and cannot be remotely controlled, an annoying inconsistency which effectively relegates this source to second ranking status.

AP-M659 TURNTABLE

Fitted with a *T4P* standard plug-in moving magnet cartridge, the *AP-M659* is a conventional system component. Fully automatic, it has a lightweight platter belt driven by a DC motor and a pivoted (and rather flexible) tonearm. The platter has feelers that protrude through the mat to tell the player what size disc it's dealing with; speed is set manually.

The player is altogether rather primitive, an observation confirmed by its excessively excitable nature when tapped. However, the drive system endows the unit with good speed stability, and the cartridge tracks well and has a smooth, clean response shape.

AT-M659L TUNER

A neatly laid out unit with an attractive backlit LCD display, this digital quartz synthesiser tuner has the capability of storing up to 16 programme frequencies on any mix of LW, MW and FM wavebands. The display shows all normal tuning data apart from signal strength. There are eight preset buttons, each of which stores two frequencies (accessed by pressing the appropriate button once or twice). AM sound quality is clean and bright though slightly more than usually susceptible to interference. FM sensitivity is fair.

GX-M759W CASSETTE DECK

Akai made its name with tape related products, so this system is predictably strong here. The Dolby B & C equipped *GX-M759W* has twin auto-reverse record-capable transports. Fully power operated transports allow 'drop in' recording direct from play mode. Parallel (A + B) and sequential (A followed by B) recording is possible in addition to sequential tape play.

Both transports have fully automatic tape type selection, and a search feature will endeavor to find a specific track up to 30 away from the current position, on either side of the tape. Blank skip is available too. Record level settings are set manually using a single slider (no balance adjustment is possible). The meters are well designed and

have a full 33dB operating range.

A number of important controls fitted near the base are almost hidden from easy use. The test sample also suffered a fault halfway through the test programme, and this prevented the second transport being auditioned.

Measurements show a marginally high basic level of wow and flutter, though unusually there is no deterioration on side two. The remaining measurements are adequate or better, and fast (optically triggered) end of side changeover allows long and almost uninterrupted recordings of high quality.

CD-M659 CD PLAYER

This player has a normal range of facilities, including a neat display that simultaneously shows transport status, track numbers and time. Audible scan and sequential track search facilities are available, plus memory programming (up to 20 tracks) via the remote control.

AM-M659 AMPLIFIER

Power output measures an extremely useful 50 watts/channel, and front panel switching provides for tape, DAT (or VCR – actually another tape circuit), tuner, phono (moving magnet) and CD inputs. But this isn't quite the whole story. The CD input takes the form of a socket for an optical fibre link, and offers, so far as can be ascertained, 16-bit

conversion with 2x oversampling. There's no back-up electrical input which is a potential limitation on flexibility, though of academic importance to most system users.

There is also another set of in and outputs, this time downstream of the volume control. Described as a 'processor' loop and ostensibly for use with a surround (eg Dolby Stereo or other video related) processor or graphic equaliser (which as usual we strongly advise against), this links the pre and power amplifier sections, and could therefore be used to patch in another power amplifier if desired. Tone controls are fitted, and can also be bypassed.

SR-H659 LOUDSPEAKERS

And now for the mutton, dressed as it is here as prime quality lamb. The loudspeakers are relatively large and heavy by system standards, being made of decent quality chip-board, vented at the rear and lined with a small amount of acoustic wadding, and are fitted with no less than three drive units (one too many for their own good). Some impressive looking trim secured by a surfeit of allen bolts (despite having no structural purpose whatever) conceals a 165mm doped pulp cone bass driver with powerful magnet, a 100mm pulp cone midrange unit and a 65mm unit, also a pulp cone type, which is asked to perform the duties normally given to a proper tweeter – which it palpably is not.

The units are slightly asymmetrically disposed around the centre line, but there is no 'handing' of the enclosures. The response is clearly best when backs are close to a wall, the overall energy trend then being pretty neutral. Nevertheless the response shape is on the lumpy side.

HOW IT SOUNDS

I was well pleased by this system. Naturally some elements were better than others, but by and large all the electronics perform well.

The CD player sounds moderately clean and the amplifier is both powerful and articulate – and clearly better with the tone controls bypassed. FM radio reception is also good, reproducing several hours of fine *Radio 3* live broadcasting during the test programme.

The cassette deck is unusual in making good use of metal tapes, gaining in dynamic integrity while staying relatively neutral tonally (with some players the metal response is allowed to rise to give a punchier sound). Speed stability was good on the whole, with just the faintest suggestion of uncertainty with some piano and other recordings. Prerecorded playback quality was unexceptional.

I am not unimpressed by the turntable either: the sound here has a structural integrity and clarity that belies the flimsy construction.

The turntable is nevertheless a weak element of this system, as are the loudspeakers, which I found distinctly odd, though not unlikeable in their way. Sounding best as promised close to room boundaries, the sound is sharp, a little messy at high frequencies but very forward and explicit. Plainly designed for effect, this effect nevertheless has some musical validity even though it does lead to an obviousness and a lack of grace and subtlety at times. The combination of high loudspeaker sensitivity and generous amplifier output power enables the system to play at surprisingly high volume levels.

VERDICT

There are ergonomic limitations here and there, and the remote control system does not extend to controlling the turntable. But these things must be seen against the backdrop of a system which is not as overdressed as some, and which in any case clearly serves music first – a safe Recommendation.



TEST RESULTS

Cost with speakers	£799
Options?	none
Size main unit	78 x 35 x 37cm (h x w x d)
Size loudspeakers	50 x 28 x 23cm (h x w x d)
Turntable	
Wow & flutter wtd	0.12
Drift	good
Speed accuracy	+0.12%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	1.0dB
Cartridge channel separation	20.9dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	fair
Signal/noise	poor
Cassette Deck	
Wow & Flutter (wtd)	0.18% (both directions)
Signal/noise ref 0dB Type II	53dB
Distortion 0dB Type II	1.3%
Compact Disc Player	
Signal/noise (measured at headphone output)	96dB
Amplifier	
Power output/channel (8ohms)	50 watts
Loudspeakers	
Efficiency	medium



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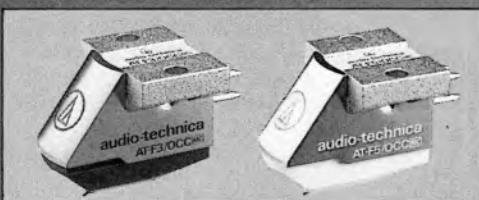
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GOODMANS 5300

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It's intriguing to chart the changes in Goodmans over the years. Many will know the company only as a manufacturer of mainstream loudspeakers, and perhaps also as distributor of Jamo, a remarkably successful 'tinsel and glitter' budget loudspeaker brand. But Goodmans is also a major force supplying car loudspeakers direct to major car manufacturers, and has recently grown into a much larger combine after merging with Tannoy, the TGI holding company encompassing Mordaunt-Short as well. These days Goodmans is broadly but not exclusively centred on audio, and dwarfs all other UK audio companies.

The 5300 shows clear signs of the company's increasing maturity. Some previous low end packages have been distinctly tacky when judged against broadly comparable midi systems from other sources, both from the graphics and the engineering viewpoint. The 5300 is by far the cleanest looking midi system I've seen from this stable, with generally good control feel, sensible control disposition and crisp, attractive graphics. My only complaint is against an ugly and obtrusive spectrum analyser display which sadly can't be switched off. If the system was mine, I might be tempted to explore the inside with a pair of tin snips (but that would invalidate the guarantee and could even be dangerous, so is not a recommendation).

The system takes the form of a main unit which contains tuner, cassette deck and the

system amplifier; the CD player and turntable are separate units. The turntable relies on the main unit for DC power supplied by a separate lead, and this means that a substitution could be made in the future should it be felt desirable. The CD player is made in Korea by Samsung, and the other electronics which are also Korean probably hail from the same source. The loudspeakers, however, are Goodmans' own Wharfedale Diamond inspired *Maxim 2*, which have been discussed fully in previous reviews. They're very much the jewels of this system and help rescue it from obscurity.

The Goodmans 5300 also comes with a rather limited system remote control. The turntable is as usual omitted from the control system, as are CD play or track skip, cassette deck play, record or fast wind. All it has is an apparently random subset of the controls available on the system itself, useful only to adjust volume, operate the radio and turn the system power on and off.

PL-020 TURNTABLE

This is a fairly typical auto-return system turntable. It's equipped with a plastic belt driven platter and an incredibly flexible arm with fixed cartridge. Wow and flutter levels are high and drift is relatively poor. Cartridge tracking is pretty good and most of the other cartridge parameters are OK. But the arm/cartridge resonance, which helps define low frequency behaviour, is at a very high 21-

23Hz (the normal acceptable range is about 8-14Hz). I would guess that the arm bending moments are a significant factor in this equation. Note also the falling frequency response of the vinyl disc front end.

5300 MAIN SYSTEM UNIT

Most of the elements of the main system unit are easily described. The tuner is a typical quartz synthesiser implementation with six FM presets and six which can be randomly shared between MW and LW. Unfortunately, off air reception is on the weak side on all bands, FM in particular suffering from a high noise floor.

The tape section consists of twin unidirectional decks, just one of which is equipped for recording. The transport is mechanically controlled but the keys have a crisp precise action. Normal and high speed dubbing, plus sequential play are all available. Dolby B provides noise reduction and a simple tape counter serves the record transport only. Record levels are set automatically, but a socket and mixing control are provided for microphone mixing. Tape compatibility extends to Type I and II tapes, with manual switching, and Type IVs can be replayed but not recorded.

The cassette deck measurements are pretty grim. Wow and flutter is unacceptably high, and the various responses look like stages in the preparation of bread dough in profile. The plot of high speed dubbing per-

formance (not shown) has far more verticals than horizontals.

The amplifier section has a handy 22 watt/channel output and one spare line level input. There's a seven-band equaliser – a touch of one-up-manship that is ironically even less necessary than usual given the quality of the loudspeakers – and auto source switching when selecting the tuner only.

CD-17 CD PLAYER

A simple player with a selectable track or time readout, the *CD-17* has a 15-track memory with track skip and audible search. There is a minor response rise at HF. The player has an unusually quick acting drawer, but is slow finding tracks.

MAXIM 2 LOUSPEAKERS

The *Maxim 2* is a genuine high fidelity design intended for use with its back close to a wall on tall open stands, though bookshelf placing may be satisfactory in some circumstances. Port loaded at the rear, the enclosures are the smallest in this project by a large margin, but build quality is up with the very best. The bass unit is an excellent large magnet design, and the tweeter is the well known small Audax unit, of no great stature in the hi-fi firmament but vastly better than the typical 5cm cone that passes for a tweeter with most system loudspeakers.

HOW IT SOUNDS

The turntable has an odd 'wooden' quality, and eats reverberant clues for breakfast, leaving a rather anaemic sound almost free of spatial information and quite devoid of depth. Tonally the sound is as dull as ditch-water; dynamically it's soft.

Curiously, the cassette deck wasn't quite as bad as might have been expected from the numbers. The lack of pitch integrity is nothing like as serious in practice as the measurements suggest, which must have

something to do with the nature and distribution of the w&f components. There's no real bass presence with any tape type and the balance is obviously on the bright side with the Type II (chrome bias) tapes tried, though Type Is tend to be more tonally accurate. The sound isn't hi-fi, but it really isn't all that bad. However, prerecorded material was affected by poor head alignment and equalisation errors, and sounded boxy and dull.

The radio tuner is broadly acceptable on FM, though hiss levels are always high – a characteristic only slightly ameliorated by the smooth treble characteristic of the amplifier and loudspeakers.

The rest of the system is fine. Whilst plainly failing to drive the *Maxims* as effectively as some, I was not unimpressed by the coherent and basically likeable performance of this system when giving its best shot. Its best shot in this context is very definitely with the CD player, but the FM tuner just about qualifies too.

The loudspeakers are obviously a key factor with their smooth, sweet mid and top, the excellent quality (and surprising depth) of the bass, and an ability to resolve fine detail and present it in the context of a believable stereo soundstage. The amplifier also helps, however, and the author is much impressed by its clarity, range and power.

VERDICT

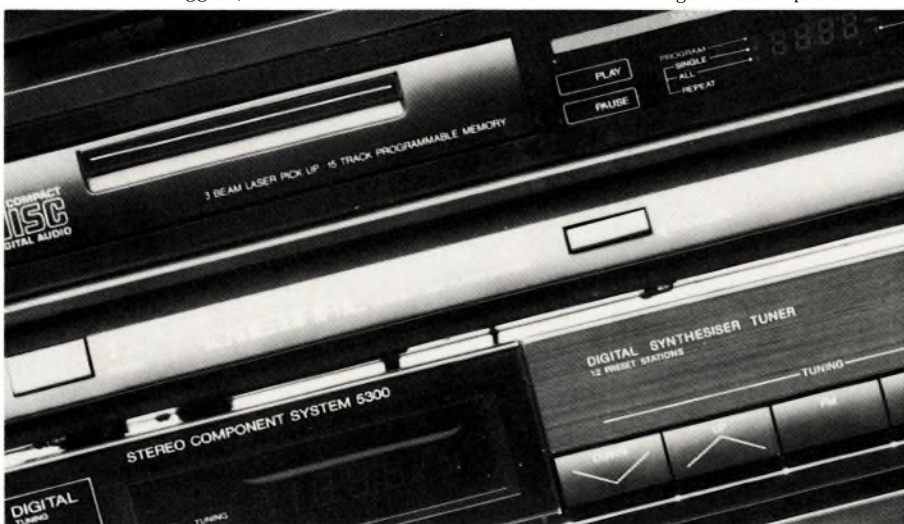
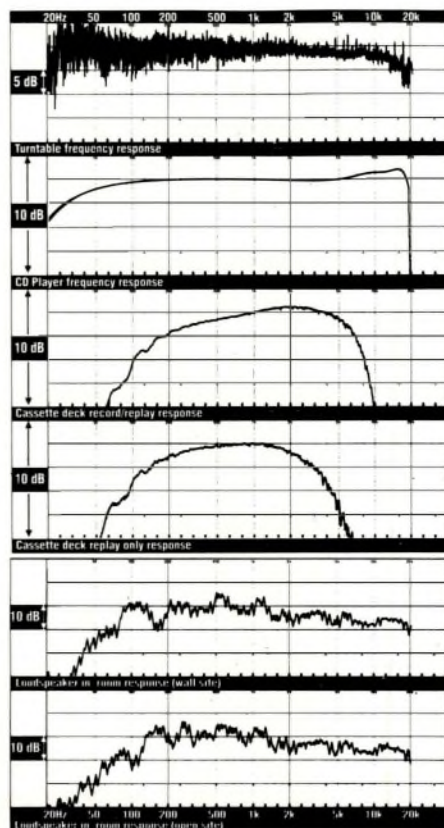
Recommended. This system misses Best Buy status by the narrowest of margins, the indifference of the various source components (aside from the CD player, which is musically better than most cheap system players) being the determining factor.

The amplifier is good for surprisingly high volumes, even with the less than sensitive *Maxim* loudspeakers. Bundling the *Maxims* in with the system was an act of purest genius, even though owners of the system will never know how good these speakers can

sound. Diminutive they may be, but they produce more and better bass than most standard midi system speakers.

TEST RESULTS

Cost with speakers	£400
Options?	CD player. (System price without CD player is £300)
Size main unit	74 x 35 x 36cm (h x w x d)
Size loudspeakers	26 x 17 x 21cm (h x w x d)
Turntable	
Wow & flutter wtd	0.24%
Drift	poor
Speed accuracy	+1.5%
Arm/cartridge resonance	too high
	(<10Hz too low, OK, >14Hz too high)
Cartridge channel balance	0.1dB
Cartridge channel separation	-22.5dB
Cartridge tracking ability	80µM
Amplifier	
Sensitivity	poor
Signal/noise	poor
Cassette Deck	
Wow & Flutter (wtd)	0.46%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	83dB
Amplifier	
Power output/channel (8ohms)	22 watts
	(1kHz, both channels driven)
Loudspeakers	
Efficiency	low
	*auto level record





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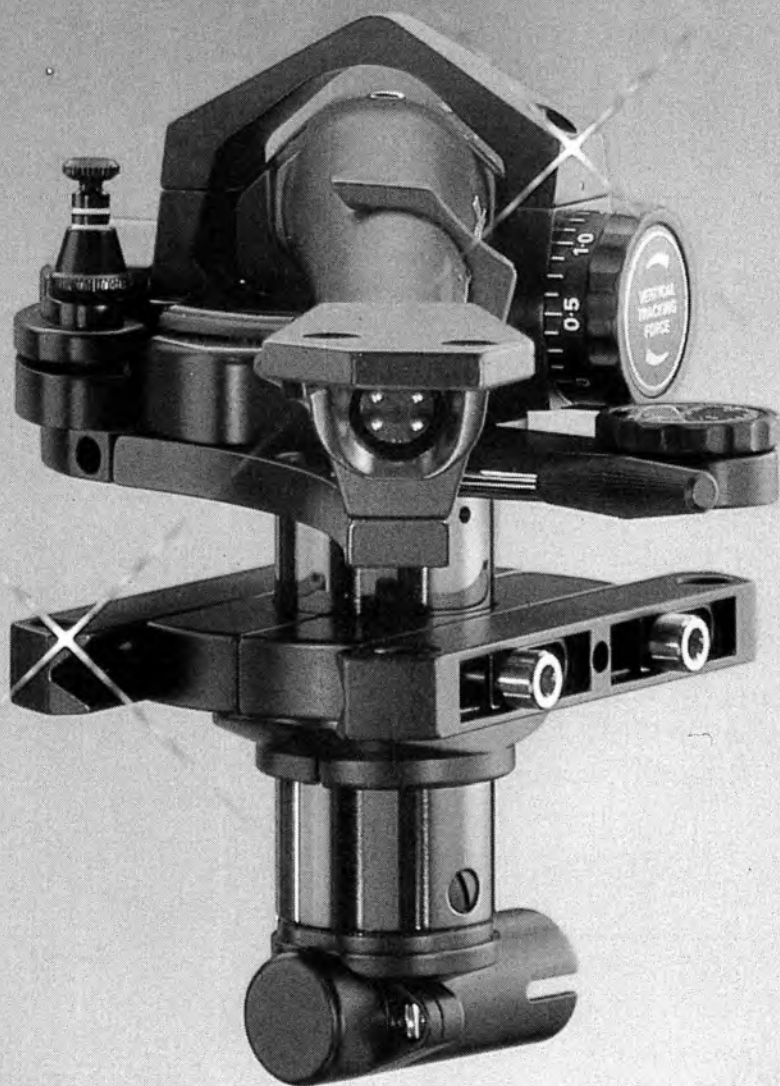
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This system hits the psychological £1,000 price break for a complete system which includes everything you'll need, apart from surround speakers if you want them. Build quality is very good, and there's a real sense of unity about the system.

JVC provide two handsets for the fully remote *Midi-W900*. A full feature one does almost everything including operating the start/stop key of the record deck, and a 'short form' one covering key commands only. The control system is further extended with automatic source selection ('Compulink'), and linked operation of the cassette deck with the CD player and record deck for correctly cued recordings.

AL-E700 TURNTABLE

At last a turntable that breaks the mould! In fact the platter section is a pretty traditional low mass belt driven design made of thin alloy and topped with an equivalently thin rubber mat. The arm, however, is a parallel tracking type, fitted into a runner in the lid and equipped with full automation that optically senses record size, inferring the speed from the size information though the player's choice can be overridden. Front panel controls include a repeat key plus left and right direction keys for shuttling the stylus around.

The nature of this kind of deck dictates automatic arm control; in compensation the JVC is effectively idiot proofed. The arm is

lifted clear of the record as the lid is opened, and the electronics then quickly tuck it out of harm's way to be used again only after the lid is lowered.

The figures show that wow and flutter is very low and drift well controlled. The arm/cartridge resonance is high – a by-product of the very short, light arm – and this will have an effect on low bass reproduction. Tracking and separation are pretty good, however, and the frequency response is very flat and well extended into the treble, though channel balance is a little awry. Furthermore, the cartridge is a *T4P* fit, so if you don't like it, you can change it.

FX-E700L TUNER

Also slightly off-beat in its design, the *FX-E700L* has three bands – FM, MW and LW, with the last two jointed together as one continuous waveband. 40 random presets are available along with the usual mono switching, and an ultra clear frequency/preset number/status display. Presets are selected using a keypad with 1-10 and 10+ keys, and a preset scan facility supplements normal pre-selection. In addition to all this, there is an optional automatic presetting feature, but it's unhelpfully designed, allowing only limited editing of memory contents. FM sensitivity proves a little lower than normal when checked with the lab FM generator, and AM reception was badly interference-bound at the test site.

TD-W700 CASSETTE DECK

There's little missing here. With one record capable transport, the deck has full auto reverse on both, triggered mechanically at the (wrong) end of the leader. Tape type selection is fully automatic and all three main tape groups are compatible for recording. Noise reduction is by Dolby B and C and record levels are set manually, using rather rough 'n' ready meters with a 16dB range. Neither deck nor system has a mic input.

The deck gets a clean bill of health on noise and frequency response grounds, though there is some HF rise with the test Type II tape suggesting the deck will be happier using a slightly lower bias formulation like TDK *SF*. Pre-recorded tapes are handled satisfactorily. Wow and flutter test results were equivocal – unsatisfactory in the forward direction but much better in reverse.

XL-E300 CD PLAYER

There are some unusual facilities here, designed to help those who want to make tape recordings off CD (a theme of this system in other ways too as we have seen). Using the programming feature, the player will keep track of how much free time is available after programming your choice of tracks by subtracting the play time from the pre-programmed time available on tape. The calculation can be made either manually (your own choice) or automatically (sequential, starting with a predetermined track).

SEA-E700 GRAPHIC EQUALISER

There are seven bands of adjustment ranging from 63Hz to 16kHz in steps of a little over an octave, with each channel controllable independently. A bypass switch is fitted. Additional features include 'Super Bass' (similar to 'loudness') and a mono switch.

AX-E900 AMPLIFIER

The 70 watt/channel amplifier (claimed and delivered) has a spectrum analyser display, divided into bands corresponding to the equaliser bands, plus sufficient inputs to enable one extra recorder and another line level item to be connected.

There's also a so-called surround sound option (using phono loudspeaker connectors, no less!), which made a totally laughable mess of the recordings I tried – violins floating around from centre front to rear right, with absolute freedom as different notes were played. The 'wide' position was even worse.

SP-E900 LOUDSPEAKERS

The loudspeakers are unusual in one respect. They are magnetically shielded for AV purposes, and this enables them to be used adjacent to a TV screen (confirmed). The shielding appears to consist of a flux ring attached to the rear of the main unit main magnet which reins in stray fields. But the other constituents of the package include a wide enclosure and very small magnets. This is a very modest design.

Appearances may suggest that you're dealing with a sophisticated three-way loudspeaker; under the skin there's just a single square of sound absorbent material behind the bass unit, three cone drivers of crude design and no crossover whatsoever – not even so much as a capacitor in line with the tweeter! (I wonder how many parties the tweeters will survive?) The in-room fre-

quency response is not too bad, despite abrupt loss of output above 13kHz; note that system alignment appears to favour use away from walls.

HOW IT SOUNDS

It's instructive to try an old but revealing trick with the graphic equaliser: set all the controls to level, choose a decent CD or radio broadcast, and switch the SEA button in and out. One way the sound blossoms, showing real signs of depth, of dimensionality and of explicit focus; the other way the sound collapses into a thin line between the speakers. The effect is that dramatic. I'll leave you to work out which way was which and draw the obvious conclusions.

The loudspeakers sound phasy and are very sensitive to the precise listening axis. They are plainly rough and ready, but categorically don't represent the disaster area of many system speakers. In a £400 system, they would have been OK.

The other components are surprisingly good, and I had much pleasure listening to CDs, radio and cassettes – both prerecorded ones and recordings made by the system. Despite the numbers, speed stability wasn't subjectively a problem, and the deck sounded clean and relatively quiet.

Even the turntable shows dangerous signs of getting in on the act! Good speed stability transforms the situation from the usual mushy, seasick nonsense that midi systems are wont to provide. The cartridge is strikingly sharp and detailed, albeit with some aggressive tendencies, and the bass is lean and not overtly subject to microphony.

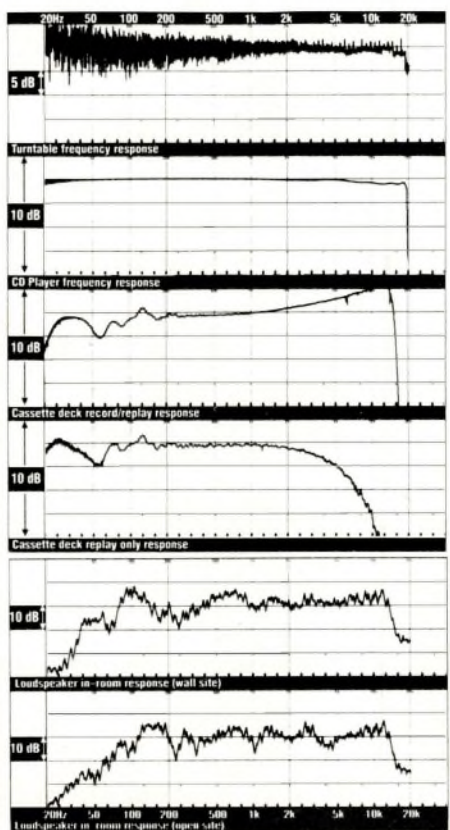
VERDICT

It's true that this system doesn't meet any acceptable definition of high fidelity, and some features – the equaliser and the surround sound matrix – get close to the edge of

the pale. The loudspeakers aren't good either, but they do at least sound detailed and energetic, and the rest of the system is roughly evenly competent. This in the end is enough to clinch a Recommendation, though the additional purchase of a decent pair of speakers would be well worthwhile.

TEST RESULTS

Cost with speakers	£1000
Options?	none
Size main unit	88 x 36 x 35cm (h x w x d)
Size loudspeakers	48.5 x 28 x 21.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.10%
Drift	good
Speed accuracy	+0.6%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	1.0dB
Cartridge channel separation	-24.5dB
Cartridge tracking ability	74µM
Turntable	
Sensitivity	fair
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.26%/0.18%
Signal/noise ref 0dB Type II	53dB
Distortion 0dB Type II	1.0%
Compact Disc Player	
Signal/noise (measured at headphone output)	103dB
Amplifier	
Power output/channel (8ohms)	70 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	high



SYSTEM OF THE MONTH

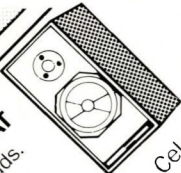


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MARANTZ MX583

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Of all the systems reviewed in this issue, this is the only one laying real claim to being a full blown audio/visual (A/V) system. Many systems have input and output socketry ostensibly dedicated to video sources, but none of the others is capable of accepting and switching video as well as audio signals. This ability is a prerequisite if audio and video are truly to coexist, because it means that important operations – say routing the signal from a CDV player so that the sound appears through the system loudspeakers with the picture on a TV screen, with a combined signal also available for taping by a video recorder – can be controlled centrally, in this case by the system amplifier or its remote control.

Depending on which piece of Marantz propaganda you pick up, you'll find the *MX583* has either the *TT483* or the *TT583* turntable, the *CD583* or the *CD873* CD player – or even no CD player at all. The list of components you see in this review is, I'm assured, definitive.

In addition to the components listed, there's another called the *SP483*, which is optional and was not supplied for this test. This is a Dolby Surround Processor which also incorporates a stereo amplifier for the rear channels. It usefully extends the capabilities of the system deeper into the 'V' side of the A/V equation – Dolby Surround being the audio format used for the surround sound available on Hi-Fi/Stereo prerecorded video

material.

The *MX583* is supplied as a set of stacking components which are well finished and make extensive use of bus communications between components to handle and distribute commands from the remote control. An auto source select system is used. Extra components like the *SP483* can be plugged into the data link using a flat umbilical cable.

You'll note the system is supplied without loudspeakers, and should allow somewhere between £100-£150 a pair for these. If rear speakers are to be used, they don't need to be the same type, but should preferably have similar audio properties. Lower cost models in the same range as the front loudspeakers may prove suitable.

TT483 TURNTABLE

The *TT483* is semi automatic (that's auto-return in real English), and features a particularly well engineered arm cueing platform controlled by a button on the front panel, and a readily removable *T4P* magnetic cartridge. Construction as usual is closer to the requirements of egg carton than a turntable, and this accounts for the grossly excessive microphony. The cartridge has a mildly (and smoothly) declining response at high frequencies, plus quite decent tracking, separation and channel balance. But the turntable itself, which usually dominates the sound of record playing systems, has extremely poor speed stability and drift.

ST583L TUNER

The conventional *ST583L* has the ability to remember up to 16 FM and eight AM (MW and/or LW) frequencies, selected by first choosing the waveband and then pressing the preset button momentarily for its first assignment and for a little longer to retrieve its second (FM) assignment. The display, in Marantz's characteristic and attractive dotted fluorescent numerics, reads out all important data including the preset number. The remaining features are housekeeping ones, the most interesting being a pair of buttons which cycle through the available presets. On test the Marantz proved disappointing on AM – it has difficulties dealing with interference, and a strangely brittle treble (or what passes for treble). But FM reception quality is about average.

SD583 CASSETTE DECK

Messy, confusing ergonomics and awkward controls characterise this well endowed, twin auto reverse deck. Only one transport records, and major features include Dolby C, microphone mixing, auto tape type sensing (Types I, II and IV for record and playback), track search (up to 15 tracks away), blank skip and the usual paraphernalia of modern cassette decks such as synchronised recording controlled via the system bus. But the limits of this deck are set relatively low – the most obvious sign being the auto record level facility. Wow and flutter is also out of the

serious cassette deck league, but the frequency responses are well enough engineered.

CD873 COMPACT DISC PLAYER

This Philips technology player has the usual 20-track programmability, repeat, skip, scan modes – even a mode called AMS which plays a few seconds from the start of each track. It has the usual Philips-style excellent tracking even on marked or damaged discs, but the ergonomics are Marantz's own – and a resounding disaster, with track skip (amongst others) hidden by a full width flap, and the player inhibited from accepting track search commands until the disc is loaded and its contents digested.

PM583 AMPLIFIER

As an audio amplifier, the *PM583* offers 40 watts/channel, with most of the fascia taken up by a seven-band equaliser, a matching spectrum display and four 'snapshot' equaliser memories. Two input selector press buttons – one for audio one for video sources – run through available inputs which include (video) TV, CDV (this input serves also as a CD input) and VCR (a tape circuit) – all three accompanied by phono-based video socketry. On the audio only side the button offers just the inputs required by the other system components. (Of course it's quite in order to use a spare video circuit for audio purposes.) There is a headphone circuit, using a 3.5mm socket.

Front and rear speakers can be connected, but this is only a two-channel amplifier; the rear speakers are driven via a signal derived from the main amplifier using a matrix circuit. No details are provided of the matrix design, but musical effect is not far removed from a Haflet type, but with more rear channel output. Musically it's a mess, and hardly even a taster for what a full Dolby Stereo surround processor can do.

HOW IT SOUNDS

For test purposes, the Marantz system was teamed with Heybrook *HB200* loudspeakers, a combination that sounded vaguely uncomfortable in practice. The amplifier isn't one of the company's best, and although it is basically clean and detailed, it never really sounded in command and didn't appear to have much weight or drive, even though there was nothing lacking in the power output or maximum volume departments. I did try playing around with the equaliser controls, but they failed to address any central shortcoming in amplifier or system – or accomplish anything else of much use.

Unfortunately, most of the system is of the same lacklustre standard. The solitary exception, not unnaturally, is the compact disc player which when used to feed other systems showed itself to be amongst the best available budget (more correctly near budget) players. It sounds solid, articulate and reasonably refined, but the system wasn't really capable of exploiting these qualities.

The tuner is a modest success on FM, but stereo imagery lacks depth and the bass has something of the anaemic quality noted with the amplifier. The cassette deck and turntable both fall by the wayside at the first fence during this test, neither having sufficient pitch integrity to sound in any way either comfortable or convincing. The cassette deck nevertheless sounds fairly crisp and clean with all tape types (there was no persuasive advantage in using Type IV metals) and manages an acceptable reproduction of prerecorded material if pitch sensitive material like solo piano is avoided.

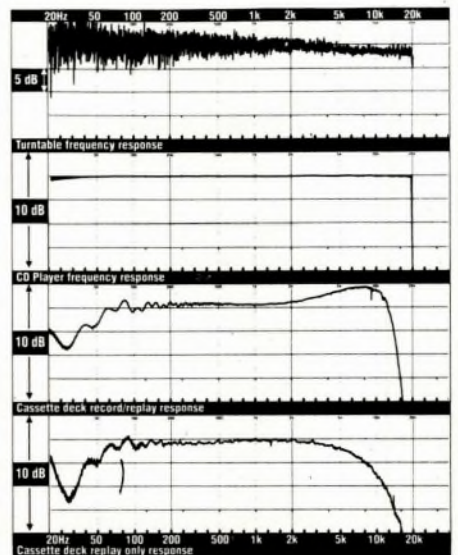
VERDICT

In the form supplied this system makes little obvious sense, unless perhaps the ability to be able to hang video equipment from the amplifier is particularly important. With the

accessory Dolby Surround processor of course we're into a whole different ball game, but even then the audio capabilities of the system remain limited.

TEST RESULTS

Cost without speakers	£750
Options?	Loudspeakers (any), SP483 Dolby Stereo Processor
Size main unit	75.5 x 36 x 39cm (h x w x d)
Size loudspeakers	n/a
Turntable	
Wow & flutter wtd	0.25%
Drift	poor
Speed accuracy	-0.3%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.3dB
Cartridge channel separation	-34.5dB
Cartridge tracking ability	73µM
Tuner	
Sensitivity	good
Signal/noise	fair
Cassette Deck	
Wow & Flutter (wtd)	0.32%/0.26%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	105dB
Amplifier	
Power output/channel (8ohms)	40 watts
(1kHz, both channels driven)	
*auto level record	



PHILIPS F777

PHILIPS ELECTRICAL LTD., CITY HOUSE, 420-430 LONDON ROAD, CROYDON, SURREY CR9 3QR. TEL: (01) 689 2166.



Philips seems to have made a conscious attempt in the *F777* to manufacture a compatible range of high fidelity equipment and market it in a package that looks like a midi system, with all the advantages that accrue – flexibility, visual unity, user confidence for those who are turned off by hair shirt hi-fi and so on. To this end, Philips supplies the system without loudspeakers, and doesn't even suggest any of its own models that might suit. In conversation with the company I was unable to ascertain whether the omission was an error, a novel (if obscure) marketing trick, or simple respect for potential owners' lugholes – full credit anyway.

In outline, the system is conventional enough, with one each of all the traditional sources and two cassette decks of course. There is some attempt (more in name than substance) to allow for the imminent A/V revolution (don't worry, it's been imminent for most of the past decade, and still hasn't quite happened). And there's a rather heavy handed attempt to cram in all possible modern electronics, one benefit being an (optional) full function remote control implementation, missing from the test system, which covers everything except for the record deck. The CD player, however, does come with its own remote handset. All components bar the CD player are made in Japan, presumably in the factory of wholly owned subsidiary Marantz; the CD player is made in Belgium.

FP772 TURNTABLE

Every pack of cards has its joker, and the Philips has the *FP772*. As a turntable it's a perfectly ghastly confection capable of undoing all the good work Philips have put in elsewhere. In the end, the lack of remote control integration might be seen almost as a blessing . . .

It's a bog standard rack system unit, light in weight and with an alloy platter that shows masses of end float (the platter edge rises and falls several millimetres every revolution), belt driven by a fairly high speed (small spindle diameter) DC motor. Operation is manual with auto return. The *T4P* cartridge gave every indication of operating at too low a downforce and skipped with abandon, even zeal, depending on the record. Speed stability is in the completely unbearable class, and I was unable to endure this product for more than a few minutes consecutively. Despite this the weighted wow and flutter figure was only moderately bad (due to insufficient weighting being given to near DC components, which shows how much use the figures aren't), although running speed was noticeably 1.5 per cent fast. The cartridge response shape is poor too, so let's move on . . .

FT772 TUNER

This tuner works in a way that will be familiar only to those used to previous Philips tuners. Having mastered its idiosyncrasies – the

display which often shows preset numbers rather than tuned frequencies, and the peculiar presetting arrangement – it turns out to be a perfectly ordinary unit capable of storing 19 frequencies at random from FM (stereo), MW or LW. It offers good reception performance on FM, while AM is biased towards maximising bandwidth, rather than minimising interference.

FC772 CASSETTE DECK

The *FC772* is a powerful machine. With one record and one playback only transport, both offer full auto reverse operation, Dolby B noise reduction, the works. The two transports are operated by a single assignable set of (rather heavy) logic controls. Above the control panel, the small but perfectly formed record level meter has a wide 28dB range. End of side changeover is a bit slow as it's triggered mechanically at end of tape, not optically at the start of the leader. Tacked on features include normal and high speed cubing and sequential play, and a mono microphone can be connected. Index scan plays ten seconds from each track start, and can select tracks up to 15 away from the present position. And that's about it – except that I defy the reader to find out how to start a recording without first reading the instructions.

Test results include a rather bright Type II response shape, excessive wow and flutter and very high 0VU distortion – the latter not

necessarily a problem unless record level settings are allowed to stray over 0VU.

CD782 CD PLAYER

The *CD782* is a lot more sophisticated than most system CD players. In addition to all the usual search, scan and programming modes, the Philips offers A-B repeat, intro scan (ten seconds per track), index number search and FTS (favourite track selection). FTS 'recognises' discs by their Table of Contents tracks, and will play a prior programmed selection.

The headphone and amplifier outputs are both controllable, the latter using the remote control only. Internally the Philips uses a twin channel, 4x oversampling 16-bit converter.

FA777 AMPLIFIER

90 watts/channel is available from this initially rather daunting high tech beast with its large fluorescent status/function display centrepiece. Much effort has gone into things like the seven-band graphic equaliser and its associated spectrum analyser display which it must be said is of dubious value. (For 'seven-band equaliser' read 'seven tone controls'; for 'spectrum analyser' read 'columns of pretty flashing lights' and you're beginning to get the idea.) For the incurably slothful, four memories will store individual equaliser, volume and balance settings. Two pairs of loudspeakers can be used and inputs are provided for two line level items and one tape deck in addition to those used by the other system components. Two of these wear video labels, but in reality have ordinary audio characteristics.

HOW IT SOUNDS

This Philips system isn't much good for playing vinyl discs. And there's the rub. Because Philips was designing a CD midi rather than just a hi-fi system, it seems to have felt obli-

ged to weed any semblance of quality from the record deck – and has succeeded. The music this turntable makes is thin and shabby, and suffers from a terminal lack of stability that makes listening to piano or other pitch sensitive instruments a joke.

The cassette deck is disappointing too. Again there are occasional signs of wow, but of similar importance is the hardness of the sound, combined with a lack of detail and stereo specificity, effects which are often associated with flutter (higher frequency speed variations).

However, the other key components are good or better. With the test Heybrook *HB200* loudspeakers, the amplifier is demonstrably able and in command. By the best standards it sounds a mite 'arms length', stripping some of the subtler clues from the music and leaving it almost subliminally less interesting and involving. But it has excellent control, an ultra-smooth treble and full, warm bass.

The tuner works well too on all bands, but the CD player comes closest to making a case for the system. It has nothing to do with the usual species of midi system player; it's all about clarity, stereo imagery, control and more clarity. In short, it has real musical integrity.

VERDICT

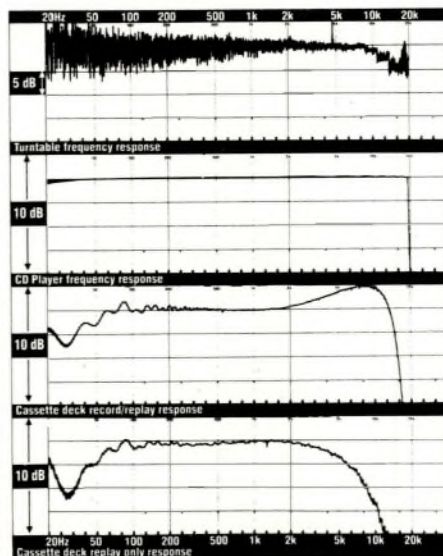
This system makes an interesting study subject. The aim seems to have been to make a midi hi-fi system using midi-type components, as suggested in the introduction, and the Philips does have the tremendous additional benefit that you can choose your own loudspeakers. However, no formal Recommendation is possible due to inconsistencies between the source components.

As a method of playing compact discs (and to a slightly lesser extent FM radio), the system transcends the usual boundaries of midi system performance, and can certainly rival some specialist hi-fi systems. But the cas-

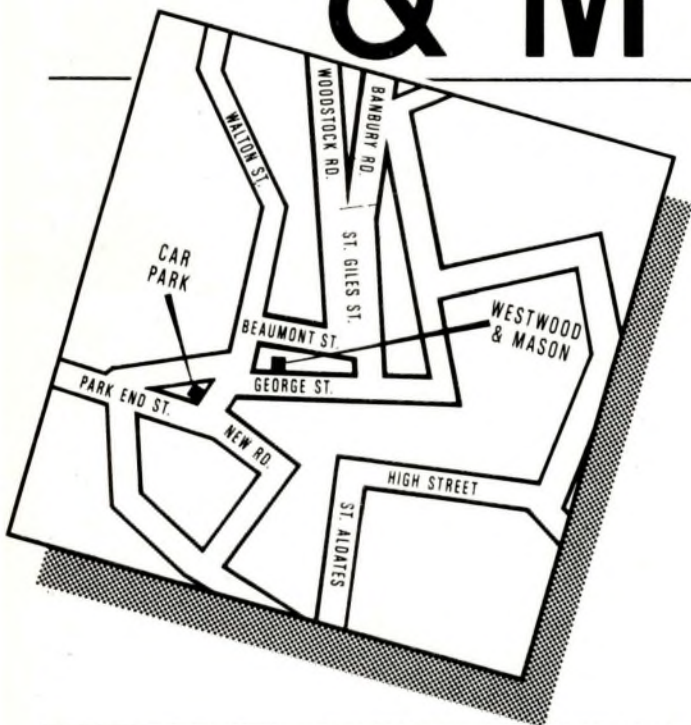
sette deck is not of the same standard, and the turntable is no more than a joke in poor taste.

TEST RESULTS

Cost without speakers	£850
Options?	none
Size main unit	lid open, w/o projections 76 x 36 x 38cm (h x w x d)
Turntable	
Wow & flutter wtd	0.17%
Drift	average
Speed accuracy	+1.5%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.4dB
Cartridge channel separation	-26dB
Cartridge tracking ability	68µM
Tuner	
Sensitivity	good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.27%/0.36%
Signal/noise ref 0dB Type II	54dB
Distortion 0dB Type II	2.6%
Compact Disc Player	
Signal/noise (measured at headphone output)	>106dB
Amplifier	
Power output/channel (8ohms)	90 watts
(1kHz, both channels driven)	



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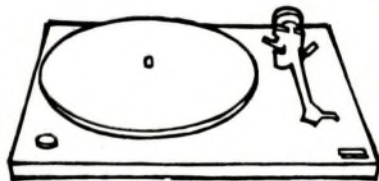
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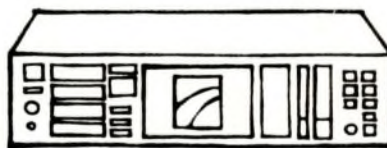
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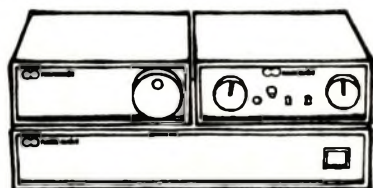
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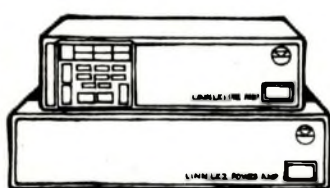
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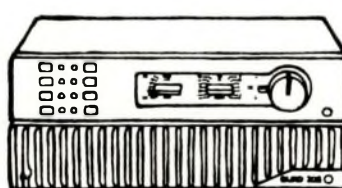
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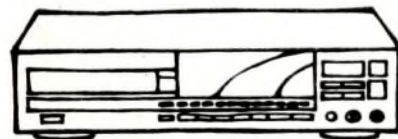
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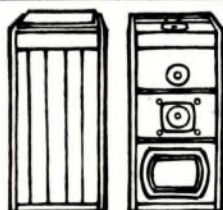
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MORDAUNT-SHORT



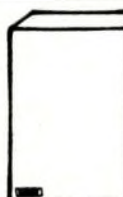
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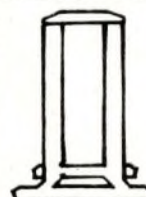
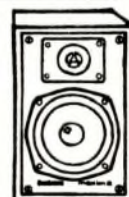
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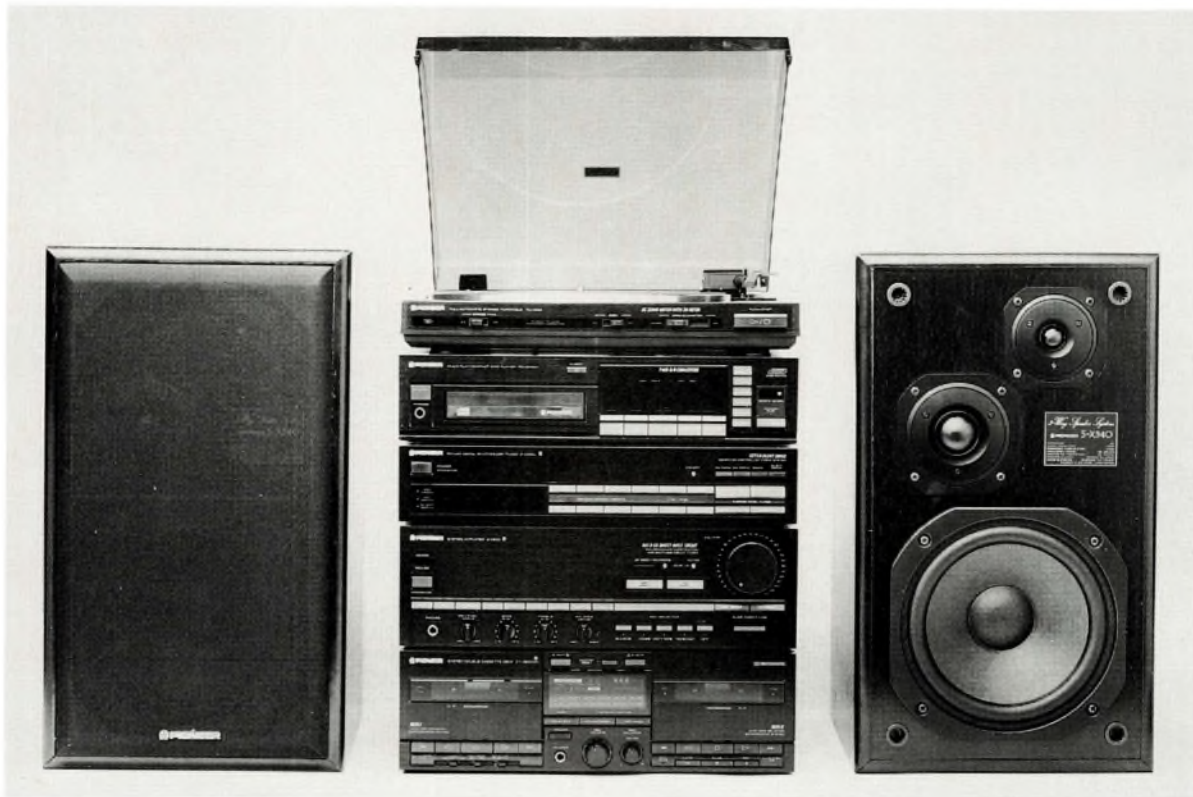
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PIONEER SYSTEM 300

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



As the story unfolds, you will see that this upmarket system is elaborate and well engineered, with many features but surprisingly few needless gimmicks. Well built and with some useful audiophile-oriented 'tweaks' (designed, for example, to reduce microphony), the system comes with two remote controls: one for the system as a whole (but it won't start a record playing) and one for the CD player.

PL-X340 TURNTABLE

No surprises here. The belt drive player has a light and far from flat alloy platter, a standard issue shabby plinth and a *T4P* interchangeable magnetic cartridge. Operation is automatic. The test programme gave the cartridge a clean bill of health and suggests that the deck has lower wow and flutter than usual. Tracking ability rates as excellent.

F-X440L TUNER

A full 24 random presets over FM, MW and LW (in 2 banks of 12) and a combined preset number and frequency display are amongst the features on this high tech tuner. A signal strength meter is fitted, but indicates full house well before optimum signal/noise is reached. Several special signal conditioning circuits are available. One, called CCTS (computer controlled tuning system) appears to work by correcting small tuning errors and invoking some stereo blend at high frequencies where noise is a problem (a

similar technique is used with car radios). 'FM Silent Servo' acts to reduce some common causes of 'beat' or whistle interference.

CT-X540WR CASSETTE DECK

This deck is unusual in being equipped with Dolby HX Pro, which reduces high frequency peak compression, besides Dolby C and Dolby B noise reduction systems. (C offers 20dB of noise reduction compared to the 10dB of Dolby B, but often with some reduction in sound quality). Track starts (up to 15 tracks away) can be located automatically, and there is also blank skip. Only one of the two transports record, but both employ full auto reverse mechanisms, though these are not optically triggered, which means about ten seconds silence at the changeover point as the tape leader is traversed. Auto tape type selection, and manual record level accompany the usual dual speed dubbing and sequential play.

The numbers speak of an extremely fine, stable transport (perhaps any deck's single most important attribute), with a wide working dynamic range but some equalisation errors in the record/playback responses.

PD-X940M CD PLAYER

The *PD-X940M* is a sophisticated component whose most elaborate feature is the ability to handle six-disc cartridge packs as push in replacements for the single disc drawer which can also be used. One of each type is

supplied with the player, and a six pack suitable for 3-inch discs is also now available. The single disc drawer differs from most others in that it must be pushed closed manually prior to use, but the six packs will be ample recompense to most. To suit the enlarged disc capacity, the programme memory is extended to 32 steps (which can include 'pause' instructions). Inevitably, random play is also available. The player is exceptionally well implemented from the control and display angle – it's only a little harder to drive than a good single disc player, though you must remember to insert discs label side down. The player uses twin 16 bit 4x oversampling converters, an ambitious specification for a midi system player.

A-X540 AMPLIFIER

The amplifier is not wholly straightforward. The record selector is an entirely separate function from the normal ('listen') selector, so you can record one source whilst listening to another. Power output measures 100 watts/channel, there is a spare auxiliary input and tape circuit, and a link between pre- and power amplifiers to enable an external sound processor (a graphic equaliser, or a video sound processor, say) to be patched in. Two pairs of loudspeakers can be connected, and there are bass, mid and treble controls plus a bass EQ control designed to add some shelf boost to small loudspeakers (a waste of time, but see what you think).

Encouragingly, Pioneer have fitted a 'straight line' switch to eliminate tone, balance and – in combination with another switch – the tape circuit from the loudspeaker feed. The bad news is that this feature is only available with the CD input and accessory DAT tape circuit.

S-X540 LOUDSPEAKERS

The decision to use three drive units with the S-X540 may be questioned, but the overall standard of design, materials and construction appears to be fully consistent with high fidelity practice. Open up the box, however, and the S-X540 begins to yield up its secrets. The wood itself is OK, but the joinery is indifferent, and internal damping is lacking. The drive units are none too highly specified and the crossover is poorly built. One heavy inductor had broken free with the test pair.

In reality they are much better than most system models, but not quite as good as they look. The frequency response shape is smooth through the mid and top, but there's a distinct bass resonance circa 100Hz, and a loss of output about an octave higher. The sound quality is best when the speakers are sited away from walls.

HOW IT SOUNDS

I like this system. It's an excellent example of cross fertilisation between the worlds of hair shirt hi-fi and that of the convenience oriented midi system. A distinction must be made between the different source components, but looking just at system behaviour with the CD player (ie CD player, amplifier and loudspeakers active only) and with all extraneous signal conditioning circuits bypassed, the system has most of the attributes I look for – sometimes in vain – with standard hi-fi separates.

The sound is relatively uncoloured, aside from a slight warm sounding bottom end, and there's little overt coloration to affect the

timbre or reduce the distinctiveness of the instruments being reproduced. It is also very detailed.

Sadly, the turntable is very poor. The primary balance is thin; there's very little bass and not much stability or solidity to the sound. Pitch stability is of the 'edge of the seat' variety.

The tuner, surprisingly, isn't one of Pioneer's finest either – and Pioneer number some very fine component tuners in their lineup. This one proves reasonably sensitive but a little noisy and lacking in real sparkle or focus. It's ordinary, and that just about sums up the AM behaviour too.

The cassette deck is also a mixed blessing, though in this case the fundamentals are pretty close to being right.

Most impressive is the very high standard of stability at all times, both in terms of pitch accuracy and also in the sense of solidity and firmness that this deck can produce. In these respects the Pioneer comes dangerously close to transcending the easy stereotypes with which we often discuss the medium, and is certainly a revelation by the standards that normally pertain.

But the deck is less than ideally lined up to some of the tape formulations it's designed to use. Type IIs sound bright, much as the response shape suggests, whilst metals lack upper midrange 'bite' and sound bright in the extreme treble (a clear sign of underbiasing). There is also some obvious Dolby mistracking, which tends to sound like level modulated 'pumping'.

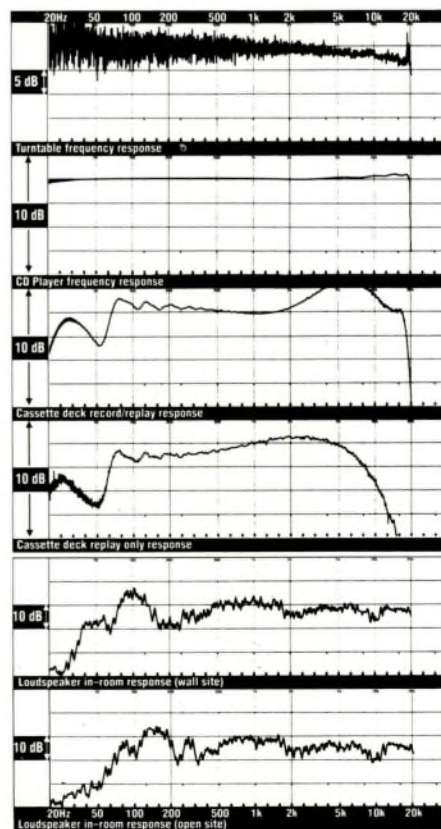
VERDICT

As usual, the turntable was the obvious weakness with this system, and the cassette deck showed signs of not being especially well set up. But the overall standard of musical attainment was more than enough to ensure a Recommendation, despite the fairly high price.



TEST RESULTS

Cost with speakers	£1000
Options?	CD Player. (System costs £750 without CD)
Size main unit	lid open, w/o projections 73 x 36 x 38cm (h x w x d)
Size loudspeakers	48 x 27.5 x 27cm (h x w x d)
Turntable	
Wow & flutter wtd	0.11%
Drift	good
Speed accuracy	-0.3%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.5dB
Cartridge channel separation	-26.5dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	very good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.15%/0.07% FWD/REV
Signal/noise ref 0dB Type II	52.5dB
Distortion 0dB Type II	0.6%
Compact Disc Player	
Signal/noise (measured at headphone output)	99dB
Amplifier	
Power output/channel (8ohms)	100 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	low



PROTON AI-3000 'THE SYSTEM'

PORTFOLIO MARKETING LTD., HILLBOTTOM RD., SANDS IND. EST., HIGH WYCOMBE, BUCKS HP12 4HT. TEL: (0494) 463345.



Proton has dubbed this package *The System* in furtherance of its designer claims. Its 'stunning' appearance (I quote from the manufacturer's brochure, and who could be better qualified to judge?) is the work of Reinhold Weiss Design, and certainly has that indefinable look that speaks of good design, with the necessary touch of originality to go with it.

In essence the *AI-3000* is in direct line of descent from the music centres of yore, but its audio pretensions are strictly hi-fi. Inside a chunky frame are housed just three components: a tuner, a CD player and an amplifier, all under infra-red remote control. There is no record deck as standard, incidentally making this amongst the first 'complete' systems to be marketed without. There are no loudspeakers either, which has got to be good news with this kind of product.

The Proton is good looking I think, albeit in a somewhat Teutonic way, and the styling features are themselves the direct causes of certain ergonomic problems.

A number of minor controls are hidden behind a bottom of fascia flap that runs almost the full width of the unit. This leads to a useful simplification in day to day use, but the main feature is the widespread use of small multicoloured buttons for just about all the main functions. They really are small too, and the equally discreet labelling makes this very much a 'peer and poke' machine, reminiscent of the controls on one of those

tiny CD portables. The subtle use of colour and disposition helps guide the fingers, but there's no getting away from the fact that the control layout of the Proton is not the most transparent on earth.

There are other ergonomic shortcomings too. For example, unless the input selector is switched to 'CD' the disc player is completely unpowered, so tasks like catching a news broadcast on radio whilst programming a disc for subsequent play are impossible. It's equally impossible to switch momentarily from CD to any other source. The sole exception of course is that the CD player can be operated in parallel with the cassette deck so that discs can be recorded.

Another oddity concerns the remote control. It's a neat device, surprisingly sleek and attractive, with a row of source selectors along the top (better than the single source 'toggle' on the main unit) with neatly laid out sections for each functional part of the unit below. But it won't record. You can't start a recording without going to the unit itself. Meanwhile back on the main unit there's no timer record facility.

On a more positive note, the Proton is well built and finished, and is surprisingly heavy – a reflection of the refreshing lack of engineering skimping inside.

AI-3000 SYSTEM UNIT

There was a time when it was not uncommon to find that tuners incorporated into systems

like this one would have just one AM band, invariably Medium Wave because the unit was designed primarily for sale abroad, and the cost of tooling up just for the UK and the few other territories where LW is used for public service broadcasting could not be justified. This practice has almost died out, but the Proton is proof that it hasn't done so completely, so there could be problems receiving Radio 4, at least during certain hours of the day and/or for some listeners.

That's the only real complaint, however. The design is otherwise conventional in offering eight presets per band, the usual stereo/mono switching and an unusually attractive, low key display which includes a variety of information including the tuned frequency and the preset number. The presets can be quickly scanned using the remote control. The lack of LW is all the more unfortunate as the MW band turns out to be extremely good, with an excellent balance between intelligibility, accuracy and the minimum of well suppressed interference. Off air FM reception quality is also beyond reproach. Now we're getting somewhere!

On the cassette deck we have an auto-reverse logic controlled deck complete with noisy solenoids, Dolby B and a manual record level setting arrangement using record level meters with a useful 26dB dynamic range. All three main tape types can be used and tape recognition is automatic. Performance is good: the Type II measured record/playback

response shape is a little bright, but the basic mechanical attributes – wow and flutter, noise and distortion – are excellent.

The CD player is a Philips clone – an old Philips clone that is, featuring the familiar and rather dated loading drawing mechanism, but with the current 16-bit 4x oversampling converter. Operating features include a 20-track memory, track skip, repeat and non-audible cueing.

The amplifier is rated at 22 watts/channel, but with substantial additional power available on a contingency basis. In our tests, the Proton handsomely exceeded expectations, providing no less than 35 watt/channel! Standard tone controls and a loudness switch are fitted behind the flap, along with a microphone mixing control and a mono microphone socket. Rear panel facilities include a preamplifier output (to feed an outboard power amp for example), and inputs for record deck and TV (which in reality is an ordinary line level audio input). The volume control is motorised for remote operation. Almost unique in this test group, the Proton has decent loudspeaker terminals – 4mm binding posts, no less.

HOW IT SOUNDS

All three source components work well, and in some cases very well. The tuner is a gem on both wavebands, with sound quality that is both articulate and together to a degree that eludes most others. The CD player is also excellent – a typical Philips implementation in fact, not the best of its type but far from the worst. There are some negatives in the case of the cassette deck, but none are severe. Pitch integrity is just slightly erratic, but slight is the operative word here, and very often the problems are not obvious at all. Recordings also tend to sound rather thin and lacking in detail, though other factors may be at play here. Like the amplifier...

The amplifier is certainly the least suc-

cessful element in the system. It has an opaqueness, a lack of grip and a softness that detracts from the stature and the integrity of good music making. It also becomes muddled during moments of musical stress.

The kind of shortcomings I'm referring to have varying effects. One piece of music I'm currently using any excuse (like work) to explore is Messiaen's convoluted and colossal *Turangalila Symphony* (the Simon Rattle/CBSO performance on EMI compact disc). I am forced to say that via the Proton system using the test loudspeakers, other loudspeakers, even headphones, this disc is little more than a noise, and a mostly unpleasant noise at that. With 'simpler' music which is less tonally and dynamically stressful the Proton copes much better and can display good analysis and refinement.

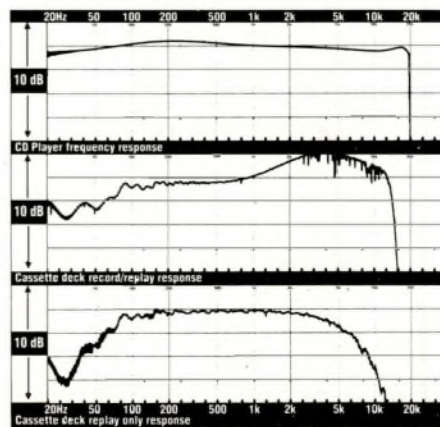
VERDICT

The *AI-3000* is not exactly cheap for the performance offered, and it's shot full of ergonomic niggles, none of which, happily, are of crucial significance. I'm not wholly convinced by the amplifier either, but the ability to choose a decent turntable and loudspeakers means that the Proton is potentially about the best packaged audio system available at this price – short of a well chosen separates hi-fi system that is – and is clearly Recommended.

Finally, a word of praise for the instructions, which are a model of their kind. I particularly like the following priceless gem, which is repeated verbatim: '... You cannot, however, reverse the tape whilst recording without first stopping the tape (underlined item italicised).'

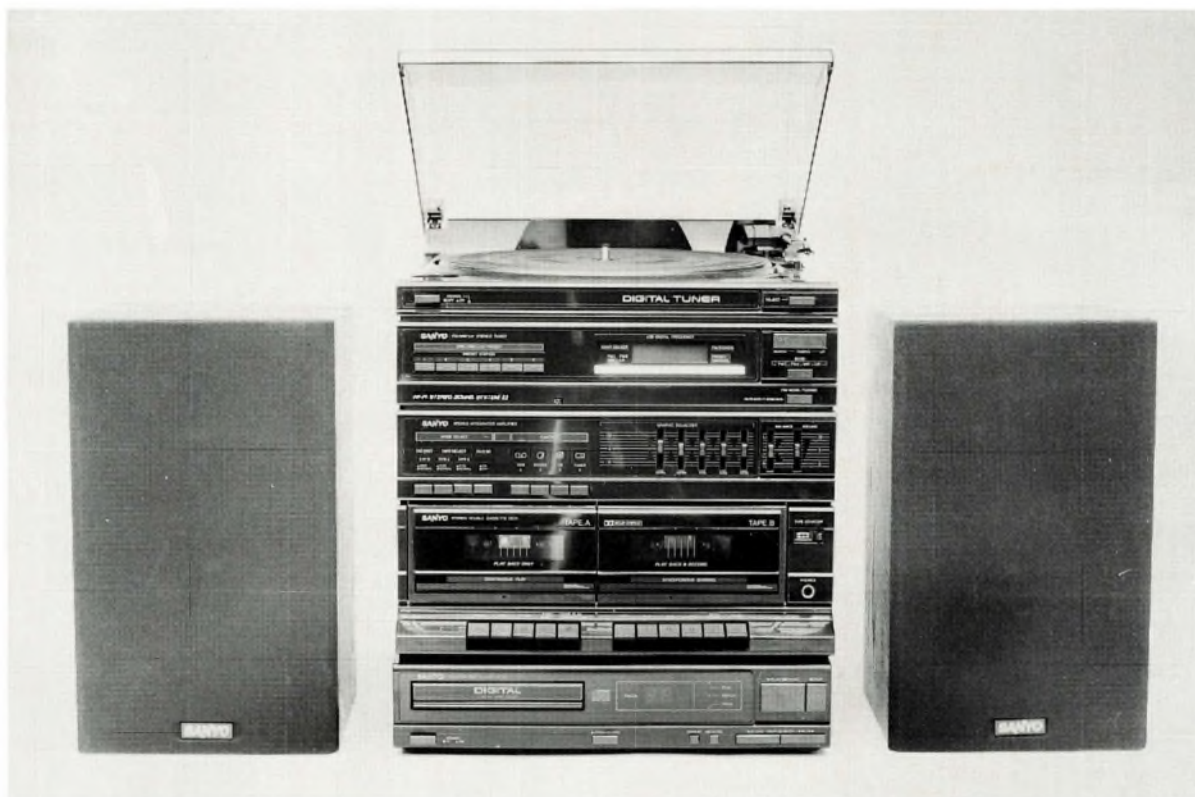
TEST RESULTS

Cost without speakers	£550
Options?	none
Size	16.5 x 42 x 37cm (h x w x d)
Tuner	
Sensitivity	very good
Signal/noise	very good
Cassette Deck	
Wow & Flutter (wtd)	0.17% (both directions)
Signal/noise ref 0dB Type II	52.5dB
Distortion 0dB Type II	1.0%
Compact Disc Player	
Signal/noise (measured at headphone output)	84dB
Amplifier	
Power output/channel (8ohms) (1kHz, both channels driven)	35 watts



SANYO SYSTEM 22

SANYO MARUBENI (UK) LTD., SANYO HOUSE, OTTERSPOOL WAY, WATFORD, HERTS. TEL: (0923) 246363.



This is very much a low end system, costing £199 without CD and £350 with, which is within striking distance of some of the low-life systems with less than respectable brand names (I put it no stronger). Sanyo is a highly respectable and respected brand name in such company, so this system might be seen as a safe alternative to some of the widely advertised alternatives from sources that are reluctant to submit products for independent evaluation.

Most of the electronics is supplied in a single package; only the (optional) CD player is being packaged separately.

DCX22 MAIN SYSTEM UNIT

This unit combines a turntable, tuner, twin cassette deck and amplifier, which will be examined in that order. Sitting below a hinged acrylic lid, the turntable is belt driven and stiffly decoupled from the main unit. The arm houses a simple magnetic cartridge – many systems this price manage with ceramic ones of grossly inferior sound and tracking performance – but utterly lacks structural integrity, as indeed does the lightweight rubber topped plastic moulded platter. Records are played manually, assisted (if that's the right word) by an undamped cue; arm return is automatic. The cartridge frequency response (measured via the amplifier) is quite smooth, but player speed stability is poor – both wow and flutter and longer term drift are extremely poor.

The tuner section is probably the most attractive feature, not least for the comforting yellow glow from the backlit liquid crystal display – which shows the currently selected preset number, the waveband and mono/stereo status in addition to the tuned frequency. One neat touch is seen when presetting: merely tuning and then holding a preset button down for a couple of seconds is enough to commit the frequency to memory. There is a slight loss of flexibility, however, in the rigid demarcation of memory capacity – ten presets for FM (divided up into FM1 and FM2 on the 'band' switch) and five each on LW and MW. The AM bands sound rather dull but surprisingly interference free. As an FM tuner, however, the design delivered an exemplary reception performance by budget standards.

The specification for a cassette section in this price range is virtually engraved in marble, with few deviations in practice. It's considered commercial suicide not to provide two transports of course, so two there are; likewise Dolby, so it gets Dolby – the B version, not Dolby C. Naturally high speed dubbing and sequential tape play are available. Tape type selection is manual: high bias metal tape recording is not accommodated, but metal playback is feasible. Record levels are set automatically, so there is no need for record level meters. Auto stop works from play and record, but not fast wind or rewind.

The tape section test results were frankly

worse than its comparatively musical performance led one to expect. Wow and flutter levels look severe on paper but were often innocuous enough in reality. The measured responses are about par for the course – no bass, no extreme treble and rather wobbly elsewhere.

The amplifier section is equipped with 5-band equaliser, volume and balance controls. The volume control consists of a short-throw vertical slider – identical to those used for the equaliser, and probably the least enjoyable type of control known to man. Power output is 15 watts/channel, measured using our usual test criteria which are stricter than those used by Sanyo. There are no spare inputs for external sources, and no line level output which could be used to feed external audio components.

CP33 CD PLAYER

The CP33 CD player, also used in the *System 33*, (separately reviewed) is a neat, modern looking unit. It accommodates 3-inch CD singles as well as normal 5-inch discs and has a basic array of facilities only – track skip and search, a 16-track memory and repeat. Economies are seen in a display which normally shows track numbers only (indicating elapsed time when in track search mode), and in the search mode itself, which operates with the output muted. The same controls are used for cueing and track skip purposes, in the former case via 'pause'.

SX22 LOUDSPEAKERS

Little can be said about the loudspeakers beyond what can be seen from the outside, which is that they're compact and not exactly over-engineered. It seems that this is a two-way design, but no further examination is possible because the units are effectively sealed to prevent tampering, not to mention the attentions of the press (ie tampering). The SX22 is reasonably sensitive and has a rather lumpy response shape, best exploited by siting quite close to a rear wall. The response shape is a little 'spikey' but the overall energy trend is reasonably benign. On paper at least there are plenty worse in this price sector.

HOW IT SOUNDS

To put it mildly *System 22* is a simple system which ostensibly at least holds no special audio promise. Indeed, seriously good sound quality is effectively precluded by some of the design details and by the low cost nature of the product. But the reality is that within its modest brief, this Sanyo is surprisingly good. It isn't hi-fi, and will keep no serious audiophile happy for long. But it does display a modicum of overall balance, with a tolerable level of transparency in most departments, and most importantly in the amplifier and the loudspeakers. It beats hollow (or should it be flat?) some of the alternatives up to £400.

Record reproduction is not the Sanyo's most obvious strength, but even here it avoids the worst excesses and unpleasantnesses of some of its peers. But it is hard to ignore a certain blandness and some high frequency distortion on peaks, which could have been because the stylus was trying to cut its own swathe through vulnerable virgin vinyl. Let's just say it is not an accomplished tracker. Rumble is also rather obvious at times, and there are occasional odd changes

in pitch and tempo, which reflect in the 'drift' figure (see test results).

Inevitably, the cassette section also gives rise to some question marks. Yet it consistently performs better than the numbers suggest, and is capable of decent recordings with moderately low noise and quite crisp definition using both ferric and chrome tapes. Replay of prerecorded material is also satisfactory. There's nothing here that would sustain prolonged scrutiny, but it isn't bad.

The system shows its best sides, however, with CD and off air. The FM section is genuinely capable beyond its brief, having a wholly natural touch of a kind that eludes so many tuners. The circuitry also copes with weak signals well, and gave no hint of co-channel problems under crowded signal conditions.

Whilst not the best of its kind, the CD player is acceptable. It tracks decently and sounds attractively musical most of the time, roughly on a par with the FM radio source.

VERDICT

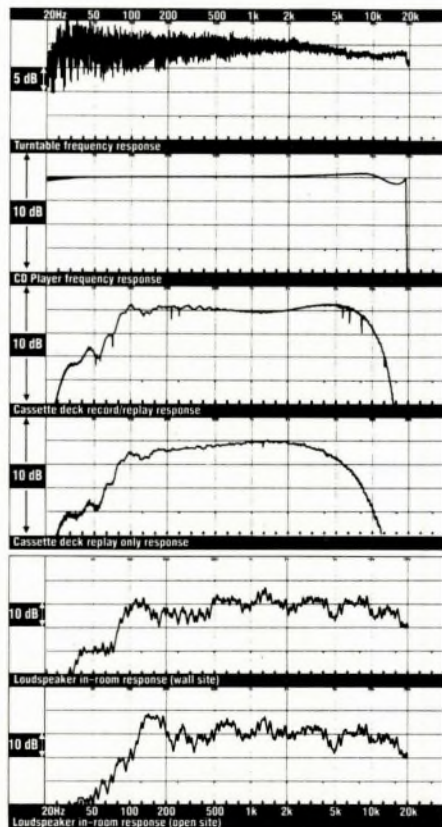
The audio performance of this very ordinary looking system varies between extremes of sublime indifference or benign incompetence. However, at the price this is little less than a miracle, especially when you take the intangibles into account (the brand name etc.), so it's an obvious Best Buy, though you have to understand the nature of the competition to appreciate the reasons for awarding this accolade.



TEST RESULTS

Cost with speakers	£350
Options?	CD Player. (System without CD costs £200)
Size main unit	lid open, w/o projections 66 x 33.5 x 34.5cm (h x w x d)
Size loudspeakers	33.5 x 20 x 18cm (h x w x d)
Turntable	
Wow & flutter wtd	0.26%
Drift	very poor
Speed accuracy	n/a*
Arm/cartridge resonance	n/a*
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	n/a*
Cartridge channel separation	n/a*
Cartridge tracking ability	n/a*
Tuner	
Sensitivity	good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.38%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	78dB
Amplifier	
Power output/channel (80hms)	15 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	medium

*No line out socket, hence no measurement



SANYO SYSTEM 33

SANYO MARUBENI (UK) LTD., SANYO HOUSE, OTTERSPOOL WAY, WATFORD, HERTS. TEL: (0923) 246363.



To a first approximation, Sanyo's *System 33* is a *System 22* (also reviewed) with extra bells and a little more balls. One of the differences is obvious at a glance: *System 33* has a separate turntable, which could in the due process of time be upgraded if that was felt desirable, whereas the *System 22* turntable is built into the main system unit, allowing no access to the amplifier phono input. Other differences include a higher power amplifier, larger loudspeakers and – usefully – a remote control facility.

However, this stops some way short of the real thing, since the handset is designed to operate the key CD and tuner functions and the amplifier volume control only. The handset will not instruct the turntable or the cassette deck (mine wouldn't even address the CD player, but that was a sample fault), and isn't capable of switching inputs. All of which tends to restrict its usefulness.

TP33 TURNTABLE

The turntable is physically light and fitted with a plastic, belt driven platter and a rubber mat. Both of these are superior to the ones fitted to the cheaper Sanyo system turntable, but not by much. Ditto the cartridge, which is a magnetic with an interchangeable stylus, but which is not in itself ordinarily replaceable. The numbers are much as you might expect: better than with the cheaper Sanyo system – but not by much. The cartridge is considerably brighter though, and in

fact is rather over the top, with a fizzy and aggressive top end in consequence. Tracking ability is limited.

DCX33 MAIN UNIT

Power output is 20 watts measured our usual way. For your delectation and enjoyment, Sanyo fit a 5-band equaliser in place of tone controls, but there are no other facilities of note. Not even a spare amplifier input.

The tuner is a simple extension of that used in the *22*. Prime features are a neat and quite informative back lit LCD display, plus three wavebands (FM, MW and LW) with stereo/mono switching. The number of preset keys is up to six, giving 12 FM presets, plus 6 LW and 6 on MW. Sensitivity and selectivity both rate well for a tuner in this price category.

The cassette section is rudimentary. One of the two unidirectional transports records and plays back, the other is for playback only and is used when tape-to-tape dubbing or when playing two cassettes sequentially. The decks are controlled manually, with auto stop from play and record only, and Dolby B noise reduction is fitted. Tape type selection is manual, with metal tapes not accommodated for recording purposes (this is hardly a liability with a budget system). Recording levels are set automatically, so bang goes dynamic range and bang goes low background noise levels (gain is automatically racked up along with hiss and hum dur-

ing the quiet passages). High speed dubbing is available, but not a microphone input.

Noise measurements were not possible due to the ALC circuit, but hiss levels seem generally higher than usual, the obverse of this coin being rather less high level squash and compression. So there you go.

CP33 CD PLAYER

The CD player (shared with *System 22*) is very simple indeed, even lacking some features that you would normally expect to find on the least costly players. The most annoying omission for me is the audible output when cueing, which makes finding a specific point within a track (some of my discs consist of just one track) somewhat fraught, even though the track number display is automatically switched to give a rudimentary readout of elapsed track time. There's no headphone socket either, but track skip, a 16 track memory and a repeat facility are provided. Bench tests show that the deck has fair tracking ability but a sharply rolled off treble very near 20kHz when measured via the system amplifier. That caveat is important since the latter is almost certainly responsible for the anomaly.

SX33 LOUDSPEAKERS

These loudspeakers follow the pattern of the *SX22* supplied with the cheaper Sanyo system: each takes the form of an anonymous looking, fully sealed enclosure which cannot

be opened for examination without risk of causing damage. The spec. sheet says each has two drive units and that's all the technical information I have – save that the box is slightly taller than its 22 counterpart.

Despite the unpromising appearance, however, the SX33 turns out to have a respectable measured performance – similar in character to the smaller model, but more extended into the treble region and smoother through the midband. The auditioning quality too leads to the idea that this is something of a wolf in sheep's clothing, but I'm jumping ahead...

HOW IT SOUNDS

Given the nature and cost of this system, the performance is strikingly good in some areas, and never altogether bad. The amplifier and the loudspeakers again set the tone – as they must, being the only common components for all four source components. The loudspeakers sound only slightly thin, and in fact are pretty neutral and quite sharply focused, with a relatively refined treble and transparent midband. They definitely don't sound like they look. The amplifier delivers the promised extra drive and consistency over the cheaper Sanyo system, without being appreciably different otherwise. In other words it's OK, and in combination with the loudspeakers the system has real liveliness and energy, and not a little refinement.

Predictably perhaps, the good amplifier and loudspeakers did tend to put the spotlight on the source components, and in some cases these were unable to tolerate this close examination convincingly.

In this price category, turntable and cassette deck are bound to be the weak links. And that is precisely how it turned out. Black vinyl piano reproduction was 'shaky' in tone and 'scratchy' at HF with a raw upper midband that is obvious with some material. Some vocals tended towards sibilance, yet if

sophistication isn't the name of the game here, the fundamental liveliness of the design shines through.

The cassette deck has something of this quality too, but was shakier in pitch integrity by a considerable margin. Both mechanisms were culpable, but the playback transport was the more wobbly in tone, to the extent of being unusable for serious listening in my view. It was also plainly less detailed and articulate and sounded just like what it is: a cheap and cheerful facility, varying in utility somewhere between adequacy and simply filling the role of makeweight.

Like System 22 though, the tuner and CD player were able to drive the system more effectively and make something like the most of its capabilities. Quite unremarkable by normal standards, the CD player has the discipline and control that this kind of system really thrives on. Ditto FM radio (AM was merely OK), which again belies lowly origins to sound articulate and convincing, with a lucid and coherent stereo image given the right kind of broadcast.

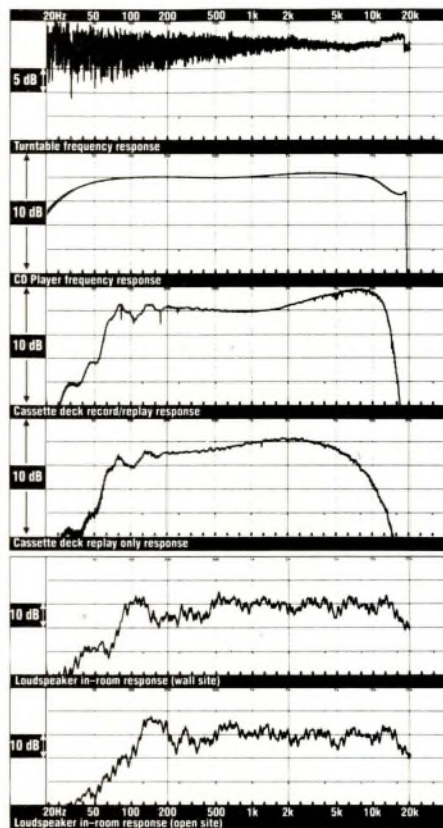
VERDICT

Way back at the start of this review I described *System 33* as a kind of Sanyo 22 with bells on, and thereby lies its limitation. *System 22*'s Best Buy rating was due to it being cheaper perhaps than any comparably performing system. *System 33* is more than the *System 22* in several ways, but fundamentally it's little if any better. But it nevertheless remains a fine performer in relation to price, and does warrant Recommendation.



TEST RESULTS

Cost with speakers	£400
Options?	CD Player. (System without CD costs £250)
Size main unit	76 x 33.5 x 34.5cm (h x w x d)
Size loudspeakers	38.5 x 20 x 18cm (h x w x d)
Turntable	
Wow & flutter wtd	0.19%
Drift	average
Speed accuracy	+0.9%
Arm/cartridge resonance	not measurable
(< 10Hz too low, OK, > 14Hz too high)	
Cartridge channel balance	1.2dB
Cartridge channel separation	-23dB
Cartridge tracking ability	62µM
Tuner	
Sensitivity	fair
Signal/noise	fair
Cassette Deck	
Wow & Flutter (wtd)	0.50%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	85dB
Amplifier	
Power output/channel (8ohms)	20 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	average
*auto level control	



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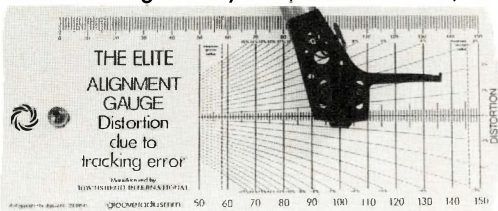
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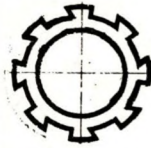
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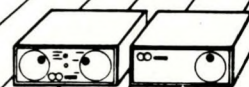


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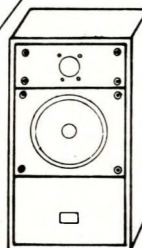
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SONY COMPACT 350CD

SONY UK LTD., SOUTH STREET, STAINES, MIDDLESEX. TEL: (0784) 67000.



I take Sony on trust that this is a legitimate system; after all, if Sony can't get it right, who can? But I have my doubts. Consider the following vital statistics: The system (excluding CD player) costs the grand sum of £269.95, in which form it is known as the *Compact 20* (no, I didn't ask). The CD player featured here costs no less than £249.95, and incidentally is bigger than some suitcases of my acquaintance. Obviously there's a huge imbalance in this instance and the more rational, balanced Sony system is the *200CD*, where the CD costs nearer £180.

What Sony has done with the *350CD* is supply a player which has multi-disc capability, which means that you can load it up for about 6 hours of uninterrupted playing time. A complete Wagner opera say (but even with the real thing you get breaks), or the duration of a party. Well the choice is yours, but it's decidedly *not* the optimum 'sound value for money' solution.

The system itself, being at the cheaper end of the market, has had to make a few sacrifices. I'll get to this shortly. What has not been given up, however, is the standard of external engineering, which in many respects would do credit to some systems at three times the price. Finish is a distinctive textured grey with vertically curved fascias – ignore the CD player in our photographs which was supplied to us separately. In packaged systems everything will match visually. Almost all key functions are included on the remote hand-

set, including full (manual) source selection and a random access keypad, switchable between CD player track and tuner preset selection. Once again the poor vinyl disc player gets short shrift . . .

XO-D20 MAIN SYSTEM UNIT

The basic system is all housed in this one unit, with only the CD player and loudspeakers excluded. It has been styled after the fashion of stacked separates. Records are (mis)handled by a *very* basic auto-return deck, which has a crude plastic platter. There's no separate mat; the platter has a textured top surface to take this role. The general standard of engineering is *so* basic, I was almost surprised to find a magnetic and not a ceramic cartridge. As it happens, the response shape looks more like that of a ceramic, with a broad energy peak centred on 1kHz.

The tuner is a digital synthesiser model with 12 preset keys providing 12 preset channels on each of the three available wavebands – FM, MW and LW. It's a peach to use: the display is large and clear, providing all the key information, most prominently the waveband, the tuned frequency and the assigned preset number. Memory scan plays a few seconds from each available preset, which takes a while.

Naturally there are two cassette decks, only one of which is designed for recording. The transports have surprisingly slick,

mechanical transport keys, but the deck won't autostop from fast wind. Noise reduction is by Dolby B, record levels are set automatically, but you must take the trouble yourself to tell it what type of tape you're using. (Incidentally it must also be the same type of tape in both transports if two are being used together, for example when dubbing.) The Sony is not designed to record on metal (Type IV) tapes. Other features include high and normal speed dubbing (advice: don't, especially on 'high'). Unusually, the deck will not automatically play two tapes in succession, and there's no tape counter.

Cassette wow and flutter is high – 0.36 per cent is well into the realm of audibility. Frequency responses are limited too. Power output measures 15 watts/channel (which is consistent with the manufacturer specified 20 + 20 watts into an unrepresentative 6ohms at 10 per cent distortion). The amplifier has a separate five-band equaliser, for each channel, but no spare inputs.

CDP-C50M CD PLAYER

The market leaders in multi-disc players (Pioneer) found they had a hit on their hands with their six-disc cartridges and players. These were liked by those who wanted to assemble long programmes, but also proved attractive for archive storage, and nowadays the same cartridges can be used in boot-mounted car players.

The Sony addresses only the first of these situations, though it's simpler to load and handles three-inch CD singles with aplomb. You can load its rotating disc platform with up to five five-inch or three-inch discs, and play them singly, in sequence – or programme up to 32 tracks (complete discs can be counted as a single programme step) from a random mix of discs, with or without repeat. You can even shuffle the running order of tracks and discs. Try it with Beethoven's 9th and surprise your friends! However you choose to use it, you'll find the fascia a model of clarity, with the relatively few controls supported by a very good display with a calendar style readout of tracks remaining on the current disc, alongside disc, track and index numbers and a readout of elapsed track playing time. A headphone socket with its own volume control completes the player's description. However, I had some trouble with my sample of this player, which late in the course of the test programme quite suddenly developed an aversion to playing early tracks on discs.

SS-A20 LOUDSPEAKERS

The SS-A20 is a typical midi speaker: a small, sealed system fitted with a 16cm bass unit and a 5cm tweeter of crude design. It's no heavyweight, but it's less flimsy than some. The frequency response run shows some loss of energy and some unevenness in the upper bass and the treble regions. The bass lacks extension.

HOW IT SOUNDS

Overall it's not a bad system, but there are problems. The main one, and it's an all too familiar refrain, is a terminal loss of pitch integrity which occurs with cassette and records alike. In each case, however, the problem is hard to quantify because the symptoms tend to come and go. The cassette

deck turns out to be extremely sensitive to the tape used. Two identical samples of the same type played one after another could sound completely different, one suffering from rapid cyclic pitch variations, the other sounding almost OK. With vinyl discs instability was set off by the slightest jog or bump, or – more disturbingly – when the music became particularly animated. Apart from this, the record deck sounded extremely thin and forward, one explanation for which may be seen in the frequency response curve.

There were problems with the tuner too, in this case for an unexpected reason. Unlike most of their competitors, Sony persist in fitting spring terminals for the aerial connections, not coaxial ones. Using a 75ohm downlead into the 75ohm tap resulted in severe loss of signal and high levels of noise even on the strongest off air signals. Using the 300ohm taps via a balun (transformer) or direct was little better, and the tuner only really began to sound decent when run from the very strong signal derived from an FM lab generator. This inevitably colours what could have been a decent performance. AM sound quality was very poor.

In the end, only the CD player, amplifier and loudspeakers deserve real praise. The loudspeakers begin to sound rather monotonous due to a loss of tonal range and presence at the frequency extremes, but regular readers will have no difficulty in identifying this as high praise in a price area where most loudspeakers are simply unlistenable. They have a certain clarity – even transparency – and driven from the CD player through the coloured but not unpleasant sounding amplifier, they made pleasant music. Well, pleasantish...

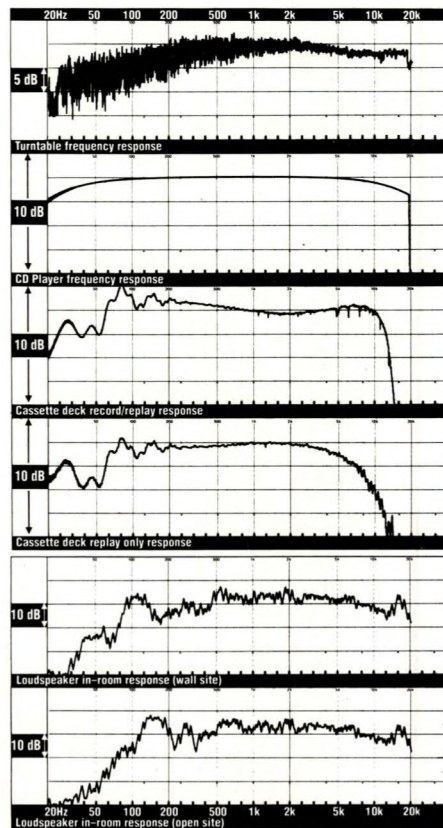
VERDICT

It's a close run thing. This Sony is an attractive and easy to use system with some audio

potential in certain areas. But there is no doubt in the final analysis that given the total package price, the provision of a multidisc CD player has squeezed resources for the rest of the system beyond breaking point. The Compact 200CD is bound to be the more rational purchase.

TEST RESULTS

Cost with speakers	£480 without n/a
Options?	CD Player £249.95. (System without CD costs £269.95)
Size main unit	lid open, w/o projections 72 x 35.5 x 38cm (h x w x d)
Size loudspeakers	41 x 23 x 14cm (h x w x d)
Turntable	
Wow & flutter wtd	0.26%
Drift	poor
Speed accuracy	n/a*
Arm/cartridge resonance	n/a*
	(<10Hz too low, OK, >14Hz too high)
Cartridge channel balance	n/a*
Cartridge channel separation	n/a*
Cartridge tracking ability	n/a*
Tuner	
Sensitivity	very poor
Signal/noise	poor
Cassette Deck	
Wow & Flutter (wtd)	0.36%
Signal/noise ref DdB Type II	n/a*
Distortion OdB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	77dB
Amplifier	
Power output/channel (8ohms)	15 watts
	(1kHz, both channels driven)
Loudspeakers	
Efficiency	high
	*not measured due to test equipment incompatibility



SONY COMPACT 500CD

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX. TEL: (0784) 67000.



The £550 Sony *Compact 500CD* slots in somewhere around half way up the extensive Sony system tree. It consists of a combination dual cassette deck and amplifier plus separate turntable, cassette deck and tuner. However, both turntable and tuner are driven by the power supply built into the cassette deck/amplifier; only the CD player is mains powered and can be used separately if so desired.

An important (if superficial) feature of this and other systems in the Sony range is their truly neat styling. The *Compact 500CD* has a clean, sharp appearance and seems to be well engineered. It's also well finished and has excellent displays which can be easily read even from a distance. The front panel of each unit has a softened profile, achieved by eliminating sharp edges and by slightly sculpting the fascias – all measures that come under the general description 'human engineering'. Sony has proved adept at this in the past.

The system can be purchased in two colours: grey and white. The grey review sample has an attractive, matt textured finish that makes a refreshing change from the uniform flat black of almost every other system on the market.

The remote control handset is a chunky unit, well laid out with widely spaced keys and a numeric keypad which enables random track access on CD and random preset search on radio. Almost all the main func-

tions are controllable, including selection of the phono input, even the spare external input. But as usual the turntable itself cannot be switched on or off using the handset.

PS-LX60P TURNTABLE

The attractively presented *PS-LX60P* has automatic start and stop, with manual speed and record size selection. The pivoted arm is equipped with a non-interchangeable cartridge in a plastic headshell. This is set askew when viewed from the front which will reduce separation and may also increase stylus and record wear. Build quality is very light (so what's new?), but the feet do at least have some decoupling which usefully reduces susceptibility to feedback.

Bench testing confirmed the Sony's lowly status, wow and flutter and wow levels both checking out as poor. The cartridge is a little more encouraging, especially in tracking ability and response linearity.

ST-D50L TUNER

The *ST-D50L* has 12 presets per band (FM, MW and LW) with a preset scan feature and a neat preset number/frequency display. I was disappointed by AM reception quality which controlled interference but at the expense of an insipid and woolly overall sound. The FM circuits, however, seem highly competent on all main counts, but the lack of mono switching means that there are noise problems when receiving transmis-

sions of marginal signal strength.

XO-D50 CASSETTE DECK/ AMPLIFIER

The *XO-D50* cassette deck controls are disposed in two adjacent groups between their respective loading doors and are fully logic interfaced, albeit with rather noisy solenoids for transport mode engagement. Full auto reverse transports are used on both the record/replay and the playback only decks. Tape type recognition and recording levels are fully automatic. The 'one key' dubbing facility works at the usual choice of speeds, and sequential play is also available. Dolby B noise reduction is fitted, but not Dolby C.

There are other restrictions too, the most notable of which is an inability to record with metal (Type IV) tape. This may seem annoying, but is no disaster given the technical difficulty of extracting useful extra performance from what is also a costly formulation. The feed from a microphone can be mixed into the recording – via the graphic equaliser if required. Similarly, a bass boost can be added to tapes at the record stage, a facility intended to add a little extra 'wallop' to tapes destined for personal stereo use. (Would that it were that simple in reality – the more likely outcome is audible, if variable, distortion.)

The amplifier section delivers about 2x35 watts, while the preamplifier section has a 5-

band equaliser section, a crude power level display (I thought they'd died out), and a bass boost switch which is similar to a 'loudness' control in action

The measurements illustrate a problem with the tape transport, which is distinctly lacking in pitch accuracy. The frequency responses were an acceptable shape but limited at the frequency extremes.

CDP-M35 CD PLAYER

The key features here are the slick, precise controls, the audible cueing, the 20-track memory and the random play feature. The player has an excellent time/track/index display and a fixed level headphone outlet. 3-inch (8cm) 'single' CDs can be used without need for adaptors.

SONY SS-A70 LOUDSPEAKERS

The *SS-A70* is a simple two-way design of undistinguished build and based on crude drive units. Although tonally near neutral, the response shape is extremely 'knobbly' – a graphic illustration of the lack of engineering class.

HOW IT SOUNDS

On the whole this system is fair enough, but it doesn't display the inspiration factor that informs the aesthetic design.

One pleasing find, however, is the cassette deck. Although well short of CD or FM radio standards of sound quality, it nevertheless has most of what is needed to succeed. In particular it has relatively good stability (the test figures notwithstanding) and freedom from dropout.

The deck is also well matched to the major Type I and II tapes, and works very well with Sony's own Type II *UX-Pro*. There was a noticeable loss of 'airiness' and presence with prerecorded tapes, but this is an all too common failing. The auto record level control does cause some (expected) compression,

and background noise levels were prejudiced for the same reason, but the deck is intrinsically a little noisy anyway. It's also a little sibilant sounding at times.

FM radio leans this way too. It's never actually sibilant, but the treble has a sharp 'pursed lips' quality that detracts from euphony and leads to a certain hardness, close to brittleness. AM performance is very poor, for the reasons already suggested.

The turntable is less excitable than most of its type and doesn't jump grooves too readily, though this is partly for the wrong reasons (viz. a high tracking downforce). However, the deck is highly rumble prone, detectable plainly even through Sony's own loudspeakers. Stereo imagery and detail are indistinct, and the midrange and bass areas loose and fluffy in texture.

The loudspeakers are not really good enough for a system in this category, and if the system were mine, I'd lose no time junking them in favour of something a little more meaningful. They sound exactly as they measure: uneven, full of resonances and hoxy.

The amplifier is really little better than it needs to be. Again it has some of the rather sharp, grainy quality noticed elsewhere – indeed it is certainly contributory in the case of the turntable and the tuner.

This leaves the compact disc player, which readily transcends the standards of the rest of the system, not because of anything intrinsic to compact disc, but because the *CDP-M35* is built to a standard in line with other acknowledged fine-sounding Sony standard players. It plays by a different set of rules if you like – an all too familiar story.

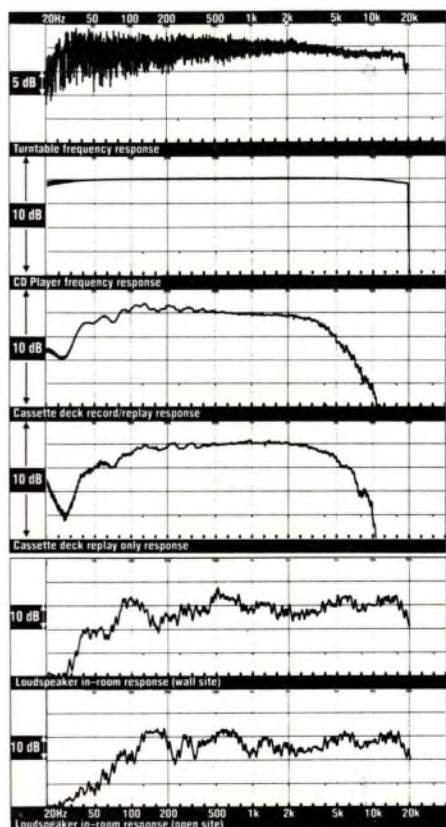
VERDICT

The major plus points here are twofold. The first and most obvious is the superb exterior design – an excellent blend of style and function. The cassette deck also transcends expectations, but the amplifier sounds synth-

etic and the loudspeakers are extremely rough and ready.

TEST RESULTS

Cost with speakers	£550
Options?	CD Player, (System with CD (Compact 50) £400)
Size main unit	110 open, w/n projections 71 x 35.5 x 36.5cm (h x w x d)
Size loudspeakers	41.5 x 23 x 21.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.21%
Drift	poor
Speed accuracy	+0.6%
Arm/cartridge resonance	too high
(< 10Hz too low, OK, > 14Hz too high)	
Cartridge channel balance	1.3dB
Cartridge channel separation	-24dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.28%/0.27% FWD/REV
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	> 105dB
Amplifier	
Power output/channel (8ohms)	35 watts
(1kHz both channels driven)	
Loudspeakers	
Efficiency	medium
*auto level control	



SONY COMPACT 700CD

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX. TEL: (0784) 67000.



To a first approximation, the £700 *Compact 700CD* system is like a grown up *Compact 500*. Several of the individual elements – the turntable, the tuner, the CD player and the loudspeakers – are the same. Your extra £150 replaces the cheaper system's combined cassette deck/amplifier by separate components that cover the same two functions, but better.

All of which is only right and proper. Sony has attacked two obvious weaknesses of the *Compact 500CD* whilst leaving its strengths – the CD player and the tuner – intact. What is less excusable is that the loudspeakers are also retained, and indeed that they are not optional.

The textured grey fascia finish is unusual and to my eyes extremely attractive. Moulding the fascias with subtle curves where everyone else uses flat planes is a stroke of what must pass for genius in the stereotyped world of (er) stereo.

The system comes with remote control – again the same excellent handset supplied with *Compact 500CD*. It addresses most system functions but makes the usual exclusion – controlling the turntable.

PS-LX60P TURNTABLE

In common with the tuner, the *Compact 700CD* system turntable is shared with the less costly *Compact 500CD* system (reviewed separately). It breaks no moulds, although it would be fair to say that it is a little better put

together than some of its more careless rivals. There is at least some semblance of stiffness in the arm tube (not much, but some), but the plastic platter showed enough give to suggest (wrongly as it turned out) that it was independently sprung. The magnetic cartridge – canted sideways on my sample – is fixed and non-replaceable, which locks owners into the Sony replacement stylus for the lifetime of the system. Deck operation is fully automatic, with the main controls fitted forward of the cover, but record size selection and arm cueing are near the arm base.

As with the *Compact 500* system turntable, measured speed stability is poorish all round. The cartridge measures satisfactorily, ironically with better channel separation than the turntable.

ST-D50L TUNER

The *ST-D50L* is unusually well equipped with presets – no less than 12 per band may be selected by choosing a waveband (FM, MW or LW) and then preset on a bank of 12 buttons. In addition, a preset scan button cycles through available presets on the waveband selected. The usual tuning modes are available, but no mono/stereo switch. This is a serious shortcoming in my view, as we don't all have strong signals to play with on all the frequencies we want to hear. In areas of weak FM signals a mono button on your tuner is essential.

TC-D70 CASSETTE DECK

The *TC-D70* has one record and one playback transport, but both have auto-reverse, Dolby B, high speed dubbing, sequential play (Sony call it Relay Play) and so on. Automatic tape recognition is used, but metal (Type IV) tapes cannot be recorded. One major addition omitted from cheaper Sony decks is the ability to set recording levels manually, with potential payoffs in improved signal/noise ratios and better dynamic range. The deck has a very good measured performance on the whole, but with one glaring exception: wow and flutter is somewhere around double the maximum acceptable level.

CDP-M35 CD PLAYER

Like an increasing number of its peers, this player is directly compatible with 3-inch (8cm) singles – 5-inch adaptors won't be required. The main play modes are the expected ones. Audible cueing and track skip are supplemented by a 20-track memory capacity and a shuffle (random) play option. Index search is not available, but the display defaults to show index numbers with track numbers and elapsed track time, and alternative time readouts are available by pressing a display button. The deck operates well, with excellent tracking. It has its own headphone socket distinct from the system headphone socket, but this one has no volume control.

XO-D70 AMPLIFIER

Power output checked out at just under 40 watts/channel, which it must be said was not as generous a 40 watts as supplied from some similarly specified amplifiers. (It is notoriously difficult to give a real indication of power ability simply by reference to the power figures, paradoxical as it may seem.) The amplifier is well endowed with a range of facilities, including a five-band graphic equaliser married to a spectrum display (a power level display with peak hold broken up into bands corresponding to the coverage of the individual equaliser controls). A separate control enables the record-out feed to pass through the equaliser – a facility of less use than it may appear due to the way tape handles audio signals. DOL (a form of 'loudness' compensation), microphone mixing and a very simple matrix surround sound facility complete the gadget count.

SS-A70 LOUSPEAKERS

The *SS-A70* is modestly specified and built and is equipped with two drive units in the classic vertical in-line configuration. The enclosure looks neat but has limited structural properties. The measured in-room response is very ragged, which is a clear pointer towards what is actually heard when they are driven in anger.

HOW IT SOUNDS

The surround sound matrix serves no serious purpose since its effects are musically anomalous and usually absurd, but it can be fun so it's best treated on that level. This apart, the amplifier is of a pretty high standard, ensuring an overall system performance considerably above *500CD* standards.

Having assessed the loudspeakers, I junked them for all subsequent listening, and can only recommend that the user does like

wise. Instead of thinking of this as a £700 purchase, think of it instead as an \$800 one where you make your own choice of loudspeakers with that final \$100. The system makes no sense otherwise, even though the loudspeakers sound under better control with this amplifier than they do with the poorer amplifier section of the *500CD*.

In discussing record based sound quality, I am inevitably reminded of the aphorism: 'in the land of the blind, the one-eyed man is king'. Objectively the turntable is awful (indeed long term instability was audibly worse than with the *CD500CD* system, which is a measure of production spread). But there are considerably more awful turntables around than this one (hard to believe I know), and the amplifier is considerably more capable, which helps. Given decent loudspeakers it begins to sing, though sound-staging is still noticeable by its absence and rumble remains a constant irritant.

The cassette deck works well apart from a slight loss of focus and grip with transient rich material, which is almost certainly the main audible effect of the lack of absolute transport integrity. The deck sounds sweeter and clearer without Dolby in use. There's little squash and noise levels are well controlled. If this deck differs from that of the *500CD* only by having manual record level setting, it's a potent demonstration of the importance of this single feature.

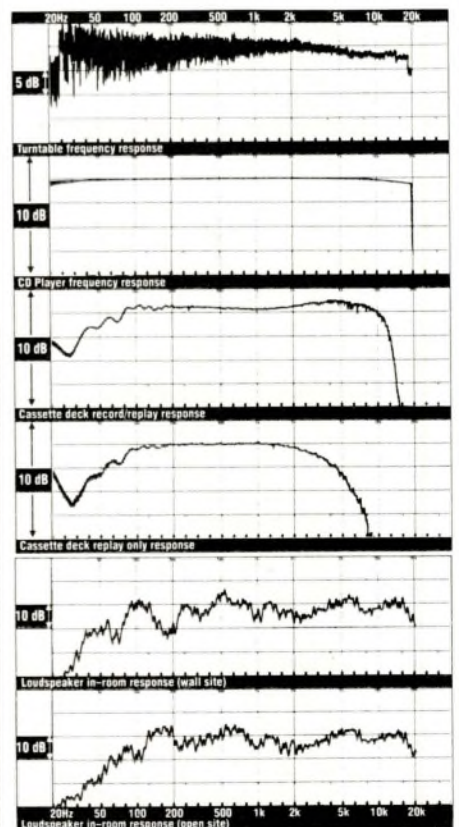
The tuner is adept at suppressing AM noise, but at some cost to bandwidth at both bass and treble extremes, the result being a rather flat sound which also lacks in clarity. The FM band is better, ranking a tad or so above average all round, though occasional synthesiser whistles were audible. Finally, the CD player is simply amongst the most lucid and believable of the budget players around.

VERDICT

The *Compact 700CD* – a *500CD* with bells on – is worth considering, but only if those awful loudspeakers go. Cost is a little on the high side, but the fine presentation would make a stylish addition to most homes.

TEST RESULTS

Cost with speakers	£700
Options?	none
Size main unit	lid open, w/o projections 74 x 35.5 x 36.5cm (h x w x d)
Size loudspeakers	41.5 x 23 x 21.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.21%
Drift	pcor
Speed accuracy	+0.9%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0dB
Cartridge channel separation	-29.5dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.30%/0.34 FWD/REV
Signal/noise ref 0dB Type II	55dB
Distortion 0dB Type II	1.8%
Compact Disc Player	
Signal/noise (measured at headphone output)	>106dB
Amplifier	
Power output/channel (8ohms)	39 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	medium



SONY SERIES 1000CD

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX. TEL: (0784) 67000.



This system bears no relation to the cheaper Sony models tested in any material respect. A full separates package with remote control for the CD player only, it is well made, immaculately finished, plastered in spaghetti around the back – and altogether not for your average granny. One minor ergonomic niggle: the tuning control is tailor made to be confused with the amplifier volume control. I was forever detuning the radio when I merely wanted to adjust the volume. Drat!

PS-V715 TURNTABLE

This is the last time you'll read this here: the turntable is quite out of keeping with the nature of the system, and is scarcely if any better than the decks supplied with systems a quarter of the price. With full arm automation, it has a lightweight alloy belt driven platter and a grossly under-engineered pivoted arm and fixed cartridge. Happily, wow and flutter is quite low, and drift lower still, but the arm/cartridge resonance is set near 20Hz, which is far too high and will add unwanted colour to the bass. Other cartridge parameters are good, not least the well extended treble response.

SDT-V7700L TUNER

Apart from the rotary electronic tuning control, which is normally only used when setting up the presets, this is a straightforward device with 12 presets per band (FM/MW/

LW), a signal strength meter and preset scan. Reception quality is excellent on FM, but at best unexceptional on AM.

TC-V7700 CASSETTE DECK

The two logic controlled mechanisms are all-singing auto reverse decks, both record capable and with Dolby B or C, auto tape type select, sequential play, two speed dubbing, a simple track search and minor features like blank skip and auto play following rewind. The tape counter reads in minutes and seconds, and has a memory stop or play mode. Record levels are set manually, using tiny 28dB range meters. The 7700 can also make parallel and sequential recordings, the latter enabling up to four hours continuous, unattended recording.

Speed stability is good but not exceptional. The noise figure is satisfactory taking the 0VU distortion level into account. All the frequency responses are flat and well extended. Not reproduced here, the effect of high speed dubbing is as usual ruinous.

CDP-M95 CD PLAYER

A highlight here is a little confection called *Custom File* – a kind of Philips FTS with wings. It's a disc identification system and memory, allowing up to 226 discs to be pre-programmed with a ten digit alpha-numeric label which appears in the CD display area, plus a choice of either a 20 track (max) programme or up to six randomly assignable

'index' points which can be located and played between, from or to. All the usual facilities are on hand too, including memory, repeat, random play, a random access keypad and calendar style display, a variable headphone outlet . . . The deck also has optical and electrical digital outputs in addition to the usual analogue output (see amplifier).

SEQ-V7700 EQUALISER

There may be a case for using equalisers in audio systems (though I've not heard a good one yet). But there's no excuse why it should not be optional except greed. The *SEQ-V7700* has seven bands per channel and a matching spectrum display. The unit can be bypassed, switched off and/or removed.

TA-V7700 AMPLIFIER

This 60 watt/channel amplifier is remarkable for including digital to analogue converters and optical inputs (one for CD, one for DAT), which means that the digital conversion can be done as close to the point of delivery (as it were) as possible. There's no magic to this idea, but Sony has so contrived it that some advantage can be demonstrated. There are several unassigned in- and outputs: two tape circuits, a DAT output and the two optical inputs. Furthermore the amplifier has a 'source direct' switch.

APM-12ES LOUDSPEAKERS

The *APM-12ES* has a healthy following in the

separates high fidelity market, where it enjoys a respectable reputation as a design that uses Japanese technology (the flat, piston driver) to meet European inspired ends.

There are two drive units, both high tech. The bass unit has a flat, stiff aluminium skinned honeycomb structure. It appears to be a high power unit and has a substantial magnet. The tweeter is a small metal dome unit, and the two units are married by a full crossover – almost unheard of in the midi system world. The baffle is braced around its waist, the rest of the enclosure being made to a good standard, with a limited amount of internal sound absorbent material. Measurements are consistent with the engineering, but also suggest that the sound will be a bit bright in the extreme treble – the cymbal region from 5kHz and above is subject to a 2-3dB shelf boost.

HOW IT SOUNDS

It has long been my contention that the most useful litmus test for good hi-fi is that it's a good advocate for the unfamiliar and the difficult. Generally I can enjoy James Taylor (picking a name from mid air) on anything half decent – though it will always respond given better equipment still. But it takes something rather special to enjoy, say, Schoenberg's *Pelleas and Melisande*. The work is dense and powerful, yet has moments of blessed repose and lyricism, and calls on the whole repertoire of skills of any system. And here we have a system that is able to do Schoenberg justice.

Of course there are negative points, and the turntable comes top of the list. I can only conclude that records are a makeweight facility with a system which is oriented more than most towards digital audio. What makes this system both rewarding and enjoyable is first and foremost its outstanding dynamic range. Recorded silences are inky black, the subtle clues that suggest the shape of the

recording venue are reproduced, and very quiet instruments are not swamped by the dominant sounds in a mix.

The loudspeakers help. They are not as bright as the measurements suggest, but are extremely detailed and lively, with an equally quick and surprisingly powerful bass.

But it's the amplifier and CD player that are the root cause of the good notices the system is getting here. It is not in the nature of the speakers to cover up ills elsewhere in the system – that follows from what has already been said. There is a mild loss of upper midband presence, and a consequent slight lack of tonal 'colour'. And I can see some listeners complaining that this system sounds thin, though I wouldn't really agree.

What I would strongly advise against, however, is trying to correct matters with the graphic equaliser. I tried it, and the result was to strip away everything that was good about the sound.

Happily this shouldn't be necessary. The CD player is practically 'invisible' since it is feeding the amplifier a digital signal, and the latter is the match of many hi-fi amplifiers. It has an immediacy and presence, excellent detail and dynamics, and just enough grace to get by – though probably no more. Stereo reproduction is exceptional.

The rest of the story is by the book. The cassette deck is limited by the best standards, lacking some solidity and not putting high level sounds as cleanly on tape as some, notably the better HX Pro equipped designs. Yet it focuses well and reproduces plenty of detail when not stressed too hard.

Finally the tuner is fine – AM a little anaemic and interference prone; FM spacious and alive, even tactile at times.

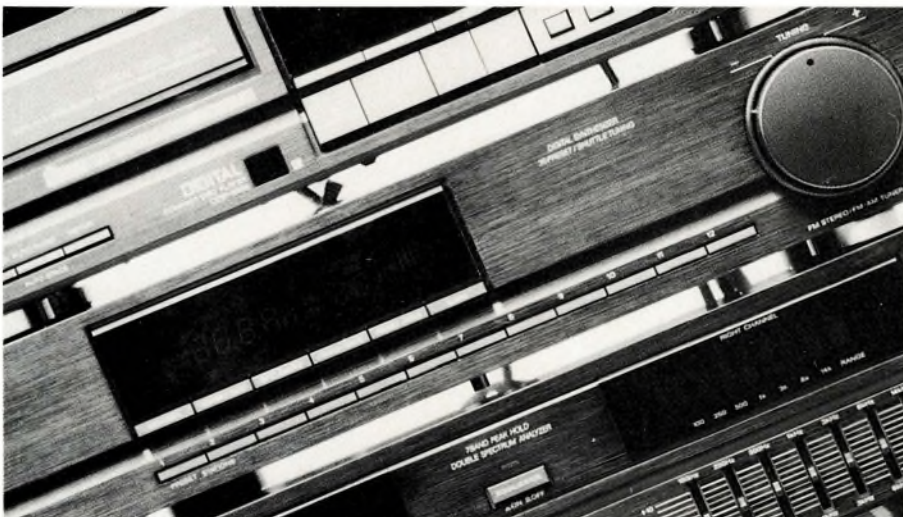
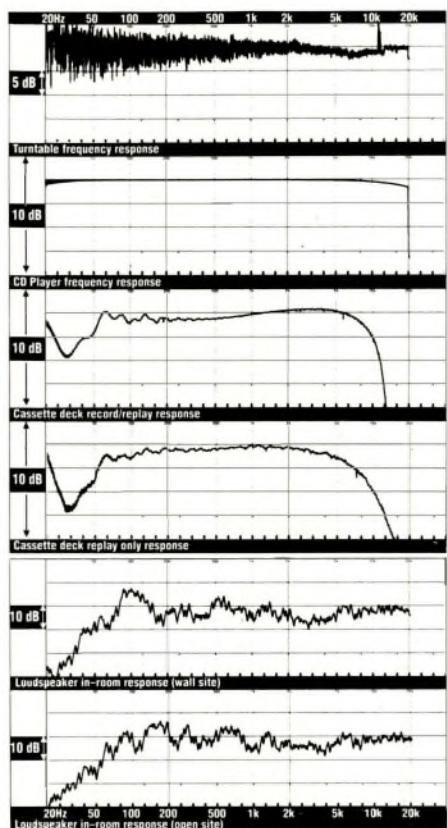
VERDICT

The turntable is something of a waste of space, though the adequate cartridge gives it tonal accuracy and a spurious legitimacy.

The cassette deck is adequate in sound and ultra-flexible, whilst the tuner and CD are capable of truly excellent music through the system amplifier and loudspeakers. Recommended despite the price.

TEST RESULTS

Cost with speakers	£1500
Options?	CD Player
Size main unit	lid open, w/o projections 90.5 x 35.5 x 36cm (h x w x d)
Size loudspeakers	43 x 25 x 29.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.11%
Drift	good
Speed accuracy	+0.3%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.7dB
Cartridge channel separation	-30dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	very good
Signal/noise	very good
Cassette Deck	
Wow & Flutter (wtd)	0.20%/0.15 FWD/REV
Signal/noise ref 0dB Type II	56dB
Distortion 0dB Type II	2.0%
Compact Disc Player	
Signal/noise (measured at headphone output)	96dB
Amplifier	
Power output/channel (8ohms)	60 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	low



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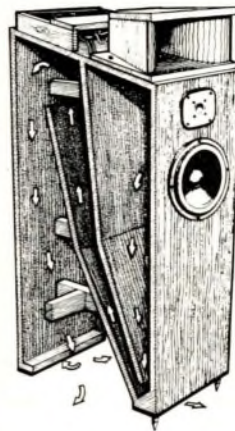
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When Music Is Important It's Not What You Know But Where To Go.

The advice isn't new, but it still holds true: choosing your hi-fi dealer is more important than choosing your hi-fi equipment. Find the right dealer, and he'll guide you to the equipment that's right for your needs.

Introducing and evaluating equipment keeps most magazines fully occupied. There's seldom the opportunity to do a similar introduction for hi-fi retailers, which is why we at Hi-Fi Experience have decided to tell you something about our six specialist hi-fi shops around the country. There are three in London, all wholly owned by Hi-Fi Experience plc, and franchises which we directly control in Birmingham; Bradford, West Yorkshire; and Leamington Spa in Warwickshire. Each store has a highly individual character of its own if not the building, then the manager! Yet each benefits from being part of a multiple retailer.

From your, the customer's point-of-view, that means our shops are ready to help each other when it comes to obtaining an item of equipment you especially want to listen to. Each one stocks a range of equipment - much of it British-made-tailored to the requirements of its own customers, but there is a standard of service that's common to all.

The three years that Hi-Fi Experience has been operating have shown us that, with increased leisure time, people everywhere are putting a higher value on good hi-fi. In addition, we've all lately come to expect better service regardless of what we're buying, and there was an urgent need for hi-fi retailing to reflect that trend and finally move away from the 'boxes over the counter' approach of a few years ago.

At Hi-Fi Experience we decided to offer a new level of service, one that would apply without qualification at all our shops, regardless of where they were or how big they were. That meant stocking only equipment we were satisfied with, in terms of sound quality, construction, reliability and after-sales service. We had to be able to demonstrate that equipment to the best of its capabilities, and that meant implementing an ongoing programme to ensure our listening rooms and setting-up procedures met that requirement.

There is a constant effort to improve the comfort and ambience of our demonstration rooms, to make selecting and comparing equipment as relaxed and enjoyable a process as possible.

Of course, the best equipment and the best demonstration facilities would count for nothing if we didn't believe we also had the best staff. Good staff is a product of good training, and we invest heavily to ensure the people you will encounter in our shops know their equipment, and how to get the best from it. We undertake the kind of staff training courses that are far-from-commonplace in hi-fi retailing.

It's all part of an effort to offer you a level of service that's way above the rest, but should you find you don't get that level of service from one of our shops, let us know and we'll do something about it. We have confidence in ourselves, and we want you to have confidence in us.

Each of our shops will do some things slightly differently: we encourage an individual approach to customers' requirements. But the minimum we expect from each one is good demonstration facilities; comfortable, well-furnished places in which to listen; an exchange-if-not-entirely-satisfied procedure; and fair prices. We also hope they'll convince you that good hi-fi can look good, too, and that you don't need the likes of a Gold Visa card to obtain it! All our shops offer sound-value, inexpensive equipment which will form the basis of a reliable system for years to come.

It's worth adding that Hi-Fi Experience plc is a member of the British Audio Dealers' Association (BADA) as are some of our shops on an individual basis. All, however, trade within the terms laid down in BADA's charter, and most often exceed them.

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TECHNICS SYSTEM X900CD

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The lowliest of Technics' CD based systems, the *X900CD* is a classic product of its type – relatively strong in the areas of presentation and finish (fittingly for the brand) and fairly short on innovation (not that many manufacturers experiment much with this kind of product). The system takes the form of a single combined cassette/tuner/amplifier (aka cassiever), with the turntable and the CD player housed separately. It can be purchased without the CD player if desired, but the loudspeakers are not optional.

A 23-key infra-red remote control handset controls the main functions of the amplifier, tuner, CD player and tape deck. Source selection is automatic when using the handset; press a preset number and 'radio' is automatically selected on the amplifier. For reasons which remain obscure, however, this handy shortcut is not available when using the system hands-on. There's another limitation too: the turntable is excluded from the remote control loop.

Technics has gone to considerable lengths to make the system look as though it is made up of separate components. The divisions here are not the usual notional ones designed merely to help compartmentalise the controls and displays and thereby make it easier to learn and use – this is deep rooted deception! Still, the build quality appears to be a little better than average, and finish is better still. The system looks businesslike and should certainly last the course.

SL-J90 TURNTABLE

The simplest of the three turntables found on the various Technics systems, the *SL-J90* is nevertheless fully automatic in operation, with automatic sensing of record size, using feelers built into the platter. All controls are fitted on the front panel, and are accessible with the lid closed.

Belt driven and with a lightweight pivoted arm, construction quality doesn't concede much to mechanical solidity. Although Technics does boast of using a material called TNRC (Technics Non-Resonant Compound) in the base, it really doesn't show. The proprietary magnetic artridge is a *T4P* type and therefore readily interchangeable without any need for setting up. Turntable speed stability and drift are satisfactory – microphony is more of a bar to good sound quality than pitch accuracy – whilst the cartridge has a smooth, natural response, tracks well and offers good separation.

SA-X900L MAIN SYSTEM UNIT

The top slice of this unit is devoted to the three-band digital synthesiser tuner. 24 random presets use a telephone style keypad with delays after inputting a '1' or a '2' in case you're going to complete a two digit number; I'd judge the delay rather too long (it shouldn't exceed about a second) and counter-intuitive. The display is clear and attractive, providing all relevant data includ-

ing waveband, preset number and frequency. It's a good tuner too; bench testing confirms fine sensitivity and freedom from noise. Off-air AM reception quality is about average.

The other source here is the cassette deck, which as usual has two transports one of which is capable of recording and the other not. Tape type recognition is automatic. The controls are soft touch logic types, well (if conventionally) laid out, and noise reduction is courtesy Dolby B. The bad news is that record levels are automatic.

The good news is that high speed dubbing, which is ruinous to musical quality, is omitted, leaving just the sensible real time dubbing option. There's also a neat new gadget called Rewind Auto Edit, which allows two tapes to be loaded following which they will rewind automatically and start dubbing with no further intervention. Technical performance is not bad, though the ALC circuitry prevented some of the measurements being done. The various frequency responses (not all of which are shown here) are mostly relatively flat, with good bass but limited treble extension.

The amplifier delivers about 26 watts/channel into the test load. Facilities include bass and treble controls, a mute switch, a bass boost switch, a spare line level input and electronic volume and balance controls – the former a large analogue style rotary. The system drives headphones and one pair of loudspeakers.

SL-PJ25 CD PLAYER

This standalone player has a 16-bit 4x oversampling converter and digital filtering – a relatively ambitious configuration for a packaged system component – and is externally simple and well rationalised. The display defaults to elapsed track time and number readouts, but can be cycled through a number of alternate modes. Track skip, audible search and a 20 track memory are all available. Programme sections of discs may be defined by playing durations (in minutes), and synchronised recording is also possible.

SB-F900 LOUDSPEAKERS

It wasn't possible to examine these loudspeakers non-destructively since the front covers are nailed firmly shut. Technics' own information invests the unit with two drive units; bass is handled by a 16cm unit and the tweeter is a 5.5cm unit, both cones. Near wall siting usefully extends bass response to a (still highish) 100Hz or so without significant loss of euphony, and this is how I'd recommend they are used. The measured mid and high end response shape looks pretty smooth, but this is no high quality system...

HOW IT SOUNDS

There are some minor operational irritations. One is the fact that selecting a track number higher than the highest available on CD takes the laser back to Track 1, whilst backskipping from there failed to get back to the last track on the disc. Another is that the cassette deck eject keys, which have hair trigger responses, are not interlocked when in 'record' or (less crucially) 'play' modes.

The instructions are equivocal with regard to metal tape compatibility; the deck is equipped with feelers for auto metal tape recognition, but the deck's electronics plainly underbias such tapes; recordings

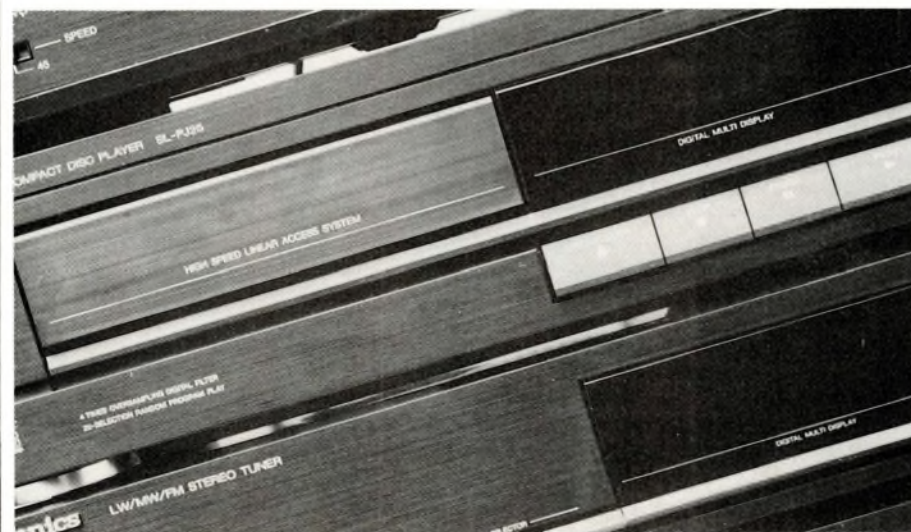
sound thin, bright and noisy, with a hint of distortion on peaks. (Metal playback is of course no problem.) The lack of auto source selection and the limitations of the remote control have already been mentioned.

In other respects too the system mirrors the design aspects already covered – adequate but uninspired. There are no serious complaints though, and some praise is due to a turntable which is commendably refined in quality and rather less microphonic and better damped than expected. The cassette deck too works well, with minimal intrusion of what we scientists call the wobbles, and an intelligently designed automatic record level circuit (if there is such a thing; these devices always sit on musical dynamics to some extent). In musical terms cassette offers a real suggestion of clarity and stability, best results predictably being with Type II (chrome) tapes.

CD and FM stereo works immaculately too, but in all cases the amplifier imposes limits on the system by sounding a little thin and grainy – characteristics the thin, brittle speakers tended to emphasise. Still these aren't all bad, and have a degree of transparency and evenness through the crucial midband; they meet their Waterloo at the frequency extremes.

VERDICT

Sonically and musically this is a mixed package with some mediocre touches (the amplifier and loudspeakers), some unexpectedly good ones (the cassette deck and turntable) and some thoughtless ones (remote control system oddities mainly).



TEST RESULTS

Cost with speakers	£470
Options?	CD player. (System without CD costs £299.95)
Size main unit	lid open. w/o projections 73 x 36 x 33cm (h x w x d)
Size loudspeakers	35.5 x 22.5 x 18.5cm (h x w x d)
Turntable	
Wow & flutter wtd	0.14%
Drift	average
Speed accuracy	+0.3%
Aim/cartridge resonance	OK
	(<10Hz too low. OK. >14Hz too high)
Cartridge channel balance	0.7dB
Cartridge channel separation	-28.5dB
Cartridge tracking ability	74µM
Tuner	
Sensitivity	good
Signal/noise	good
Cassette Deck	
Wow & Flutter (wtd)	0.16%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	98dB
Amplifier	
Power output/channel (8ohms)	25 watts
	(1kHz, both channels driven)
Loudspeakers	
Efficiency	high

*auto level record



TECHNICS SYSTEM X950

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



The £850 *X950* fits about half way down (or up) Technics' predominantly up-market *Series 360* range. The standard of build is immaculate. All displays are clear and informative and although the fascias are rather too button bound for comfort, there's enough native wit and intelligence in the design – not to mention sheer excellence of finish – to counter most complaints.

The system is supplied with a 31 key remote control which covers the basic functions of all units – even the usually neglected turntable! There is a second handset too, this time just for the compact disc player. In addition the system will automatically cue recordings, the CD player or turntable operating the cassette deck pause control in record mode.

SL-J110R TURNTABLE

Containing parts that look suspiciously similar to those used on at least half the other decks in this project, this turntable is closely modelled on AST (the archetypal system turntable) but is built to a very slightly higher standard than normal. It has an interchangeable *T4P* fit cartridge (no surprise here, as Technics invented *T4P*) while the deck itself is essentially low mass in construction with a simple rubber mat and alloy platter. Auto disc size sensing is achieved the crude way, using feelers that poke through the rubber mat. The deck has fully automatic arm operation, and a front cueing switch

which is not too artfully designed.

The numbers tell of mediocre speed stability, an acceptable cartridge response shape, excellent tracking and good separation. Channel balance was 1dB out however – not unusual for a cheap cartridge, but not good either.

ST-X990L TUNER

Actually a tuner/timer, the *ST-X990L* is predictably technology oriented with automatic as well as manual setting up of up to 28 preset channels. The timer section has sleep, one-shot and repeat timers, the latter accepting instructions for daily, weekly or daily-except-weekend programmes! All three bands offer truly excellent sensitivity and freedom from hiss (on FM) and interference (on AM).

RS-X950 CASSETTE DECK

Dual cassette deck design has tended to become more user friendly with the passing of the years, and the *RS-X950* is a competent exemplar of the changing times. It has two optically-triggered auto reverse mechanisms (one recorder, one for playback only), each fitted with a neat bank of light-touch logic controls. There's also Dolby B and C, track search, normal and high speed dubbing – the works. Both transports boast auto tape selection and the deck has a neat central electronic counter and record level meter display. This reads information from either

transport, the counter even remembering the last reading of the non active transport. Record level setting is manual.

The design is highly practical and manageable. Record/playback responses are excellent though wow and flutter is on the high side, albeit not disastrously so. The playback only response for prerecorded tapes shows early treble loss, and this was confined in practice.

SL-PJ45 CD PLAYER

The most interesting group of features here rejoice under the collective title 'CD Edit', and are designed to assist (or merely confuse?) those who use the cassette deck to record from CD. This is done by rearranging the disc contents (more than one disc if necessary) to fit the pre-selected tape length, and also by assisting with record level setting. Even as a straight player the *SL-PJ45* is hardly underendowed. It has a complex and informative display, a headphone socket and an optical digital output in addition to the whole range of more traditional gadgets.

SU-X950 AMPLIFIER

Technics rates the amplifier as 60 watts DIN, but the real number is closer to 50 watts (the DIN rating merely being a way of making amplifiers look good on paper). Even with less than usually sensitive loudspeakers like the ones supplied for test, the system is more than capable of filling a fair size room with

very high levels of sound and with no signs of distress

The main features are a rotary electronic volume control that emulates an analogue control, but with an associated numerical figure (in dB), and a static bar graph display showing the gain setting. It's difficult to point to a real benefit of this arrangement, apart from facilitating remote control of course. Electronic controls rarely sound as good as the old-fashioned type, though they shouldn't deteriorate in the very long term as mechanical controls inevitably will.

The rest of the amplifier is commendably free of useless paraphernalia. In addition to the inputs dedicated to the other system components, Technics has provided no less than two extra tape circuits (labelled Tape 2 & DAT) and an auxiliary input. There is also a circuit which synthesises surround sound from stereo sources: it bears some superficial similarities to Dolby Surround, and worked a little better than some of the other, simpler matrices encountered in this project. Switching it in stripped the sound of the specific instrumental image placing in favour of a warm, effusive but inevitably amorphous image and softer transients. The Technics implementation doesn't sound as anomalous or phasey as some, but a reduction in negatives does not a surfeit of positives make.

Remaining features include bass, treble and balance controls. The output configuration is Technics proprietary pseudo-Class-A configuration that addresses some of the distortion mechanisms (primarily crossover) that real Class A operation also tackles.

SB-F950 LOUDSPEAKERS

The loudspeakers are something of an empty vessel, unfortunately. The exterior looks quite impressive with three cheap but well finished cone drivers, but there's little of substance to back up the good looks. Measure-

ments show the system is distinctly uneven, with a prominent peak around 100Hz which was minimised if the distance from a rear wall was around one meter.

HOW IT SOUNDS

The loudspeakers are almost bereft of bass reproduction, so for once the amplifier's 'super bass' facility was quite useful, helping to fill out the sound so that the speakers sounded just mildly overblown. However, this does nothing to hide something of a 'one note' bass character.

A distinction must be drawn here between the record deck and other source components. Adding 'super bass' with records tended to be less successful than with CD or radio. Used with the amplifier set 'flat', the ultra-lean sounding loudspeakers help cover the turntable's sins of omission in the bass region, and records sound tighter and better controlled as a result. The cartridge is smooth and open, and the deck has enough physical integrity – just – to invest the music with some stability and focus.

There's no reason to be equivocal about the rest of the system which achieved a high standard overall. The cassette deck is a very potent performer, making some fine recordings from radio and CD with relatively little of the loss of clarity and focus that is often found. It can make good use of the extra dynamic capabilities of chrome and metal (Type II and IV) tapes. Commercially prerecorded tapes sound slightly soft, but are still generally satisfactory. Finally there are no complaints whatever about the tuner or the CD player, both of which performed very well.

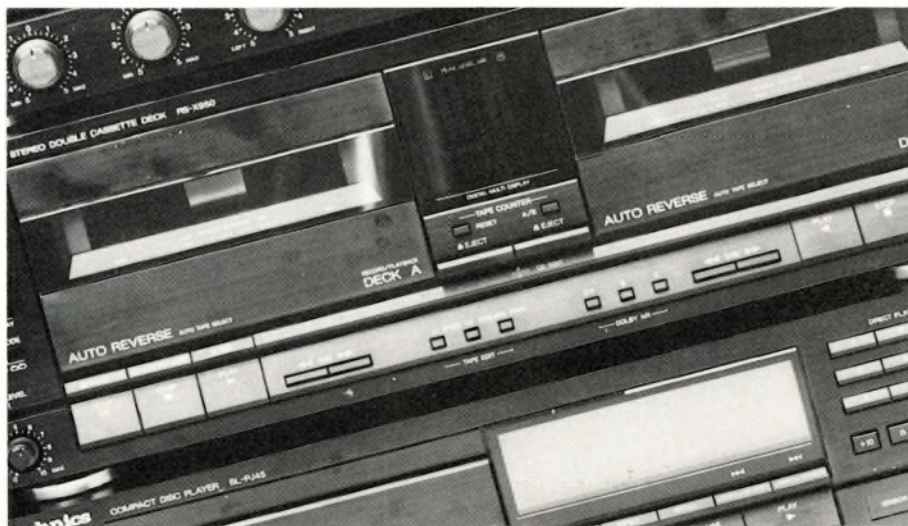
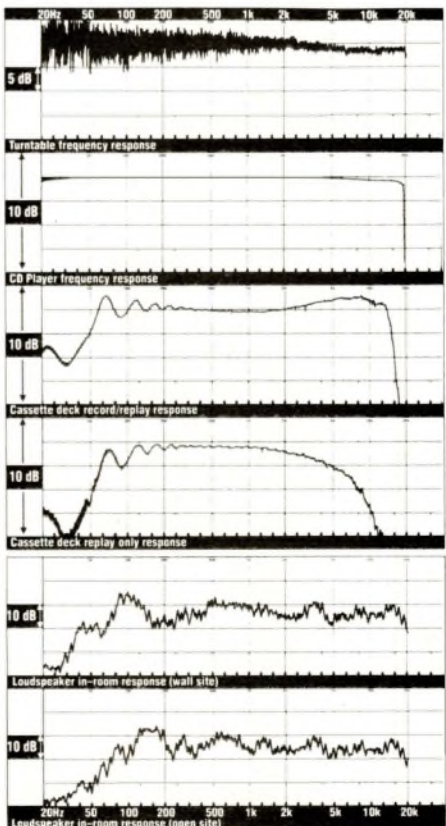
VERDICT

Enthusiastically recommended. The X950 represents a finely judged balance between sonic integrity on one hand, and features for their own sake on the other. There is a real

problem with the loudspeakers, which ideally should be replaced by something in the \$100-\$150 range from one of the specialist manufacturers. The system doesn't really recommend itself to vinyl record freaks, but the rest of the package achieves a high overall standard.

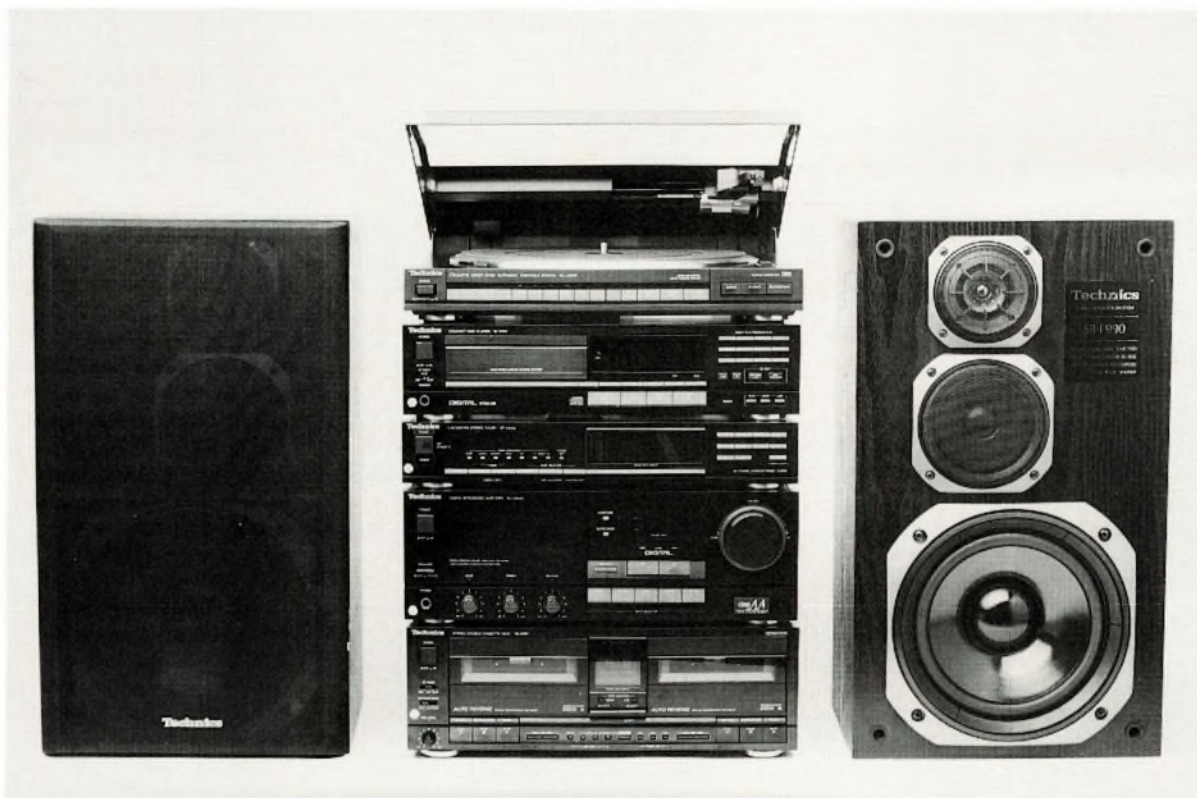
TEST RESULTS

Cost with speakers	£850
Options?	SH-E60 Equaliser, £130; CD player
Cost of system w/o CD player	£600
Size main unit	76.5 x 36 x 32.5cm (h x w x d)
Size loudspeakers	42.5 x 24 x 22cm (h x w x d)
Turntable	
Wow & flutter wtd	0.14%
Drift	good
Speed accuracy	-0.3%
Arm/cartridge resonance	OK
(< 10Hz too low, OK > 14Hz too high)	
Cartridge channel balance	1.0dB
Cartridge channel separation	-25dB
Cartridge tracking ability	£0.4M
Tuner	
Sensitivity	very good
Signal/noise	very good
Cassette Deck	
Wow & Flutter (wtd)	0.20% / 0.21%
Signal/noise ref 0dB Type II	52dB
Distortion 0dB Type II	1.2%
Compact Disc Player	
Signal/noise (measured at headphone output)	84dB
Amplifier	
Power output/channel (8ohms)	50 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	12W



TECHNICS SYSTEM X990D

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



This is the flagship of the Technics midi system range costing a cool (?) £1,250. Some flexibility is available in the system configuration. The compact disc player is one optional item. There's an optional *SHE75* equaliser too, but my advice would be to avoid this on the grounds that although it will make the system taller and more expensive, it's unlikely to help the sound. The one item that really should be at the purchaser's discretion is the loudspeakers, but here the options list unfortunately runs dry.

The system has full automatic source switching and synchronised recording capabilities. Two remote control handsets are supplied, one for the CD player, the other for the system as a whole.

SL-J300R TURNTABLE

It was Technics who invented the compact, parallel tracking arm-in-lid record player, and made the classic of the genre, the *SL-P7*. That was a gem of a turntable and a fine sounding example of the type that has never been equalled since, even by Technics. That said, the *SL-J300R* is not merely an example of electronics gone mad, it's the nearest thing to a decent, competently designed turntable that this whole midi system project has thrown up. Yet paradoxically it's also the least purist of them all.

Like all arm-in-lid players, this one is effectively foolproof since the arm is not accessible when playing records. The optical

sensor based electronics detects record size, sets the speed and generally inhibits the sort of operator mistakes that can result in bent cantilevers or the like. The platter is part of a quartz referenced direct drive motor.

When switched on with a record in place, the arm traverses the disc, registering the scrolls between tracks, and illuminating tell-tales against up to eight track number keys. The machine will then play the whole disc, individual tracks or a programmed selection, the search procedure being rapid and accurate to about 5 seconds playing time on average. Shuttle (search) keys are also provided.

This deck is notably less microphonic than usual, though it's not immune from 'booming' LF resonances. The measured physical parameters are excellent, with minimal wow and flutter and drift and an excellent set of numbers from the *T4P* cartridge.

ST-X990L TUNER

The *ST-X990L* can store 28 frequencies randomly across FM, MW and LW. Besides the usual manual method of presetting, there's an automatic presetting system in which the tuner scours the wavebands, memorising everything it finds. The display shows preset number, tuner status and frequency information.

The tuner also has a clock and timer with a 'sleep' facility (60 minutes maximum) and two programme timers. One switches on and off once within 24 hours; the other repeats

every day, or once weekly or every weekday (the Archers mode). The tuner supplies power to the system cassette deck, so this will make recordings at the timer's instructions. The tuner performs excellently on all wavebands, being both sensitive and selective, with background noise several dB better than class average on FM and AM alike (though not for the same reasons).

RS-X990 CASSETTE DECK

This cassette deck is similar to the *RS-X950* (two auto-reverse transports, manual record level, good meters, electronic tape counter, auto tape sensing, Dolby B and C and track search etc), but with several additional features. The main one is that both decks are capable of recording, which allows series recording of up to three (C90s) or four (C120s) hours duration, or alternatively parallel recording. When used with the *SL-PJ45* CD player, record levels can be set automatically by the player. Lab test performance is similar to the *RS-X950* – competent and with no important area of weakness.

SL-PJ45 CD PLAYER

A 16-bit, 4x oversampling player, the *SL-PJ45* is well equipped, with a random access keypad, a 20-track memory with repeat and a pair of rather inconspicuous controls which double to perform track skip and audible cueing. The display area has a range of read-outs including a track, calendar and a

thermometer-style playing time display supplementing the usual numerical readouts. Readers who regard this as overkill are probably right. The player also has a fixed level headphone outlet and an optical digital outlet. Finally, lurking within is quite a lot of rather poorly documented software which is able to shuffle the tracks of a CD (or more than one CD) onto tape in various ways. It can even suggest track rearrangements for a better fit, and search out the loudest passage to assist when setting recording levels.

SU-X990D AMPLIFIER

The *SU-X990D* also owes a debt to its counterpart in the *X950* system. The key distinguishing features are that power output here is raised to 100 watts/channel (measured) and that the CD input is available in optical digital or conventional analogue form. The DAT input is optical only, but the output to DAT is analogue.

SB-F990 LOUDSPEAKERS

The loudspeakers are the old story: shoddy, hollow construction, a lightweight enclosure, inadequate internal standards and three very impressive looking but actually very rough and ready drive units, which is one more than the job requires. They measure quite well but perform markedly differently on only slightly different measuring axes, which suggests drive unit integration problems.

HOW IT SOUNDS

Not for the first time, we find here some sophisticated electronics of genuine competence partnering a pair of loudspeakers utterly incapable of doing justice to the rest of the system. They sound contrived, with an over large, 'hollow' sound quality, a prominent, 'one-note' bass, an equally prominent treble, and a midrange that sounds recessed and indeterminate. It's impossible to con-

ceive what sense of priorities inspired these loudspeakers, though admittedly Technics are not the first to find themselves with their trousers down, as it were. In any event, the formal Recommendation given to this system is based on chucking the speakers away and buying another pair.

The amplifier is clean, unflappable and more than powerful enough to cope with all reasonable eventualities. It sounds smooth, tight and clear and has a discernibly fuller, weightier bass than the less powerful amp in the *950* system. The CD player, tuner and cassette deck each perform to a high standard, the latter within the slightly narrower constraints that normally apply with the cassette medium – some spreading of stereo images, an added thickness in the bass and a slight loss of airiness. These losses are well constrained, however, especially with metal tapes, which suits the deck well and which sounds sharp and dynamic without overt brightness. Prerecorded tapes are OK but no more than that.

Technics have a good name for CD players, and this one has a real sense of clarity and vividness – characteristics that are mirrored in the FM tuner. But the turntable stays best in the memory. Although cosmetically inferior to CD (say) by sounding less stable and well extended at the frequency extremes, music reproduced off black vinyl tended to breathe more naturally and expansively, and sound more vividly colourful and alive. It's an excellent turntable (by midi standards, of course).

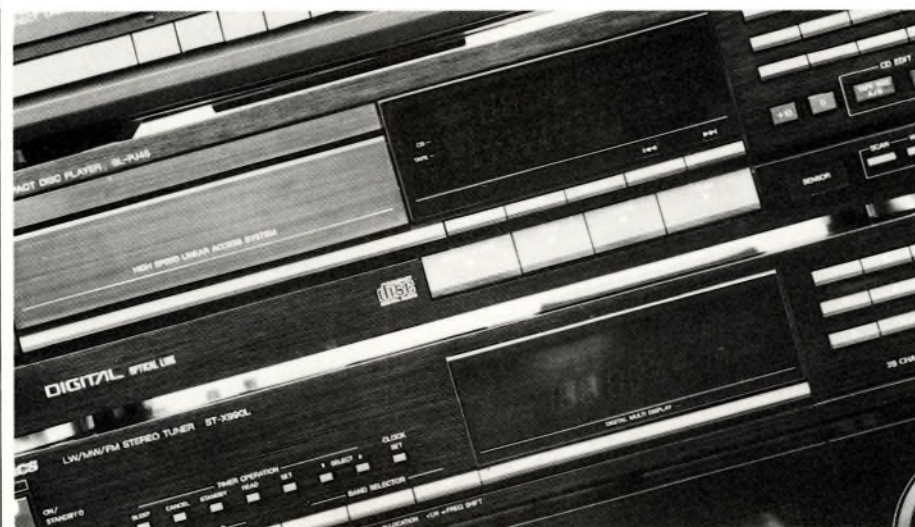
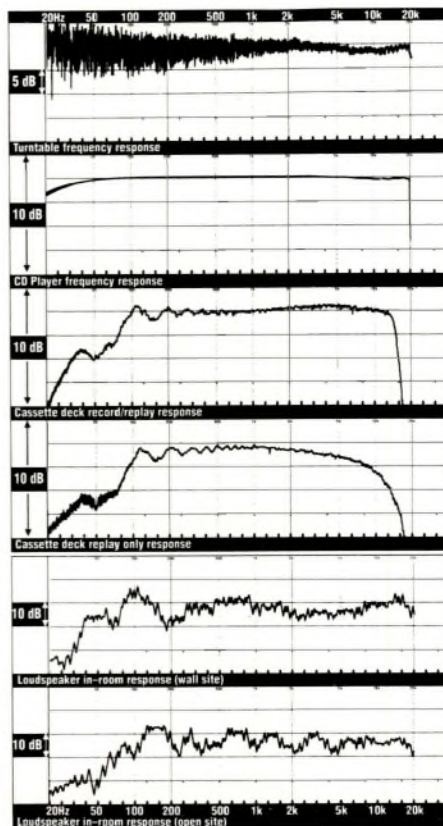
VERDICT

Some of the gadgets may be of doubtful value, but they don't overwhelm the system and there's some genuinely excellent audio engineering here. The system has real class and is a natural for recommendation. But readers are also pointed towards the *X950*

system which has many of the best features of the *X990D* at a lower price.

TEST RESULTS

Cost with speakers	£1250
Options?	SH-E75 Equaliser, £160; CD player
Cost of system w/o CD player	£1000
Size main unit	80 x 36 x 32.5cm (h x w x d)
Size loudspeakers	50.5 x 28.5 x 22cm (h x w x d)
Turntable	
Wow & flutter wtd	0.10%
Drift	good
Speed accuracy	correct
Arm/cartridge resonance	OK
(< 10Hz too low, OK, > 14Hz too high)	
Cartridge channel balance	0.7dB
Cartridge channel separation	-30dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	very good
Signal/noise	very good
Cassette Deck	
Wow & Flutter (wtd)	0.19%/0.10%
Signal/noise ref 0dB Type II	52dB
Distortion 0dB Type II	1.4%
Compact Disc Player	
Signal/noise (measured at headphone output)	97dB
Amplifier	
Power output/channel (8ohms)	100 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	low



TOSHIBA SYSTEM V18CD

TOSHIBA UK LTD., TOSHIBA HOUSE, FRIMLEY ROAD, FRIMLEY, CAMBERLEY, SURREY GU16 5JJ. TEL: (0276) 62222.



Though nominally separate, most of the components here are dedicated to this system, and cannot be used as standalone items. The amplifier and cassette deck are housed in one box, but the turntable and tuner are housed separately and have no power supplies of their own, being totally dependent on the amp/cassette deck for electrical sustenance. On the other hand, the CD player has a power supply and headphone socket of its own (but no volume control) so could be used independently.

SR-3648 TURNTABLE

With automatic arm cueing and end of side return but manual speed and record size selection, the SR-3648 is an absolutely typical system component – more's the pity. The whole player weighs in at just 2.1kg, which could be some sort of record (sorry). The chassis is a moulded plastic shell, extremely lightweight in itself, and the platter is a one-piece plastic item surmounted by a ribbed rubber mat, itself about as insubstantial as they come.

The cartridge is not a standard T4P type and is not readily replaceable, which means you're locked into using the original cartridge and Toshiba's own stylus, but this isn't a serious flaw. The unit is blessed with good speed stability, acceptable levels of wow and flutter, good cartridge tracking and reasonable separation between channels. The cartridge frequency response, measured as

usual with the amplifier in circuit, is smooth if treble shy.

ST-3518 TUNER

A neat, modern looking product, the ST-3518 ranges over the usual mix of FM, MW and LW wavebands, and can store a random mix of 19 frequencies from any mix of wavebands. The only unfortunate aspect of the design (and Toshiba are far from alone in this) is that there are only ten preset selectors, so numbers 10 – 19 can only be accessed by first pressing a key clumsily but correctly labelled '10/+10'.

The usual tuning facilities are supplemented by a preset memory scan so that the alternatives can quickly be scanned for programmes of interest. The display, in bright orange lettering, provides all the usual data, including the selected preset. Bench tested, the FM section is a little noisy, with both hiss and hum at higher than ideal levels. Sensitivity is pretty good, however. AM performance is disappointing all round, as interference is erratically extremely high, and sound quality thin and raw.

SJ3418 AMPLIFIER/CASSETTE DECK

There are few surprises with this straightforward package. The top two thirds of the fascia is given over to the obligatory twin cassette transports; both are unidirectional

and only one can be used for recording as well as playback. The unit is capable of normal or high speed dubbing and has automatic tape type selection on both transports. There are some strong limitations, however, one being the mandatory automatic record level setting, another being the limited recording tape compatibility which is restricted to ferric and chrome (Types I & II) only.

The transport section has autostop only from play or record and entirely mechanical transport keys, but there's no hardship here and the unit is so bereft of controls it's hard to conceive of operating problems. There is one irritating flaw, however: if the high speed dub switch is selected when recording from a source other than another tape, the recording just doesn't happen. In the total absence of any of the usual mode and record level displays – there isn't even a record telltale – you may not realise your mistake until it's too late (unless, perhaps, you notice that the microscopic tape counter is stationary).

The deck has a limited (and somewhat uneven) bandwidth, and mediocre speed stability; the usual noise and distortion measurements were of course prohibited by the auto level control circuits. There is no appreciable output from the deck below 80Hz which means in effect that there is no bass to speak of at all. Pre-recorded tapes are handled well enough, but high speed dubs suffer a total loss of treble and a very uneven midband.

The 20W/channel power output of the amplifier section is less than Toshiba imply, unless you're good at reading fine print – 10 per cent distortion indeed! Facilities include a five-band graphic equaliser and something called bass boost, which the instructions recommend are used in virtually all circumstances! Inputs include one spare line level set, designated auxiliary.

XR-9318 CD PLAYER

Compact discs are handled by this Philips made unit which has a rudimentary display and few controls. Features include track search and scan, 20-track programme memory and a headphone socket. Both digital and analogue outputs are fitted.

Fascia treatment is awkwardly at odds with the rest of the system, and ergonomically unhelpful despite the lack of controls. Functionally, however, the deck sweeps facile criticism aside. It's an accomplished tracker and performs to an incomparably higher standard than the rest of the system.

SS-V28 LOUDSPEAKERS

The SS-V28 is a low cost design of gimmicky appearance, with false driver trims, a flimsy box structure and crude looking cone drivers (bass and tweeter alike) setting the tone. This unpromising start is mirrored in the lab tests, the response shape being badly mauled with significant (and audible) peaks near 100Hz, between 500Hz-1.5kHz and just above 5kHz.

HOW IT SOUNDS

The loudspeakers are fit only to be junked. I'm surprised that Toshiba feels comfortable with the decision to sell this system so equipped, given the company's good record in this area with more costly systems. And price is not an excuse; the V18 is cheap, but *not* cheap.

The nitty gritty then (appropriate term in

the circumstances) is that the speakers sound thin at both ends of the audio frequency spectrum, as well as being raw in the mid treble. The measured output peak lying between 5kHz-8kHz is plainly audible, though the general unevenness across the band ensures a highly coloured and inarticulate performance. And the rest of the system does its best in support, sad to tell.

Although there is nothing in the electronics that is as objectionable as the loudspeakers, they have clearly been designed on an 'as needs . . .' basis. Because the loudspeaker can't usefully exploit a really musical signal, the amplifier and other components don't provide one.

Viewed from the wrong end of the loudspeakers, the cassette deck and turntable sound OK. With better loudspeakers and headphones, the cassette deck is clearly bass light and has a 'shuddery' quality, though pitch stability seems OK – all findings foreshadowed in the measurements. The turntable is better, but surface noise and rumble were prominent and the sound still lacks real stature. The best components are the tuner when switched to FM (despite the background noise), and of course compact disc, which is on a quite different plane.

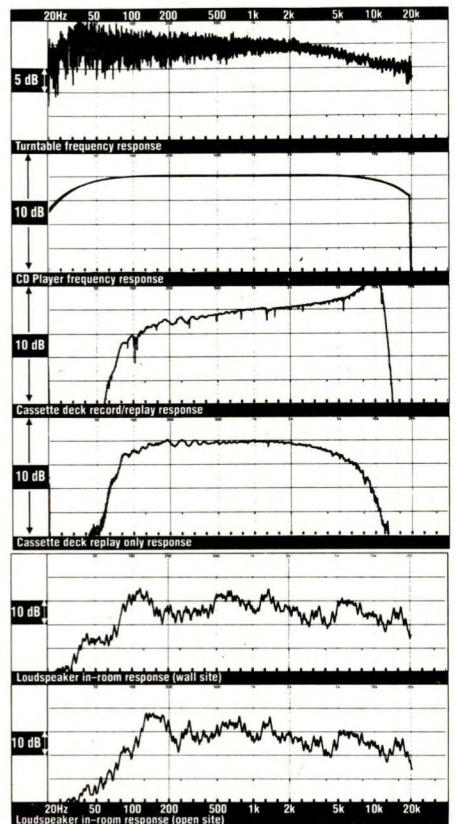
VERDICT

Unprepossessing visually, the system is nevertheless adequately built and reasonably easy to get to grips with. But musically it is a dog's dinner; only the CD player convincingly transcends the standards of a respectable portable.



TEST RESULTS

Cost with speakers	£399 without n/a
Options?	none
Size main unit	71 x 34 x 38cm (h x w x d)
Size loudspeakers	35.5 x 21 x 19cm (h x w x d)
Turntable	
Wow & flutter wtd	0.12%
Drift	good
Speed accuracy	+0.6%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.5dB
Cartridge channel separation	-22.8dB
Cartridge tracking ability	80µM
Tuner	
Sensitivity	fair
Signal/noise	poor
Cassette Deck	
Wow & Flutter (wtd)	0.27%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
Compact Disc Player	
Signal/noise (measured at headphone output)	93dB
Amplifier	
Power output/channel (8ohms)	20 watts
(1kHz, both channels driven)	
Loudspeakers	
Efficiency	low
*auto record level	



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TECH TALK

Every review includes a table of laboratory test results. This chapter explains how each test was carried out and how to interpret the results.

This section describes the measurements, in the order in which they're listed with each review. Occasionally it proved necessary to alter the procedure, especially where the system concerned lacked the usual inputs and outputs, making it difficult to connect the test gear. In general, these alterations are described within the reviews themselves. Nearly all the measurements were conducted by my colleague, Robert King, the aim in all cases being to help illuminate the practicalities of each system's performance as far as possible under normal domestic operating conditions.

Dimensions and prices: We have given dimensions of the stacked system components with the turntable (if fitted) lid up, and of the speakers. Prices quoted are typical retail prices including VAT. While to the best of our knowledge these were correct at the time of going to press, they obviously are subject to fluctuation from time to time, and this should be taken into account when interpreting our 'value for money' judgements.

AMPLIFIER

Power Output: The figures presented are the RMS output in watts with both channels driven together to a point immediately prior to amplifier output waveform clipping at 1kHz. Equipment used: Dual beam oscilloscope, dual 8ohm dummy load and Nakamichi *T-100* audio analyser, both for generating the sine wave signals and displaying the output on its wattage scale.

RECORD DECK

Speed variations (wow and flutter): The measurement given is peak DIN weighted, as measured using a 3kHz recorded tone from HFS 75 and the Kenwood w&f meter

Speed drift: This is an assessment (not a measurement) of long-term drift (low-rate speed variations) using the same test set up as above

Speed accuracy: percentage error, derived from tests using the Ortofon *TC 3000* test computer. The more accurate, the better – although of course a slightly incorrect speed is less serious than appreciable speed variations.

Arm/cartridge resonant

frequency: This is the average vertical/lateral resonance, also derived from the Ortofon *TC 3000* test computer. This frequency is related to the mass of the arm and cartridge, and the stiffness (compliance) of the cartridge cantilever (the thin rod that supports the stylus at its visible end, and which is secured loosely at the other end). Very low figures, below about 8Hz, may cause the cartridge to be easily disturbed by problems such as warped records, and (where fitted) turntable spring suspensions. Sound quality may suffer – pitch reproduction can become unstable and low frequencies generally may become muddy and ill-defined. Too high a frequency – above about 16Hz say, may result in a rather fluttery and under characterised bass. The 'ideal' figure is 10-14Hz.

Cartridge channel balance:

Again derived from the Ortofon *TC 3000* test computer. The smaller the difference between the two channels the better, of course.

Cartridge channel separation:

The figure indicates the amount of left hand channel signal appearing on the right hand channel output – or vice versa, the 'worst case' figure being quoted each time. The higher the figure, the better the result. Test equipment again was the Ortofon *TC 3000*

Cartridge tracking ability: This figure indicates the highest recorded velocity the cartridge can track at the quoted tracking force – so the higher the figure the better. The measurement is not a comprehensive test of tracking ability, but it gives a useful general indication. Any perceived shortcomings in tracking ability on music programme have been commented upon separately.

Cartridge frequency response:

For these systems we used the $\frac{1}{2}$ -octave pink noise test bands on B&K *QR 2011*, which is designed for system response checks. The signal measured was from the tape output of the system where possible, or alternatively the headphone output.

Theoretically the test described above should give something approaching a straightline response, but this never happens in practice. For reference, see the charted response of a Koetsu Black cartridge (fitted to a Linn Ittok arm and LP12 turntable) when measured this way (the output in this case being from the tape feed of a Musical Fidelity preamplifier). As you can see, the trace shows a slight loss of output at high frequencies.

Note that all cartridge responses were run with the standard 50dB scaling often used in cartridge tests.

CASSETTE DECK

Tape used for tests:

Measurements all refer to Type II (Chrome bias) tape. The brand chosen was either Maxell *XLIIIS* or TDK *SA* according to the manufacturer's recommendation (where available). Tapes used were always C90s.

Frequency response: The plot was made using the Type II tape selected as described above, and was run at –10dB ref 0VU on the deck's meters. Equipment used was a Neutrik sweep generator and chart recorder. The vertical scale was set to 10dB total, ie 2dB per large division.

Speed variations (wow and flutter): Record/replay, DIN Peak weighted. Equipment used: Kenwood w&f meter audio analyser. The lower, the better.

Speed drift: Exactly as for the equivalent measurement of record decks, this is an assessment rather than a

measurement of long term drift (low rate speed variations) using the Kenwood w&f meter

Signal-to-noise: CCIR/ARM Weighted signal-to-noise ratio. The figure quoted is for the complete record/playback cycle at 400Hz and is referred to 0VU as indicated by the deck's meters and with any noise reduction switched out. The higher the number the better

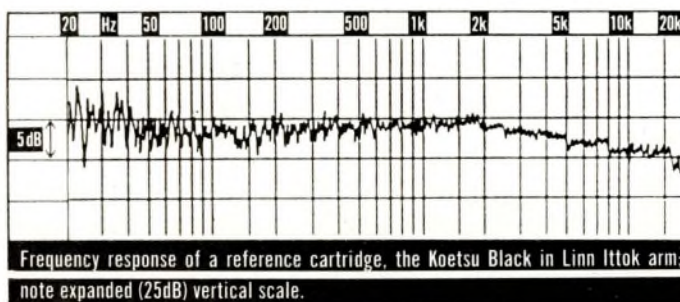
The presence of automatic level record controls, where there is no stable reference point for the record level, frustrated this measurement.

Distortion: Measured at 0VU on the deck meters, this should be read in conjunction with the signal-to-noise figure. A poor figure for the latter test may still be satisfactory in the light of a very low distortion figure (say 0.8 per cent), because there will still be several dB of headroom to play with above 0VU. Conversely, an apparently good signal-to-noise result may in reality be no better than average if the distortion level is high (say 2-3 per cent) at 0VU.

TUNER

Sensitivity and Signal-to-noise: These are assessments rather than measurements. A laboratory FM stereo generator, which can be pictured as a small transmitter that can encode any source connected onto FM, was used for these, and for a major part of the listening tests as described in the general introduction. The generator – a Radiometer SMG1 has a range of outputs ranging from 10 μ V, an extremely low level which is barely sufficient for good mono reception even with a sensitive tuner, to 100mV, approximately 100 times the amount necessary for good, low noise stereo. By feeding an unmodulated carrier to the tuner under test (that is, a transmission of silence) it was possible to obtain a reliable and repeatable idea of how sensitive and quiet each tuner was. As part of these tests, the tuner was also driven with a range of signal voltage levels using a very low-level piece of music, which gave an idea of the annoyance value of noise in the presence of a music signal. The music signal was derived from a Sony *CDP*.

Continued over the page



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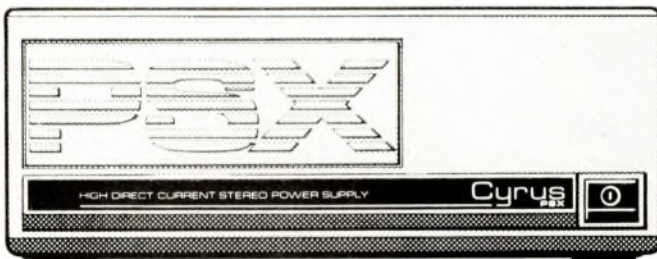
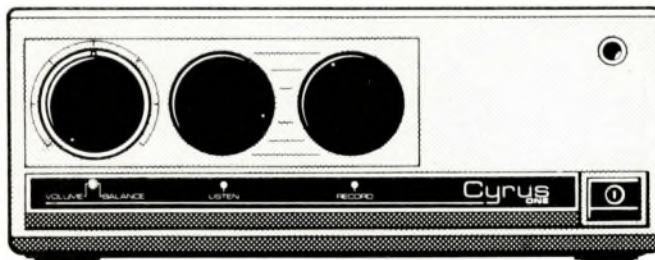
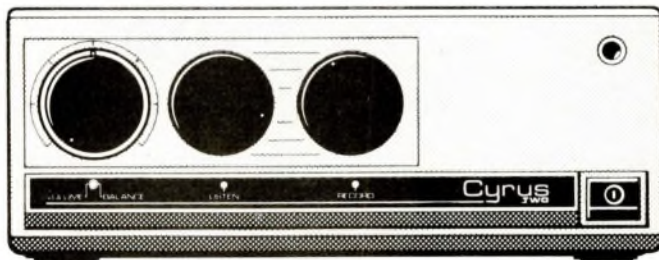
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LOUDSPEAKERS

Frequency response: One loudspeaker from each pair was measured in the room used for the listening.

The listening room itself clearly has a significant effect on the loudspeaker measured response as reflections from the walls add to and subtract from the loudspeaker's inherent response. To get some sort of feeling for what the room was doing, I measured the in-room frequency response of an inexpensive but good quality high fidelity loudspeaker – the Heybrook *HB200*. The response runs were taken with its back to a wall, as recommended for this model, and also pulled about one meter into the room. In both cases the speakers on Heybrook *HBS-1* stands, which were also used extensively throughout the system tests. The room – the main listening room for the reviews – is irregularly shaped, but is roughly 17 x 15 feet, with a tall ceiling. The in-room response was made with a 1/2 octave warble tone signal, which is a normal sine wave modified so as not to excite room resonant modes unduly. The equipment was a Neutrik generator, a high grade calibrated microphone and chart recorder, the microphone being essentially flat (ie accurate) to 20kHz.

This room is responsible for a suck-out at 200Hz and some boosting of the curve between 400 and 600Hz. The sharpness of these effects is critically dependent on the geometry of the loudspeaker itself. Where the bass unit is equidistant from the base and the two sides of the enclosure the effect is more sharply defined. Small changes in the microphone position also have a dramatic effect here, as they do at the top end of each drive unit's pass band, where drivers tend to become very directional.

Taking all these effects into

account suggests that any in-room curves should be treated with a degree of trepidation, but we were able to obtain much useful information from them. First, we looked for an overall shape that was reasonably smooth and lacking in severe peaks and dips. Secondly, some idea of the frequency balance of a loudspeaker could be gleaned by looking at the area under the curve. Thus although the room is responsible for some modification to the response in the range of frequencies from 200Hz to about 1kHz the energy output of a speaker in this region (represented by the total area under the curve between these two points) should be roughly equivalent to the trend elsewhere. So we looked for a smooth mid-range and extended treble response – the *HB200* rates as good in these respects – and a smooth averaged-out response below 1kHz. Our comments on speaker performance, then, are based on these tests as well as on listening.

Efficiency: This should be read in conjunction with the amplifier output figure to get a rough idea of the maximum attainable volume levels with each of the systems. Low loudspeaker efficiency implies that more amplifier power will be needed to shake the neighbours up, and vice versa. A combination of low efficiency and low or medium power levels should act as a caution, especially for those with large listening rooms or a penchant for playing music at realistic volume levels.

LISTENING TESTS

A great deal of thought went into designing listening test procedures which would be repeatable and give consistently useful results. As far as possible, all test conditions were standardised, and system evaluation was based in the first instance on so-called 'substitution' tests. This involved careful listening to a 'reference' system, chosen as being one of

good basic sound quality without being ludicrously expensive compared with the system under test. One at a time the components of the test system were then introduced into the reference system, and notes made on the performance in each case.

After this, the 'reference' system was set aside, and the system under test was assembled and listened to thoroughly as a whole, further detailed notes being made on the performance.

In each case, the cassette decks were evaluated for sound quality by listening to pre-recorded cassettes, and by listening to the results of recordings made both from the standard system, and also the one being reviewed – records and Compact Disc being used for source material. Compact Disc was also used to drive a laboratory FM generator which fed a 'broadcast' signal to each tuner in turn, simple A-B switching between the tuner and a straight feed to each system's own amplifier being used to establish sound quality in a particularly repeatable way. Each tuner was also listened to off-air from a four-element roof-mounted aerial which provided a good quality and strong signal from local transmitters.

All listening was done with only the test pair of loudspeakers in the listening room – that is under 'single loudspeaker' conditions. While I made no attempt to keep to a selected batch of records and CDs, I did maintain consistency from system to system by keeping a number the same from one review to the next – but not always the *same* two or three records. There were several reasons for this, though it had a lot to do with wanting to keep a fresh ear and brain for each review.

The complete reference or benchmark system was as follows: Audio Technics *AT-95E* cartridge, Dual *CS-505* turntable, Musical Fidelity *A1* amplifier,

Heybrook *HB200* loudspeakers, A&R Arcam Alpha tuner, various CD players (mostly Sony & Marantz), plus headphones and sundries, mostly from Sennheiser, QED and Mission.

Apart from the CD player of course, this system is representative of good quality, medium price record playing systems. The loudspeakers, which were used with each system tested, are relatively easy to drive and efficient, as well as fitting the bill on sound quality grounds.

PROGRAMME MATERIAL

Musical programme used for the listening tests included the following:

Records:

Horowitz plays Mozart *Giulini/Orchestra del Teatro Alla Scala* (DCC 423 287-1).
Mahler Symphony No 2 – *Abbado/Chicago SO* (DGG 2707 094).
Heliotrope Bouquet Piano Rags – *William Bolcom* (Nonesuch M71257).
Billy Joel – *The Stranger* (CBS 82311).
Tom Waits & Crystal Gayle/*One from the Heart* (CBS 70215).

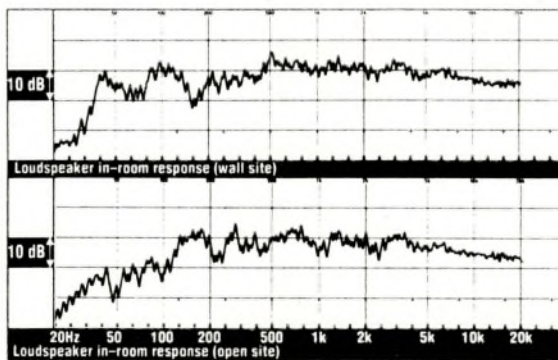
Compact Discs:

Mahler/Symphony No 5 – *Maezler/VPO* (CBS MK42310).
Honegger/Concerto da Camera, etc – *I Musici de Montreal* (Chandos CHAN 8632).
Bartok/Concerto for Two Pianos, Percussion & Orchestra, etc – *Simon Rattle/CBSO* (EMI CDC 747446/2).
Bizet/Symphony in C etc – *Marriner/Academy of St Martin-in-the-field* (Decca 417 734-2).
Beethoven/String Quartets No 9 & 11 – *Borodin String Qtt* (Virgin Classics VC7 90713-2).
Schubert, Schumann & Weber/*Gervase de Pejer* (Chandos CHAN 8506).
Brahms Ein Deutsches Requiem (Teldec 8 48272).
Jennifer Warnes/*Famous Blue Raincoat* (RCA PD90D48).
Michelle Shocked/*Short Sharp Shocked* (London Int 836 343-2).
Miles Davis & Marcus Miller/*Siesta* (Warner Bros 925 655-2).

ACKNOWLEDGEMENTS

First, my thanks to Robert King, who sat at the test bench day after day performing most of the test programme. Thanks are also due to QED Audio Products, Heybrook Audio, A&R Cambridge, Sony UK, for loan of equipment.

Last but not least, thanks to my family, and especially my wife Kathy, for perseverance in the face of considerable domestic disruption.



Heybrook *HB200* reference response graphs.

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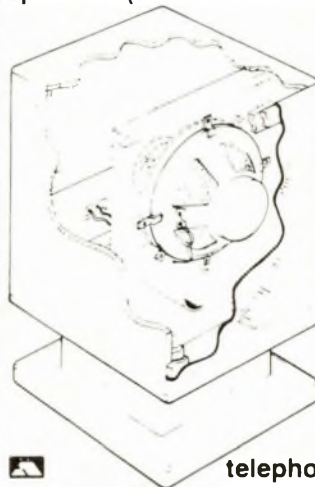
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CD MIDI SYSTEMS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Alvin Gold concludes with summaries of the best CD midi systems under review.

The shelf-top packaged midi system retains its pre-eminence on the market for yet another year. Despite flashes in the pan such as the Proton *AI-3000*, which represents a harking back to the era of the music centre, there is no obvious successor to the midi. It remains to be seen how the concept copes with CDV (if and when), the larger integration of audio and video (ditto) and the slow winding down of the record player.

It's intriguing to note that fully five years down the road from the introduction of CD, which has revolutionised audio thinking and buying habits, most manufacturers still don't sell systems without record players. But they do sell systems without CD players; a fair proportion of systems on the market have optional CD players, and on this basis CD can be said to have not yet come of age.

My guess, based more on intuition than on anything more tangible, is that in a couple of years that position will be reversed. The groundwork is already being laid. The trend towards centralised control systems – remote control, automatically cued recordings and so on – favour the microprocessor driven components like CD. Even a simple task like, say, finding the start of track three on an LP cannot be performed reliably. Most systems with remote control leave the record deck facilities off the handset. Thus even without recourse to discussing sonic limitations, the vinyl LP is already beginning to look depressingly like a has-been.

As *Choice* has shown in the past, records have little to fear from compact disc except in the peripheral, cosmetic areas of background hiss, scratches and the like. But this doesn't apply with midi systems where in the face of static or improving standards elsewhere the record deck has been steadily declining to the point where many decks now weigh next to nothing, have arms that could double as bedsprings and where platters are often made of thin, moulded plastic. If the idea is to wear us

away from records altogether, they are an outstanding success.

Loudspeakers continue to be neglected too, though some manufacturers show what can be done without spending much money, and there are a few decent system loudspeakers around (take half a bow Goodmans, Pioneer and Sony). For the rest, if the manufacturers can't do it right, let someone else do the job properly and make them optional.

Cassette decks are becoming easier to drive and many now sport twin auto-reverse mechanisms, but it's true to say that here you get what you pay for. Tuners show some signs of modest improvement, and the inclusion of timers with some systems is welcome – but beware many modern cassette decks don't support timer programming.

With amplifiers, I was a little disturbed to note that the cheap systems were consistently outperforming the expensive ones. Although the former often tended to be rather loose, ragged and shallow, especially in the bass, they obviously have simpler, more transparent circuits that manage to sound more tactile and alive than their overcomplex and overpowered counterparts. Despite this, there has been a general if modest uplifting of standards here too. Indeed this comment can be extended to systems as a whole, especially the more expensive models upwards of about £800.

This year's list of Recommendations and one Best Buy is as follows:

BEST BUY

Sanyo System 22CD (£350)
It looks pretty ordinary but works as well as any low end system examined so far. It earns Best Buy status – the only one this year – because it undercuts anything comparable rather than because it does anything better.

RECOMMENDED

Sanyo System 33CD (£400)
This system amounts to a grown up System 22CD, offering slightly better sound quality than the 22 at an inevitably higher price.

Goodmans 5300CDM

(£400)
Another fundamentally ordinary system, the 5300 is distinguished by one feature only: the excellent Goodmans *Maxim* miniature loudspeakers, which massively outperform almost every one of the loudspeakers with the other systems tested.

Aiwa X-78

(£550)
The dull, compressed sound of the supplied loudspeakers is in danger of spoiling this system (an all too familiar tale!), which is otherwise more than good enough all round to earn a recommendation.

Proton AI-3000

(£549)
This latter day successor to the once ubiquitous music centre combines a CD player, tuner and amplifier in one box. There are certain functional limitations, but nothing too serious. The components that are provided are of budget high fidelity standard, and the ones that are missing (the turntable and loudspeakers) provide a heaven sent opportunity to choose from the separates market and achieve something genuinely out of the ordinary. The pricing is scarcely sharp, but performance is potentially very good.

Akai M.80CD

(£800)
The *M80CD* features a cassette deck with two record capable auto-reverse transports and a range of other powerful features. Equipment levels elsewhere are more nearly standard, unless you count the optical CD amplifier input, which is of little fundamental importance.

Technics X950

(£850)
This is a sophisticated and unusually well presented system with full remote control, a tuner/timer and an auto-reverse twin deck mechanism and genuinely high fidelity standards of sound quality. There were also the usual problems: the turntable, which is nevertheless better than some, and the loudspeakers, which should be upgraded.

JVC Midi-W900CD

(£1,000)
An excellent remote control implementation, auto source selection and linked recording facilities are strong points of this well presented system. The equaliser is an unnecessary touch but the loudspeakers have

some integrity.

Pioneer System 300 (£1,000)
Although presented as a standard up-market midi system, some of the components embody thinking more usually associated with purist high fidelity, for example 'straight line' engineering in the amplifier to eliminate extraneous circuitry from the signal path, and loudspeakers which whilst they may be objectively wanting, outshine the usual run of system designs.

Technics X990D

(£1,250)
Based closely on the *X950* system, the 990 shares some components but has a more sophisticated cassette deck (both auto-reverse transports can record), a well made programmable parallel tracking turntable in place of the usual lightweight pivoted arm player and a 100watt amplifier. The loudspeakers are larger too, but no better unfortunately, and certainly not good enough.

Sony 1000CD

(£1,500)
The usual rotten turntable removes the gloss from a package which excels in many areas. Twin record capable auto-reverse cassette decks, a CD player with 'Custom File' discs ID and auto programme play facilities, a graphic equaliser and small, high grade flat diaphragm loudspeakers head the list of features in a system which offers excellent resolution and analysis and sufficient euphony to make listening rewarding and enjoyable.

In addition to the above, the following recommendations stand for models originally reviewed and recommended in the last test (*Issue 54*, January 1988) and still listed as available.

RECOMMENDED

Aiwa <i>V1500DX</i>	£999
Goodmans <i>Maxim-Midi</i> System	£520
Sanyo <i>W40CD</i>	£380
Toshiba <i>V17CD</i>	£370

The Toshiba retains its competitiveness partly due to a reduction in selling price from £399. The Marantz *MX673CD* (£900 w/o speakers), recommended in our last test, is dropped from the list in view of improving standards at this end of the market.

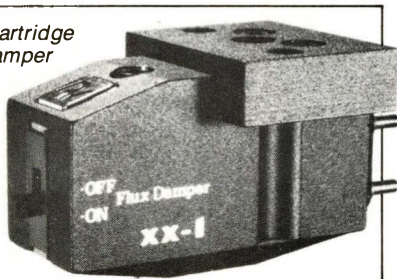
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23RS MK II	Improved, the famous Ruby Karat. Output voltage 0.15mV. Frequency response 20-30KHz ± 1dB. Tapered solid ruby cantilever. Weight 5.3gms.	£160	£130
17D2 MK II	Improved, superb accuracy diamond cantilever MC cartridge. Output voltage 0.15mV. Frequency response 20-30KHz ± 1dB. Straight solid diamond cantilever. Weight 5.3gms.	£198	£170

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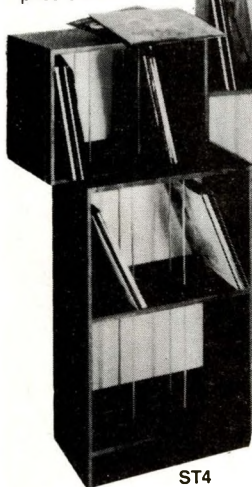
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CHOOSING AND USING . . . TUNERS

Radio engineer Norman McLeod tunes you into his test methods and explains what makes a good radio tuner.

The tuner reviews which follow, may well be different from those you've been used to in the past, here or elsewhere. This is because your reviewer doesn't normally work in the hi-fi industry, where radio tends to be seen as an unexciting, minor and not very distinguished subsection. Instead, I work in radio broadcasting, where the modern form of hi-fi enthusiast tends to be regarded as a lunatic, a charlatan, or a fool!

In the 'sixties and early 'seventies, broadcasters, amateur experimenters, recording enthusiasts and an overwhelmingly British hi-fi industry all spoke politely to each other. Shared technical criteria like frequency response, noise and distortion formed common ground for comparing systems or techniques.

LACK OF RIGOUR?

Twenty years on, the hi-fi industry – or more specifically, the hi-fi press – seems to have discredited itself in the eyes of many broadcast engineers by an apparent lack of methodology and scientific rigour.

I am not here to take sides one

way or the other. The human ear is an astonishingly sensitive instrument which easily yields great wodge of qualitative information which cannot be readily correlated with lab results. On the other hand, the brain can be fooled in various ways, but a technical measurement repeatedly carried out is, within its limiting definitions a fact quite beyond dispute.

The real task facing radio engineers like myself is never to give up on the difficult struggle to bring the two approaches – listening and measuring – closer together. At the end of the day, our broadcasts are there to please the ear, not the 'gear', and we forget this at our peril.

THE VITAL CONNECTIONS

The two diagrams show the test connections made in order to take the measurements which, after processing, make up the *Test Results* tables.

The Hitachi *FT5500 MkII* tuner was used, with identical input signals as a reference throughout the tests. The tuner was not used for any special qualities, except that the signal

meter is incredibly handy: it functions as a known quantity, measured so often I could quote its specs in my sleep.

Doing the tests, readings were regularly checked against the reference tuner to ensure the results were valid. If any measurement took me by surprise, the Hitachi provided an instant check that the equipment was functioning correctly. It was also a useful yardstick for the listening tests, and was used similarly as a reference during air tests.

DOING IT IN DECIBELS

All the results have been boiled down to a figure in decibels. The decibel has always been used for frequency responses, but only grudgingly now is being adopted also as a way of expressing power output, signal level or distortion.

However, I decided to go the whole hog and convert everything into dB. Why? Because it makes relative comparisons so much easier, since all the values are expressed in the same unit. Differences of less than a decibel in *anything* are not thought to be very significant at the transmitting

end of the radio business.

The only measurements where figures are quoted to a precision greater than a round decibel is in the frequency response, where I believe my techniques are reliable to about 0.2dB.

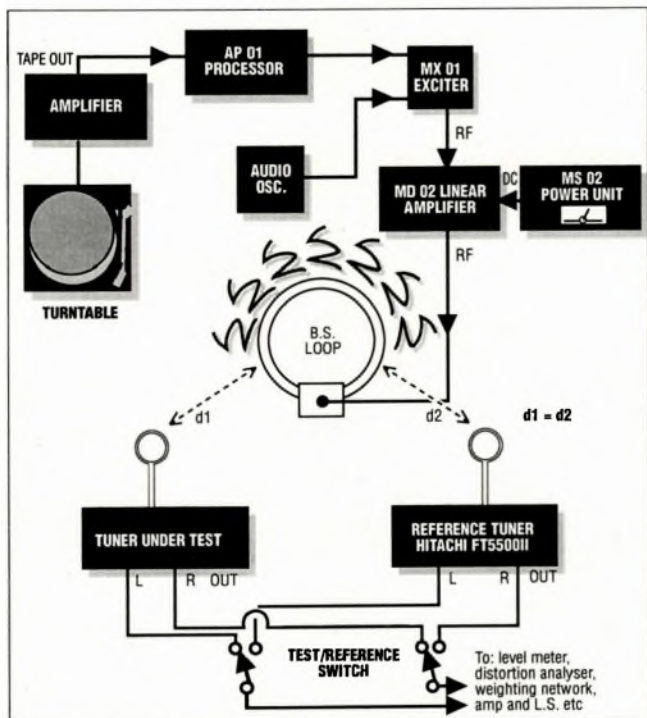
Let me stress that all measurements are bound to be less accurate in absolute terms than they are between one tuner and another.

Cumulative errors in test equipment may produce a set of results which are out by a constant dB or two overall, but relative to each other the figures should be fairly reliable.

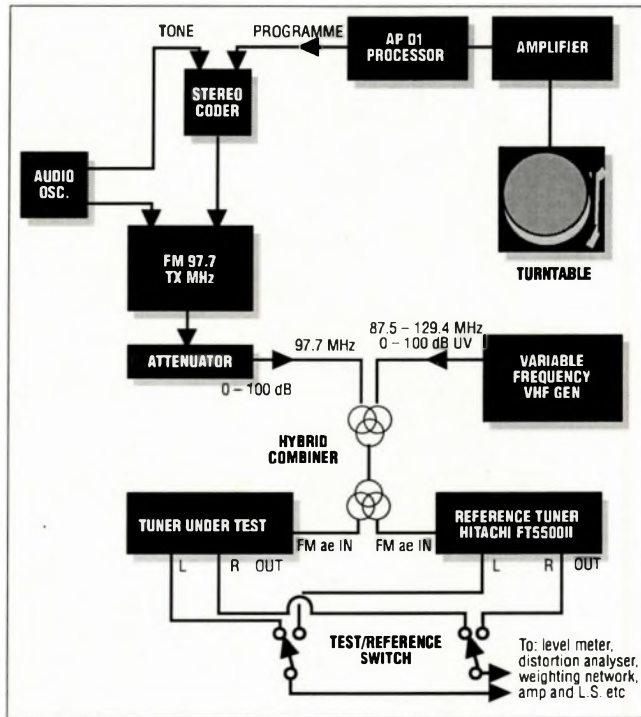
Remember, too, that measurements taken were of only one sample of a mass-produced item, subject to all manner of production tolerances and 'spreads'. A test engineer has no way of telling – apart from measuring umpteen samples of the same unit – whether the review sample is in the middle or at one end of these tolerances.

Certainly, if anyone wants to check the tests I have made, I'll be happy to provide full details, but here I can explain them only briefly.

Continued over the page.



Test set-up for AM measurements. AP01 processor and MX01 exciter are by Wireless Workshops. Note that 'reference' and 'test' tuners are set equidistant from the BS loop ($d_1=d_2$).



Test set-up for FM measurements. FM generator set to 97.7MHz is an FM10 unit from Phoenix Communications.

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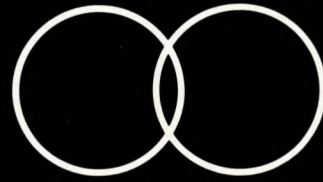
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Continued from previous page.

FM SECTION

In tuner-talk, the **front end** is the screened box of tricks which converts the incoming RF signal – between 87.5 and 108MHz – to the IF at 10.7MHz. However, this process is prone to noise and spurious responses, particularly when there are strong signals.

The **RF noise figure** is a measure of how noisy the RF input stages of the set are: figures of between 5 and 10dB are typical. There's little to choose between modern tuners – there's more difference between a two and a six element aerial, in terms of picking up weak signals, than there is between the best and worst tuners in general use.

The **RF Overload** figure is arguably much more important than the basic sensitivity: this is the point at which the presence of a strong signal will overload the front end, causing the reception of weak signals to be degraded.

RF Intermodulation is assessed subjectively during aerial-based listening tests. My local aerial signals include two strong transmissions (at around 80dB μ V) on 94.5MHz (Radio 4) and 95.3MHz (Radio Sussex). If we heard any 'third-order intermodulation' products on 93.7 and/or 96.1MHz, consisting of spurious, non-existent 'stations' carrying Radio 4 and Radio Sussex simultaneously, then the tuner was poor.

Although my local signals are strong, they are not exceptionally so: here is one clear test which sorts out the professional front-ends from the junk.

The **Adjacent-Channel Protection** reports cover what is normally called 'selectivity' and is normally measured in a different and less helpful way. The figures presented tell you how much stronger a station 300 or 400kHz away can be before it starts to degrade reception of a 48dB (250 μ V) stereo signal to any perceptible extent.

For example, a protection ratio of 40dB at 400kHz means that if you were listening to a very weak ten-watt transmitting station on 95.0MHz, a station the same physical distance away operating on 95.4MHz could run 100kW (+40dB) without upsetting your reception.

The BBC tell me that the **Noise Floor** of their stereo FM transmissions, measured CCIR/PPM, is about –63dB relative to peak programme. So let's not go daft about tuners which vastly better this spec, and only condemn those which fail by a significant margin.

By looking at the **Saturation Sensitivity**, you can also tell how little signal is required for the tuner to give a fully adequate performance. **Saturation sensitivity** is the amount of aerial signal required for the tuner either to meet broadcast spec (–63dB CCIR/PPM), or to 'quieten' within 3dB of its own noise floor, whichever is worse.

So there is little to be gained from having signals any stronger than the ones quoted, since the most that is on offer is another 3dB of signal-to-noise ratio. Put another way, provided a signal at least reaches the **saturation sensitivity**, there is very little lost compared to stronger ones.

Distortion and Frequency Response figures should be self-explanatory. Distortion is almost entirely second harmonic, and often considerably higher than it needs to be due to misalignment of the detector quadrature coils. So this is as much a measure of quality control as it is of the basic nuts and bolts. Local tweaking can bring distortion down from the 40s to the 60s in many cases.

AM SECTION

The two key parameters of **Distortion and Frequency Response** are tabulated in conventional fashion. Poor LF distortion on AM indicates compromises in the design of the AGC circuit, while a telephone-like AM frequency response points to a cheap and cheerless ceramic filter in the IF.

Listening tests served to assess the **RF Performance** easily enough. We have a weak French station here on 585kHz, and a strong English one on 1485kHz, which lands exactly on the image frequency for most synthesised radios tuned to France. So we can hear all about the **image rejection** (or lack of it), and there's no disputing the relevance of the results! The 585 signal also serves as a **sensitivity** check.

ACKNOWLEDGEMENTS

I could not have completed these reviews at all – let alone in time – without the generous help of the frequency planners at the *dti*, engineers from the BBC Design Group and Engineering Information Department, Andy Gemmel Smith of *Alice Soundtech*, Robert Dowse of Brighton's *Definitive Audio*, together with Lawrence Hallet, Martin Spencer, and Tim Brown of *Phoenix Communications*, Tim Oates, Keith Hall and Pete Mitchell. The fads or follies are mine alone, though, while the only axe I'm grinding is for better radio!

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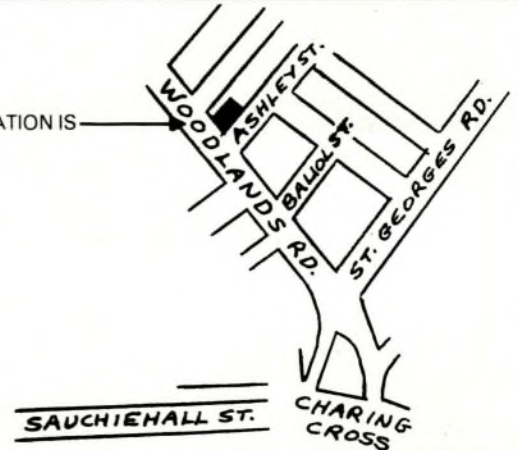
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BEST BUY



The key question about ergonomics is – can you make it work without first reading the instructions? You can with this tuner, and this is the first of many points in its favour.

Everything necessary and little that's superfluous is the philosophy of the AT-52L. Below the indicator panel there are eight buttons which between them can store 16 stations – to call up the other one press the button twice. Told you it was simple!

There's a button to select wide or narrow selectivity (on FM only, alas), a button marked 'FM Auto' which lets the stereo decoder loose when required, another button which turns off most of the muting (hooray!), and a band-change button. The only button I would willingly forego is the one which churns through all the preset positions holding each station for five seconds at a time.

The setting of the buttons and the 'shift' position of the memory keys are all confirmed by five bright but dimly labelled LEDs. The signal strength indicator illuminates two sections at a time in a vain attempt to persuade you that it has more resolution than it actually possesses. Don't be silly, Akai, five lights will do – no need to pretend there's ten. And the tuner forgets all the memories when the power is removed, reverting instead to factory alignment frequencies, which proved a considerable irritation.

Driving is easy. The AT-52L stays where it's put until moved, and then it stops again when you take your finger off the button. It mutes during tuning itself, which makes it easy to miss something unless you stagger up the band in hiccups of 50kHz, but then all tuners do this out of habit rather than necessity.

The 'wrap-around' tuning – which hops back to the bottom of each band once you've reached the top – is a nice touch for inveterate band-scanners.

Inside, there's the usual aerial tuned circuit plus bandpass-pair before the mixer. The RF amplifier is a 3SK107 dual-gate FET, while the mixer is bipolar. The RF AGC circuit seems to have been 'boded' on our sample to work from after the IF selectivity amp rather than before. A Sanyo LA1266 IC is the mainstay of the AM/FM receiver, with selectivity provided by a dual-element SFZ450A

ceramic on AM, and four SFE 10.7MMA filters for FM. The Sanyo LA3410 decodes, while the budget runs to 14 inductors in all.

LAB REPORT

In terms of FM sensitivity, there's no problem at all: the AT-52L beats the Hitachi reference (which costs a lot more) by about 1dB in the lab, and subjectively more than that (owing to the way FM works), on weak and fragile real aerial signals. Adjacent-channel protection hits the limit of measurement – even for signals just 0.3MHz away.

The stereo crosstalk was both lower in level than the reference and no more distorted, with the selectivity switch making no difference to the stereo separation. Why fit a 'wide' position at all, I wonder, when the 'narrow' setting achieves excellent separation, together with superb adjacent-channel protection, at one and the same time?

The noise floor on stereo is 3dB short of broadcast spec., while the frequency response on FM is as flat as anyone could want. FM distortion is OK, while the less said about the AM figures the better. The LA1266 is not an inherently bad IC in terms of AM performance, but Akai have somehow contrived to make it so.

AIRCHECK

The lab is one thing, the real world another. Many a tuner comes horribly unstuck when confronted with a jumble of real signals. The AT-52L produces nasty intermodulation even with 70dBuV (3mV) signal pairs: on eighty the 'ghost' signals are deafening. This is not the tuner for you if you live under the shadow of the Wrotham mast, to be sure. But in the absence of strong signals on unfortunate frequencies, it's fine on FM. Our listening panel correctly identified that the tuner was flatter than the Hitachi reference (the Hitachi's HF response is around 1dB down at 12kHz) and voiced no complaints about its presentation of material.

On AM, though, poor lab results were matched by an 'objectionable', 'fatiguing' sound which no-one liked at all. The image rejection was dreadful, our French station on 585kHz being almost totally obliterated by image interference from 1485.

CONCLUSIONS

This tuner turned in a handsome performance on FM, though it can't handle a strong signal environment without a plug-in attenuator on the aerial lead. On FM – but only on FM – it delivered the sonic goods as well as our reference. It's sensitive, selective and good at stereo – a rare combination at any price, let alone for £150. However, the AM performance strains the vocabulary of condemnation.

It comes with a 'Best Buy' rating, for services to FM radio, but it's the sort of tuner from which the medium waveband might well pray to be saved.

TEST RESULTS

FM SECTION: Front End	
S/N at 10µV input (CCIR/PPM)	-51dB
(CCIR/RMS)	-57dB
RF Noise figure	6dB
RF overload	+23dB/µV
Intermodulation	poor
Adjacent Channel Protection	
at ±300kHz	+45dBmin*
at ±400kHz	+45dBmin*
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-32dB
quality	pure
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-65dB
(CCIR/RMS)	-70dB
Noise floor (stereo) (CCIR/PPM)	-60dB
(CCIR/RMS)	-66dB
Saturation sensitivity (mono)	+30dB/µV max*
(stereo)	+51dB/µV
Distortion (100% modulation)	-42dB
Frequency Response (10kHz)	-0.1dB
(12.5kHz)	-0.6dB
(16.0kHz)	-0.5dB
AM SECTION: RF Performance	
Sensitivity	fair
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-24dB
(90% modulation) (1kHz)	-24dB
Frequency Response (5kHz)	-7dB
(6.3kHz)	-10dB
(8kHz)	-14dB
Subjective sound quality	poor
Wavebands	FM, MW, LW (LW on 'L' suffix models only)
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*Limit of measurement	

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RECOMMENDED



It seems quite fair to compare this, Akai's £250 tuner, with its less expensive model reviewed on the previous page. The cheap one's so promising that I start with high hopes for the AT-93/L.

You pay more money; you get more buttons. In addition to the usual repertoire, we have variable stereo blending, a hi-cut treble roll-off, scan-tuning and all that. But this is just window dressing compared with the AT-93/L's ability to switch between one FM aerial and a second. This uses a very effective PIN diode circuit, and two sockets on the back. On a scale of usefulness from nought to ten, this facility weighs in at around 95. In my set-up it was wonderfully simple to alternate between my beam and my halo in search of the best signal, with no need to mess about with aerial pluggery.

Ergonomics have not become noticeably worse compared to the '52, except that the 'wrap-round' facility is now absent. Once you reach 108MHz, you're stuck there, and have to go the long way back to 88 unless you can find a convenient memory position to start from. The AT-93/L feels reasonably expensive and solid to the touch, though our users did think it was rather cluttered, and I agree.

The instruction manual is one of the better examples of its kind, not that this is any great accolade. It warns that "an unauthorised person might touch the internal parts and receive a serious electric shock" and indeed this is true. On removing the lid, there are some exposed mains terminals available to shock any unauthorised persons unwise enough to touch them.

Internally the box is pretty full. A considerable amount of design effort has been invested in the decoder, which in the cheaper model is a routine Sanyo IC. The AM section is awarded an IC in its own right, the LA1245, with filtering by a single-element SFF450G ceramic, while the FM design is cunning and complex. Yet only one tuned circuit protects the AM mixer from image responses, while the FM front-end is no more elaborate in radio-frequency terms than before. There are still just three RF circuits prior to the mixer, which is now a second 3SK107 FET. And the 15V 'C' supply regulator, TR9, warms its reservoir capacitor up -

which it shouldn't.

LAB REPORT

Basically, what we are looking at is a much more complicated tuner. But is it much better?

On AM the AT-93/L certainly is. The figures now look quite sensible both for mid-band distortion (-34dB, 2 per cent), and for frequency response - within 3dB of the double-fifty microsecond curve, right up to 6.3kHz. The LF distortion, however, still lets the side down for want of a little attention to the AGC. And the AM image rejection is still inadequate.

The effort put into the stereo decoder has been rewarded with an exceptional figure for separation, alongside the best of the batch. But I cannot help but wonder if Akai's enthusiasm for separation is misplaced, especially since the FM selectivity seems to have been marginally compromised as a consequence.

The FM stereo noise floor is now better than broadcast spec., but there is evidence of a 'ripply' output filter.

AIRCHECK

A/B tests between FM aerials are so easy on this tuner it's almost worth buying for that facility alone. It delivers an aerial performance just better than my Hitachi reference, though the benefit is more marginal and qualified than with the cheaper '52. We really are splitting hairs, though; this is a proper FM radio in all but one respect - it still overloads on my strong local signals, though not nearly as badly as some.

The listening panel again found the AT-93/L to sound similar to the reference, but pointed out a tendency to exaggerate noise and hiss, and suggested there might be some HF rise. The tiny ripple (the response at 12.5kHz being marginally higher than at 10kHz) suggests there is some very steep filtering going on. Steep filtering tends to exaggerate noise by ringing and delay effects in the filter inductors or their equivalent.

On AM the tuner was widely liked. It had plenty of 'guts' - like a good jukebox should! But the AM RF bits and IF filter are tokenist - not for difficult conditions, or night-time.

CONCLUSIONS

In the context of what else is around about the £250 mark, including our 'reference' tuner itself, the Akai always delivers. Technically, it has no problem that it doesn't share with the rest of the market generally - middling overload on FM, and near-limitless interference potential on AM. Apart from that, it's fine.

However, it seems to me that all that extra fuss with the decoder and the filters was not the optimum way of assigning a large components budget, so the AT-93-L just fails to make Best Buy status for this reason. It is warmly Recommended nonetheless, particularly as a tuner for those who use all three radio bands.

TEST RESULTS

FM SECTION: Front End	
S/N at 10µV input (CCIR/PPM)	-51dB
(CCIR/RMS)	-57dB
RF Noise figure	6dB
RF overload	+82dB/µV
Intermodulation	middling
Adjacent Channel Protection	
at ±300kHz	+36dB
at ±400kHz	+45dBmin*
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-36dB
quality	fair
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-70dBmax*
(CCIR/RMS)	-76dBmax*
Noise floor (stereo) (CCIR/PPM)	-65dB
(CCIR/RMS)	-70dB
Saturation sensitivity (mono)	+35dB/µV
(stereo)	+52dB/µV
Distortion (100% modulation)	-44dB
Frequency Response (10kHz)	-0.3dB
(12.5kHz)	-0.2dB
(16.0kHz)	-0.5dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-20dB
(90% modulation) (1kHz)	-34dB
Frequency Response (5kHz)	+2.9dB
(6.3kHz)	-3.1dB
(8kHz)	-20dB
Subjective sound quality	good
Wavebands	FM, MW, LW (LW on 'L' suffix models only)
Dimensions	461 x 87 x 344mm (w x h x d)
Typical retail price	£250
*limit of measurement	

G R E A T P E R F O R M E R S N o . 1



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KENWOOD KT-660L

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

RECOMMENDED



When you come across buttons called 'execute', 'clear' or 'program', the heart sinks and you know you're in for a hard time. It was all I could do to set the video recorder when I had one, and now the *KT-660L* comes along with the following gem, culled from the instruction manual:

"... if you found entry mistake at this time, press the CLEAR key: the first press returns the display to the stage of entry standby for the OFF TIME first digit, and the second press returns it to the stage of entry standby for the ON TIME first digit again..."

You what? Ergonomically, the Kenwood '660 has gone completely over the top. You'll either love it or you'll hate it, and it's as much as I can do to prevent my own opinion from emerging with indecent frankness.

The tuner has a mains outlet on the back, and it's possible to programme the micro-processor inside (if you can understand the instructions) in order to power up the outlet, and switch on the *KT-660L* at an appointed hour. That is handy, and thanks are due to Kenwood for at last providing the beginnings of what we've been used to on video machines - the ability to set, forget and record programmes automatically. Couldn't they have just made it a little simpler, for old fogies like myself?

There is, of course, a digital clock (however did we manage without them?) and there's also the ability to label stations with a three-letter word of your choice. It can wake one up in the morning, or send one to sleep, alarm-clock style. Oh, and it works as a radio as well, eventually. There was the most agonisingly long 'mute' every time a button was hit - certainly long enough to be a nuisance.

Behind all the display razamatuzz, there's a fairly reasonable, if hardly opulent, radio sub-section. You get real birdie and pilot filters, if not much else bar the necessities, and I suspect that the very simplicity of the design actually helps the sound. The ubiquitous Sanyo *LA1265* IC covers both FM and AM receiving functions, filtered on AM by a single-element *SFU 450E*, while the decoder is an *AN7470*. The FM front-end is pretty flimsy, and there is only one RF circuit to protect the AM.

LAB REPORT

We fell about laughing at the instructions, but the lab report is worth taking seriously. So the *KT-660L* is a little 'deaf' (an observation confirmed in direct aerial tests against a reference) but there's no compromise in selectivity and the noise floor isn't much deficient either. Considering the £130 price tag, everything is pretty much where it ought to be - a decibel or three short of state-of-the-art in most respects, but nothing seriously out of place.

The FM stereo crosstalk was very distorted - as the selectivity might imply. But it was below -30dB on programme, measured with CCIR weighting on a PPM, so no problem.

The AM results raised an eyebrow or two. The *LA1265* IC is clearly turning out less AM distortion than its relatives elsewhere. The Akai *ST-52L* is -24dB on AM, while the Kenwood under test goes 13dB better at 1kHz, even if the bass is still muddy. Even the rather dismal frequency response does not mask the fact that Kenwood's AM implementation is far better, and the listening panel agreed.

AIRCHECK

The tuner is so busy remembering its appointments that tuning itself is painfully slow, although the *KT-660L* does at least wrap around when we hit the end of the tuning range. On quality Radio 3 music and Radio 4 speech minor sibilance and some lack of instrumental character was noted, but overall the impression was very positive. On weaker signals it sounded altogether shakier and considerably more hissy than the *FT5500* reference: but this is not a long-distance tuner, and was never meant to be. The usual intermodulation products were there - 96.1MHz in noise-free stereo, indeed. They should give away free co-ax attenuators with this grade of equipment, I fear.

AM was listenable, except on poor old FiP, the French station on 585kHz, which was blown to pieces again by Radio Sussex on 1485. Subjectively, AM sound was rated 'fairly good', which is better than we've come to expect from these bands. For daytime, nearby station use it will just about do, but

forget it at night

CONCLUSIONS

If you like the look of this tuner, examine the instruction book before you buy it. If you can manage all that then there's nothing that could possibly alarm you about the Kenwood *KT-660L*'s abilities as a radio receiver, brave soul that you are!

For £130, the *KT-660L* can't really be a Best Buy, that accolade really has to be reserved for something that works as well as much more expensive units. But you are getting your money's worth - no more and no less - and for that alone, the product deserves to be Recommended.

TEST RESULTS

FM SECTION: Front End	
S/N at 10µV input (CCIR/PPM)	-48dB
(CCIR/RMS)	-53dB
RF Noise figure	9dB
RF overload	+80dB/µV
Intermodulation	poor
Adjacent Channel Protection	
at ±300kHz	+45dBmin*
at ±400kHz	+45dBmin*
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-30dB
quality	very distorted
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-69dB
(CCIR/RMS)	-74dB
Noise floor (stereo) (CCIR/PPM)	-63dB
(CCIR/RMS)	-68dB
Saturation sensitivity (mono)	+36dB/µV
(stereo)	+55dB/µV
Distortion (100% modulation)	-41dB
Frequency Response (10kHz)	+0.9dB
(12.5kHz)	+1.3dB
(16.0kHz)	+1.0dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-25dB
(90% modulation) (1kHz)	-37dB
Frequency Response (5kHz)	-7.5dB
(6.3kHz)	-10.9dB
(8kHz)	-15dB
Subjective sound quality	fairly good
Wavebands	FM, MW, LW (LW on 'L' suffix models only)
Dimensions	440 x 65 x 251mm (w x h x d)
Typical retail price	£130
*Limit of measurement	

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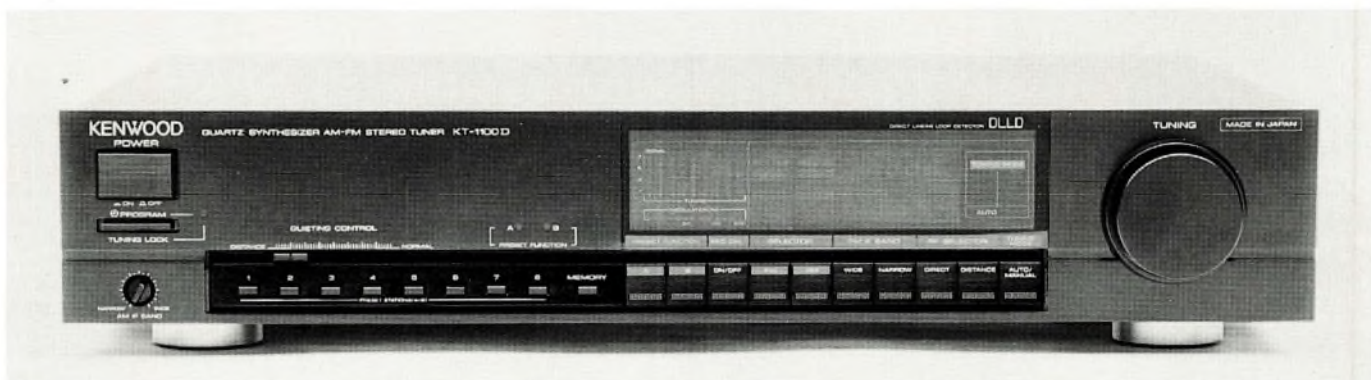
Agfa Hi-Fi stockists also carry a range of top quality Agfa Video tapes from the Agfa E180 HGX Hi-Fi at around £4.99 to the Agfa E180 High Color at only £3.29.



KENWOOD KT-1100D

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

RECOMMENDED



The Kenwood *KT-1100D* distinguishes itself in a number of ways, one of which being that you can hardly miss the display – in fact you could land an aircraft by it. Another is that tuning a station produces a bewildering flash of coloured fireworks, more like television than radio really!

However, many refined people will take one look at the display and assume the tuner to be junk. If it were a good tuner, it wouldn't need to advertise itself in this garish manner. Flashing lights, they will think, never made a tuner sound any better, any more than they improve the timbre of an amplifier.

However, the flaw in this reasoning is that the *KT-1100D* is OK really. To begin with, the obsession with computer programming of the cheaper model has been replaced with a rotary tuning knob. This couples to a shaft encoder which tunes too slowly on FM, and in a rapid and stumbling fashion on AM, but Kenwood have got the right idea. Up/down buttons are no substitute for twisting a knob in the old-fashioned way, even if this one is not terribly slick in action.

Moreover, inside the box there's a circuit board of staggering originality. It's severely laid out in rectangular sections, some with plug-in boards festooned with presets, and it's very, very different.

Although the FM front-end and the AM section are fairly conventional, each is at least as good as other circuits using the same sort of techniques, while the detector and decoder in the FM section are out of this world. Both inside and out there's 'ge-whizzery' galore.

The claimed specification is ridiculous – figures of 0.005 per cent distortion are banded about, as are meaningless signal-to-noise ratios not far off a century. There is clearly silly 'specmanship' going on here. Yet the measured noise figures in the standard test rig banged the gong labelled 'limit of measurement' on every occasion, although the distortion (measured sensibly) was no great shakes.

The listening panel liked the *KT-1100D*, both on FM, where it was marginally preferred to the reference '5500 tuner, and on AM, where it was described as 'much more natural'. Appearances can be deceptive.

LAB REPORT

Starting, as usual, with the FM front-end, the noise figure was quite normal, while the RF overload test suggested a distinctly high signal tolerance. I could apply 20 millivolts (plus 86dB μ V) before upsetting a 10 μ V signal, which is 66dB weaker. This is not vastly better than the run of the pack, but certainly enough to be noticed.

Adjacent-channel protection tests could not be faulted – in both cases the limit was met. When I measure protection in a dual bandwidth tuner, it's in 'narrow' mode, reasoning that if protection is what is required, that is what 'narrow' positions are for. On the other hand, I measure fussy matters like distortion and separation in 'wide', and only comment on the 'narrow' performance if it is exceptional.

Martin Spencer of Phoenix Communications made me a special low-noise crystal oscillator to check the *KT-1100D* further: a mono noise measurement of –80dB (CCIR/PPM) was confirmed. Truly amazing. But straining to reach a noise floor 17dB below broadcast spec. seems pointless.

AIRCHECK

In the listening room, the *1100D* acquitted itself of all remaining charges of garish indecency. Our listeners would have preferred to hide the display out of view, but the FM sound was variously described as 'well-integrated', 'smooth' and, if anything, better than the reference. No-one observed improvements to the signal-to-noise performance, because (as I will keep saying until the message gets home) once below the broadcast noise, no-one can hear any difference between –70 and –80dB.

Mind you if in years to come, the BBC is able to upgrade its broadcast chain to near compact disc quality noise floors, this tuner will be the first to know. However, sackfuls of mail are not arriving at Broadcasting House complaining of the current specification, so it's unlikely to be one of Michael Checkland's priorities.

On AM the sound was also favoured; the lab figures were very good too, though there's little to remove night time interference. The

image rejection was barely adequate, but sensitivity was good.

CONCLUSIONS

Behind a wildly garish display, the *KT-1100D* is a tuner of remarkable originality and considerable competence. Kenwood is playing the game of specifications for all its worth, and some of this effort is paying off in terms of sound quality and air-worthiness. Yet the AM could be much improved for the price of a 9kHz notch filter and an extra RF tuned circuit. At this price level I cannot rate the *KT-1100D* as Best Buy just yet, though it would take very little reworking to make it worthy of this accolade.

For FM anywhere, and daytime AM use on strong stations, the *KT-1100D* gains a Recommendation for those who like the firework approach to display ergonomics.

TEST RESULTS

FM SECTION: Front End	
S/N at 10 μ V input (CCIR/PPM)	–49dB
(CCIR/RMS)	–55dB
RF Noise figure	7dB
RF overload	+86dB/ μ V
Intermodulation	good
Adjacent Channel Protection	
at \pm 300kHz	+45dBmin*
at \pm 400kHz	+45dBmin*
Stereo Crosstalk (programme)	
level (CCIR/PPM)	–30dB
quality	very distorted
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	–70dBmax*
(CCIR/RMS)	–76dBmax*
Noise floor (stereo) (CCIR/PPM)	–70dBmax*
(CCIR/RMS)	–76dBmax*
Saturation sensitivity (mono)	+30dB/ μ Vmax*
(stereo)	+45dB/ μ V
Distortion (100% modulation)	–42dB
Frequency Response (10kHz)	–0.5dB
(12.5kHz)	–0.6dB
(16.0kHz)	–0.9dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	good
Audio Performance	
Distortion (100Hz)	–31dB
(90% modulation) (1kHz)	–40dB
Frequency Response (5kHz)	–1.5dB
(6.3kHz)	–2.7dB
(8kHz)	–5.1dB
Subjective sound quality	
Wavebands	FM and MW only (sorry, Radio 4 fans, no long wave)
Dimensions	440 x 88 x 331mm (w x h x d)
Typical retail price	£300
*Limit of measurement	



NEWSLETTER

Vol. 4, No. 7 December 1988.

The end of the year is a good time to reflect upon the state of the art: what has changed and what has remained as *The Absolute Sound*?

Despite everything, the LP remains as the most important source of quality recorded music, and the Goldmund Reference remains as the standard to which the others aspire. The Goldmund ST4 is still very expensive at £4,550 yet its magnificent motor and tonearm offer a level of performance which reviewers and listeners find overwhelming.

There is, of course, no connection between *Absolute Sounds of London* and *The Absolute Sound* magazine of USA, excepting their impeccable taste and audiophile standards (this sycophancy should result in two Christmas cards, this year) – but both have earned the respect of audiophile cheapskates by recognising the greatness of The Well Tempered Arm and Table. No lesser authority than Audio Research brought it to the attention of the American community two years ago, and since then the manufacturers have gained strength, respect and stability under new ownership. The design attacks root problems in a unique and inexpensive manner which appeals to many who incline to the uncluttered Zen economy which states that Less is More.

The two further designs which have changed yet remain the same are the Gyrodek and the Roksan Xerxes. The Gyrodek, with its revised acrylic platter and the new power supply, represents a supreme value world class design and partners well with a budget arm from Audio Technica through the Zeta, Mechanic or Well-Tempered Arm to the magnificent Air Tan-

gent now in its Mark II form.

The Roksan Xerxes continues to improve machining standards based upon a design philosophy as unique but different to the Well Tempered Lab's. Despite its recent price increase to £655 for the basic (black ash) version Roksan Engineering still offer value for money in one of the most important and revolutionary Hi-Fi products of this decade. This claim is further enhanced by the arrival of the arm and cartridge which now form the Roksan Record Player! Had it not evolved over the years, the Xerxes would have won a Music Room Award (yes, it is that time of the year, again) but with the Artemiz tonearm and Shiraz cartridge the current Roksan Record Player must win the Silver level award: in our view, at the affordable level, it offers the audiophile new standards of sonic excellence. We are proud that our customers and friends were the first after the Chicago Show to hear prototypes this summer in our Musical Evening.

Recognising that many high-end customers find that the Xerxes is too cheap for their system, a piano finish is now available at £895, and *The Cognescenti* is a hand marble finish to the customer's preferred colour scheme. The version with piano hinges, factory run-in and calibrated for £1,500 was announced at the London Heathrow Show, and Britain's premier Hi-Fi Specialists were proud to sell serial No. 1 which is now being built to the customer's specification.

With the sad demise of *Subjective Audio Ltd.* we will assume the mantle of Britain's senior dealers in Audio Research and we will be happy to share our many years of experience advising on their use, re-valving

the older ones, fixing them (yes, nothing is perfect) and if you entrust us to do so, we will happily deliver, install and continue to service your purchase.

It is three years since the SP-11 was launched to an unsuspecting world which universally heard the giant leap closer to concert hall realism. Since then, an SP-9 became available and offers this class of sonics for a much more affordable sum of £1,698. As such, it won our Silver Level Award (imagine Audio Research of this quality at an affordable price!). This year Audio Research has continued to push forward the frontiers with amazing speed and assurance.

We now live in the age of the SP-15, and the leap further forward cannot be denied. Compared to the latest '11, there is a magnitude of increased clarity and gains in most other departments. The cost is substantial, £6,350 but creates a unique opportunity for someone to bid us £3,995 for our five month old SP-11 Mk II Demonstrator in Glasgow. There are two new Mono Hybrid amplifiers and the Stereo Hybrid D-125 at £4,575. This last beast offers total user simplicity (no arguments about valves, reliability, fan noise etc. are admissible excuses): while it lacks the open clarity and finesse of the larger Monoblocks, it possesses a unique set of strengths which make it "love at first sounding". To hear it is to want it, so phone for an appointment if you want to listen to the best amplifier under £10,000.

Cassette Decks or CD Players have to be very good to enter the running for a Music Room Award, but the Nakamichi CR-7 stands alone for a magnificent device which has raised the Compact Cassette to the high-

est audiophile class. When you consider the economy of even high quality blank cassettes (TDK, That's and Maxell ranges), the sheer ruggedness and universality, from cars to personal stereos, the neatness etc. then you might share our opinion that the Cassette deserves to be the best selling Record format – which it is. Now Nakamichi have launched a range of cassette decks down to the £345 CR-1, so come along and choose the one to fit your budget and your Christmas stocking.

Next month we will announce The Music Room Awards, plans for our Tenth Anniversary Year and discuss CD Players and loudspeakers. If you want to get the best from your records then you should read our announcement relating to LAST record cleaning and preservative devices in the Hi-Fi New December Accessory Club Brochure. Or you may send s.a.e for the latest Music Room Information Sheet No. 10 ("Record Care" – and for a change it is ready on time!) or No. 15 Longevity – the Controversy.

As usual, we will end on the note of affordable excellence. Our Winter Sale will commence early this year for children of all ages to have their reward for a hard year in time for delivery by Father Christmas (this year John Todd will wear the white beard for Scottish customers and Nigel Charleton the red dressing gown for Guardian and Granada-land).

We will have a new SP-7 for £1,150 to introduce people to one of the finest transistor pre-amps at *any price*. If still unsold, we will have many ex-dem and second-hand items being turned around for the busy season – so don't miss out. Phone or visit before the crowd!

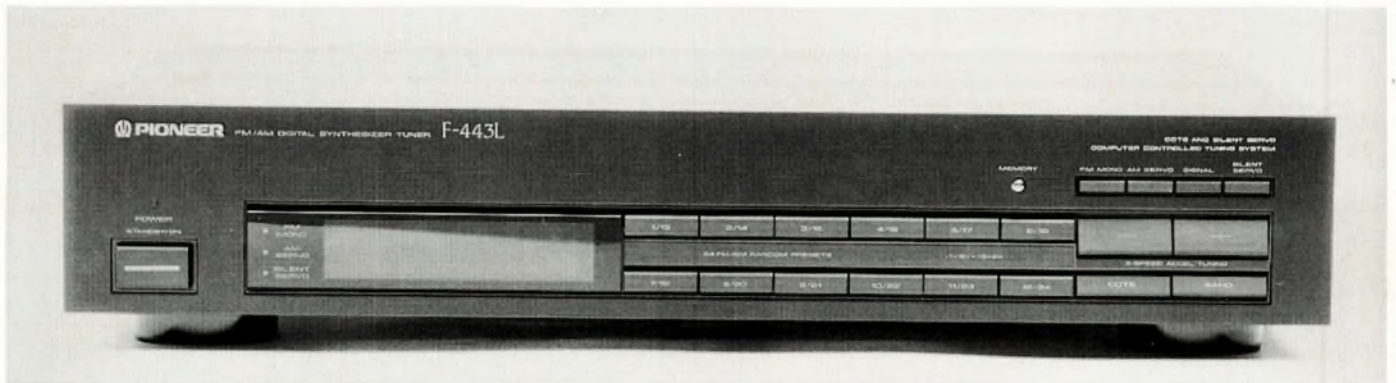
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PIONEER F-443L

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



First, the good news. The *F-443L* could be operated without reference to the instructions, and it's easy to programme the buttons. When it comes to the manual, my assistant Keith reckons that it 'beats about the bush but gets there in the end'.

So far so good. But the listening team objected to the fact that there was no auto-tuning as such – in other words, no automatic stopping on strong stations. Personally, I prefer that. When the FM band begins to fill up with new stations in a few year's time, it will be very difficult to get many tuners to move far at all.

The *F-443L* has 'wrap-around' at the top of the dial, but just scanning through to see what's happening is difficult because of the long muting pauses. The *F-443L* is very enthusiastic about muting.

The tuner boasts a CCTS (computer controlled tuning system) which allegedly 'automatically performs the optimum tuning for the station received.' Our local Radio 4 FM transmitter is on 94.5MHz, so we mis-tuned the receiver to 94.4MHz, and pressed the CCTS button. A display on the front performed a little pirouette, the audio muted for long enough for you to have forgotten what it sounded like before and – nothing happens! It was tested again with various other offsets but it didn't help. Badly tuned and distorted stations stayed badly tuned and distorted.

Additionally, the *F-443L* has a 'silent servo' function, which the manual says is for 'cutting out spurious high frequency clock signal harmonics in order to minimise inter-modulation (beat) distortion, improve the signal-to-noise ratio, and elevate sound quality.' It sounds very technical, but is really of no use whatsoever. There's also an 'AM servo', which seems to disconnect something nasty, and is known elsewhere as the wide/narrow function.

The wish was for more coils and rather fewer 'servos'. Inside, however, I only managed to count eight devices that looked like inductors – no birdie or pilot filter (though there are holes for them) and nothing that even looked like a proper FM front end. The line-up is *LA1247* (AM), *HA11225* (FM) and *AN7470* (decoder) with the bare minimum of parts round them.

LAB REPORT

The noise figure of the 'front-end' – such as it is – is entirely typical, but the RF overload point is now distinctly on the low side of average. Moreover, placing a signal 500kHz away from our test frequency produced all manner of whistles and swishes which had no place being there.

Neither is selectivity the best by any means, though listeners are only likely to have trouble with the pirates on their self-assigned frequencies. Any legal station whose frequency was planned using the current assumptions about receiver selectivity – which are very pessimistic by today's standards – would be fine on this set.

Stereo crosstalk was notably poorer than usual (at minus 26dB), and had an unpleasant, 'swishy' sound. Stereo noise could not be tested accurately because of the high output of supersonic garbage.

Yet AM has a staggeringly good distortion figure, matching many FM sections (so much for all the claims about how terrible AM has to be). But the frequency response is modelled on a telephone, alas.

AIRCHECK

The listening team noticed background noise on Radio 3 (92.3MHz), which was not present on the reference. This took the form of various swishing and warbling, and seems to be an intermodulation problem with the front-end. Only reducing the signal input level appeared to cure the problem.

The *443L* achieves the dubious distinction of sounding worse connected to a proper aerial than it does on a piece of wire. It could not take the local aerial levels without cross-modulating, even on the network reception itself, and any hope of rescuing Radio Solent from under the 96.1MHz intermod was soon dashed.

It was thought to be grainy, splashy and unpleasant on FM, while on AM the programme sounded 'like it was coming down a tube'. The users complained that the so-called 'silent servo' and 'CCTS' operations were 'obscure and pretentious', and complained that they didn't seem to do anything. Only the 'AM servo' button actually improved

the sound, but even then it was worse than most, with a very narrow bandwidth.

CONCLUSIONS

It's difficult to find anything charitable to say about this tuner. Little attempt has been made to build a quality radio set: instead, effort seems to have been devoted to dressing up very ordinary functions to make them appear much more complicated and clever than they actually are.

The only ray of hope is – for AM purposes – the *LA1247* IC. The *F-443L* uses one: it seems to be capable of very handsome AM distortion figures, and if it were matched with suitable quality ancillary parts it could be very nice to listen to; but not, alas, here.

TEST RESULTS

FM SECTION: Front End	
S/N at 10µV input (CCIR/PPM)	-50dB
(CCIR/RMS)	-55dB
RF Noise figure	7dB
RF overload	+79dB/µV
Intermodulation	very poor
Adjacent Channel Protection	
at ±300kHz	+17dB
at ±400kHz	+30dB
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-26dB
quality	swishy
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-67dB
(CCIR/RMS)	-72dB
Noise floor (stereo) (CCIR/PPM)	-59dB*
(CCIR/RMS)	-60dB*
Saturation sensitivity (mono)	38dB/µV
(stereo)	38dB/µV
Distortion (100% modulation)	-44dB
Frequency Response (10kHz)	-0.2dB
(12.5kHz)	-0.3dB
(16.0kHz)	-0.8dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-36dB
(90% modulation) (1kHz)	-41dB
Frequency Response (5kHz)	-11dB
(6.3kHz)	-22dB
(8kHz)	-29dB
Subjective sound quality	dull
Wavebands	FM, MW, LW (with 'L' suffix denoting LW coverage)
Dimensions	420 x 85.5 x 31.8mm (w x h x d)
Typical retail price	£130
*pilot etc. predominates	

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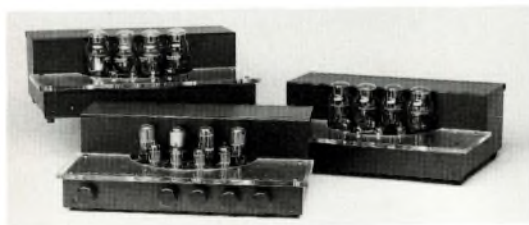
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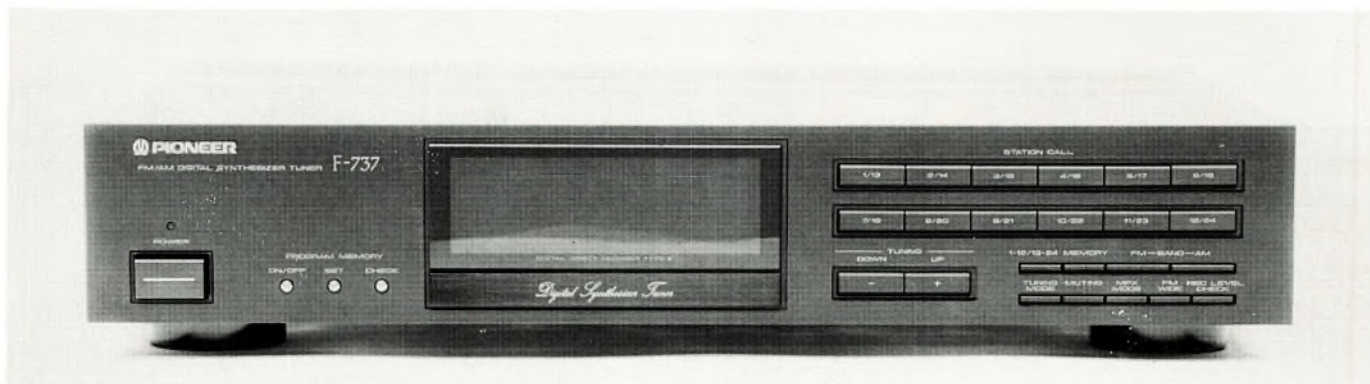
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RECOMMENDED



At \$230, there's no excuse for a bare-bones radio, and you certainly get more than twice the radio at this higher price level.

From the outside, there's nothing much to look at – the design is more understated than the 443L. There's a silly signal level meter which lights four sections at a time to provide a (very) spurious air of high resolution. Some of the other features, like a 'spin' between hi-blend, stereo, and mono – or an adjustable muting level button, use the display in an intelligent fashion. Just by looking you can see what the tuner is trying to achieve – for once the display aids the ergonomics of a tuner, instead of providing a host of visual distractions.

The restrained appearance is deceptive. The box is chocca with parts galore and there are plenty of real coils on a tidy and very well-labelled board. Apart from the LA1247 IC for the AM, Pioneer now uses its own devices throughout. The decoder shows evidence of thought and trouble, without some of the alarming complication of certain other designs. And money has been spent on ceramic filters as if it were going out of fashion. I counted no fewer than nine (yes, nine) ceramic filters looking like 10.7MHz units, while even the AM filter is a chunky SFP450G. This is a brave attempt to reconcile the contradiction between selectivity and quality. It hasn't quite worked, because the steep edges of the filter mangle AM's transmitted sidebands – and you can hear the jangly results. But full marks for trying.

There is provision on the circuit board for some interesting looking parts including an aerial change-over relay, and what looks like a foetal LW section (the F-737L, perhaps?). But there's only one RF tuned circuit on AM, so the image rejection can't be up to much. And there's no sign of any AM audio filtering either.

In a nutshell, we have a relatively restrained presentation fronting what looks like a radio worthy of the name.

LAB REPORT

What do we get from the F-737? We get a pretty hot set of figures on FM, bar one thing, and whoever invented digital synthesisers has a lot to answer for. They whine, you see,

at the clock frequency. That's why you need silent servos, if Pioneer is to be believed. This one just messes up what would otherwise be the sort of noise floor people would queue up to admire, that is if the broadcasts were up to it, which they're not.

The synth. whine only shows itself sometimes, mainly on middling-to-weak signals, but it made measurement of the mono saturation sensitivity difficult. Otherwise the separation must be at least 10dB better than it needs to be. Noise – limit of measurement. Frequency response – flat as a pancake. Even the AM gets the 5kHz response spot-on, and look how steeply 8k has fallen!

AIRCHECK

Lab tests cannot replicate the complicated and ever-changing nature of weak, noisy, and interference-ridden signals. But these are just the conditions where one tuner will out-shine another – demonstrably. After all, people buy tuners to listen to the radio, not to connect to microprocessor-controlled RF generators.

When it came to comparing the F-737 with the Hitachi reference tuner (which is about the same price) the results boiled down to six of one and half-a-dozen of the other. There was violent intermodulation on high signals, but a simple plug-in attenuator will fix this, although it ought not be necessary. And now and then backgrounds were not as quiet as they should be, not from any flaws in the decoder or detector, but because of RF weaknesses.

Still, this sample delivers everything you've a right to expect at this price level from the FM waveband. AM was considered to be too bright and 'gritty', which would appear to be down to the ceramic in use, for the LA1247 is basically sound.

CONCLUSIONS

The 737 can be Recommended with some confidence: the AM is still weak. We have a long way to go before tuners do the same percentage justice to AM sound as they do to FM. However, this one puts in more effort and expense on filtering than most, and on FM the dividends are clearly paid. A terrific combination of selectivity and separation is

let down only by a very mundane front-end, which needs protection from the full blast of my strong local signals. Silver medal material, certainly. Tickle up the AM and beef up the pre-mixer performance on FM, and it's going for gold.

TEST RESULTS

FM SECTION: Front End	
S/N at 10µV input (CCIR/PPM)	-51dB
(CCIR/RMS)	-57dB
RF Noise figure	6dB
RF overload	+76dB/µV
Intermodulation	poor
Adjacent Channel Protection	
at ±300kHz	+45dBmin
at ±400kHz	+45dBmin
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-38dB
quality	good
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-70dBmax
(CCIR/RMS)	-76dBmax
Noise floor (stereo) (CCIR/PPM)	-66dB
(CCIR/RMS)	-71dB
Saturation sensitivity (mono)	52dB/µV*
(stereo)	52dB/µV
Distortion (100% modulation)	-41dB
Frequency Response (10kHz)	0dB
(12.5kHz)	0dB
(16.0kHz)	-1.6dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-20dB
(90% modulation) (1kHz)	-30dB
Frequency Response (5kHz)	+0.5dB
(6.3kHz)	-5.5dB
(8kHz)	-30dBmax
Subjective sound quality	fair
Wavebands	FM and MW only (no LW)
Dimensions	420 x 86 x 316mm (w x h x d)
Typical retail price	£230
*synthesiser whine problem	

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RECOMMENDED



The Proton AT-300 looks very different from the run of the mill – the usual dazzling digits being replaced by a soft, back-lit, liquid crystal display with a pleasant, pale green glow. This is much less visually aggressive than most, but all LCD displays suffer from a major problem, and that is that they tend to look very peculiar unless viewed from a direct angle. This one is no exception.

All the other functions are also toned down. The buttons are small and discreet though rather 'tight' to operate, while the front panel is largely self-explanatory. But tuning doesn't wrap-around when you hit the end of travel (shame).

The instruction book which I received with the unit is clearly an American one: it tells me that the unit may only be used on 110V 60Hz mains, which would be alarming if it were true, but it is clear and helpful, and highlights one modern problem admirably: "... try to avoid playing the AT-300 in close proximity to computers, electronic typewriters, word processors, etc ..."

Of course all this is wise advice. Modern digital consumer equipment, including the compact disc player, works at frequencies well capable of badly messing up radio reception. But why in the UK are there seemingly no restraints to prevent people selling digital equipment which ruins radio reception – like my Amstrad word processor does – not only in the same room, but throughout the whole house? For want of a few pence worth of screening precautions, the pollution of the airwaves by digital technology is getting worse year by year.

Internally, the AT-300 is very conventional. A Sanyo LA1265 does the receiving (same as the Kenwood 660), while the decoder is an LA3410 (see Akai AT-52). Selectivity is provided by three SFE 10.7ML-A ceramics on FM, while a two-section SFZ450F handles the AM. The AM consists of the usual bare minimum of parts, although the aerial round the rear is larger and more effective than most. The FM front-end uses an absolutely standard configuration, with a 3SK114 RF amplifier followed by a bipolar (2SC668) mixer. There are proper low-pass and birdie filters for the FM stereo, but nothing surprising.

LAB REPORT

With a routine set of parts, one expects a routine set of results, and by and large one gets them. On the test bench the sensitivity seemed to be better than usual but do not attach too much importance to this one figure, because on real weak and fragile aerial signals my Hitachi clearly won on points.

At 300kHz away, the adjacent-channel protection was surprisingly poor: a signal this distance away still needed to be weaker than the wanted one before trouble was absent. However, the 400kHz test reached limit-of-measurement, so no real problem. Noise figures are pretty much what one might expect: stereo is just 3dB short of broadcast spec., and would be the subject of adverse comment were it any worse. Interestingly, the noise floor is the same as the Akai AT-52L, but then so is the decoder.

AM was no great shakes: there seemed to be more than the usual amount of stray AM pickup from FM antennae, and while the sensitivity was above average thanks to the large aerial, nothing else was.

AIRCHECK

Tried out on the air, the AT-300 put in an average performance. As pointed out earlier, the Hitachi reference produced less noisy and more solid-sounding reception on weak FM signals. Plugging the set into the 'halo' aerial (an omnidirectional one generating around 80dB μ V on the networks) produced prominent intermodulation, while using the 'beam' (pointing away from the local transmitter, and producing around 70dB μ V) didn't. This is pretty much what we have come to expect from the marketplace, and although I would prefer not to hear any intermodulation products at all, I can see that this is a fairly forlorn hope at under £200.

The listening team considered that the FM section of the tuner produced 'no obvious nasties': indeed, the sound was 'well-integrated' and 'seamless'. This is praise indeed. AM, on the other hand, was not liked much: 'gross, coarse and lumpy in the bass' was how one assessor put it, while another reckoned that it was better than the worst,

and 'listenable'. We had, of course, the usual AM image problem.

CONCLUSIONS

Despite its unusual appearance, there is nothing internally unorthodox about the Proton tuner: it's a reasonably competent execution of a standard set of parts which have come to be very familiar to us over the past three weeks.

It received high ratings from the listening panel and came through the lab unscathed. Put that together with a laid-back and ergonomically satisfying front panel and you have yourself a recommendation for sure. To earn 'Best Buy' status, though, this tuner would have to be significantly less expensive.

TEST RESULTS

FM SECTION: Front End	
S/N at 10 μ V input (CCIR/PPM)	-53dB
	-58dB
RF Noise figure	4dB
RF overload	+77dB/ μ V
Intermodulation	poor
Adjacent Channel Protection	
at \pm 300kHz	-6dB
at \pm 400kHz	+45dBmin
Stereo Crosstalk (mono)	
level (CCIR/PPM)	-30dB
quality	harsh
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	-68dB
	-75dB
Noise floor (stereo) (CCIR/PPM)	-60dB
	-66dB
Saturation sensitivity (mono)	+32dB/ μ V
(stereo)	+53dB/ μ V
Distortion (100% modulation)	-43dB
Frequency Response (10kHz)	-1.2dB
(12.5kHz)	-1.5dB
(16.0kHz)	-2.6dB
AM SECTION: RF Performance	
Sensitivity	very good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	-13dB
(90% modulation) (1kHz)	-17dB
Frequency Response (5kHz)	-10dB
(6.3kHz)	-12dB
(8kHz)	-14dB
Subjective sound quality	poor
Wavebands	FM, MW (no LW)
Dimensions	420 x 65 x 245mm (w x h x d)
Typical retail price	£199

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SAE T-102

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RECOMMENDED



If your idea of living room elegance includes a large black box prominently declaring itself to be a "computer direct-line digital tuner" then the SAE T-102 was clearly designed with you in mind. This tuner looks like nothing else in this survey, and it costs like nothing else too. Out of £500, you will be left with just enough change for the aerial installation. So the T-102 had better be something.

The manual, at least, is very good, and the box is solid and well-protected against knocks and bumps. The SAE somehow contrives to look larger than its dimensions actually amount to.

The frequency display is a red Light Emitting Diode (LED) type, which looks rather dated in this day and age, but not necessarily any the worse for that. A signal strength meter with five red sections seems to be something of an all-or-nothing device: on AM in particular, it lit either all five lights or none at all, when there are clearly signals around here deserving a middle rating.

I was not impressed with the way the scan tuning, on the way up, stops, lights the 'Q lock' (whatever that is), and generally declares itself to be satisfied when the tuner is displaying a frequency 50kHz below the correct one. The T-102 also seems satisfied with the correct tuning position going down, but this error indicates sloppiness of setting up, all the more so because it is so blinkin' obvious!

Unfortunately, radio receivers which have not seen a twiddling stick since they left a foreign factory are rarely in spot-on alignment. This point – individual care and setting up – is accepted elsewhere in the hi-fi industry as an important part of getting the best results. But hardly anyone can be trusted to line up a superhet radio these days, including, it seems, those at SAE.

One side-effect of the tank-like construction is that something like 25 screws had to be removed to gain access, but each one just made me all the more determined to look inside. It's just as well I did. Forty per cent of the box is empty, while what's in there doesn't look like £400 worth of radio to me. As a radio the SAE is not unusually well-equipped by any means.

LAB REPORT

The audio output level from this rig was little more than -4dBu (rel. 775mV rms) at 100 per cent modulation, some 3dB lower than usual, not that this is likely to be any handicap in use. The output levels of all the tuners were within 3 to 4dB of each other, and the only effect a different output level has is to change the amount of volume control rotation needed to produce a given amount of room volume.

What were not easy to measure on the SAE were the noise floors. There seemed to be a lot of swishing and warbling going on, and yet we had de-powered every damned microprocessor in the building. Although a pretty good FM RF noise figure was observed, the noise floor on a 48dB input signal was 4dB worse than the Hitachi, and there were noises heard on the stereo floor too.

AM frequency response plummets like a stone above about 3.5kHz; the 9kHz rejection is clearly the best in the survey.

AIRCHECK

The listening team picked up an interesting anomaly between the performance on music and speech. On music, set against the Hitachi, the tuner was thought to be clearer than the reference, and in one case 'by a considerable margin'. On speech, however, the response was less enthusiastic, and the sound of the Hitachi was preferred. The tuner was felt to be performing a very 'analytical' job – revealing the content of the broadcasts, warts and all. It may not, therefore, always sound pleasant, but then pleasantness is not necessarily an attribute of true high fidelity.

For my own part, I winced at the intermodulation, which was bad even at the 70 level and incredibly awful at 80. Also the AM suffered from the usual 'jangle' of a steep-cut ceramic filter (this one the SFP 450H), and the team agreed: AM had 'top end nasties' and was 'glassy'.

On AM the usual image problem was not much in evidence: the AM section has clearly been set up well, even if the circuit itself is no more elaborate than we are used to.

CONCLUSIONS

A higher than usual rating for sound quality – with no immediate explanation from the state of the innards – is something which you could argue begs rational and scientific confirmation, but there's no time for such luxuries here. Instead, we record an open verdict.

Admittedly this tuner is expensive (you can get at least as sophisticated a wireless for about half the price) but if you are looking for that mysterious 'audiophile' quality on FM radio, something which – as yet – eludes conventional tests and techniques, you may have found it here. Recommended for a listen, certainly.

TEST RESULTS

FM SECTION - Front End	
S/N at 10µV input (CCIR/PPM)	-52dB
(CCIR/RMS)	-58dB
RF Noise figure	5dB
RF overload	-dB/µV*
Intermodulation	poor
<i>*measurement (used)</i>	
Adjacent Channel Protection	
at ±300kHz	+10dB
at ±400kHz	+27dB
Stereo Crosstalk (programme)	
level (CCIR/PPM)	-38dB
quality	fair
Detecting & Demod.	
Noise floor (mono) (CCIR/PPM)	-69dB
(CCIR/RMS)	-74dB
Noise floor (stereo) (CCIR/PPM)	-62dB†
(CCIR/RMS)	-66dB†
Saturation sensitivity (mono)	+30dB/µVmax
(stereo)	+46dB/µV
<i>†some whistles and warbles noted</i>	
Distortion (100% modulation)	-44dB
Frequency Response (10kHz)	-1.2dB
(12.5kHz)	-2.0dB
(16.0kHz)	-4.2dB
AM SECTION - RF Performance	
Sensitivity	good
Image Rejection	fair
Audio Performance	
Distortion (100Hz)	-23dB
(90% modulation) (1kHz)	-43dB
Frequency Response (5kHz)	-11dB
(6.3kHz)	-dB†
(8kHz)	-dB†
Subjective sound quality	poor
<i>†below reliable measurement</i>	
Wavebands	FM and MW only (no LW)
Dimensions	483 x 89 x 356mm (w x h x d)
Typical retail price	£449



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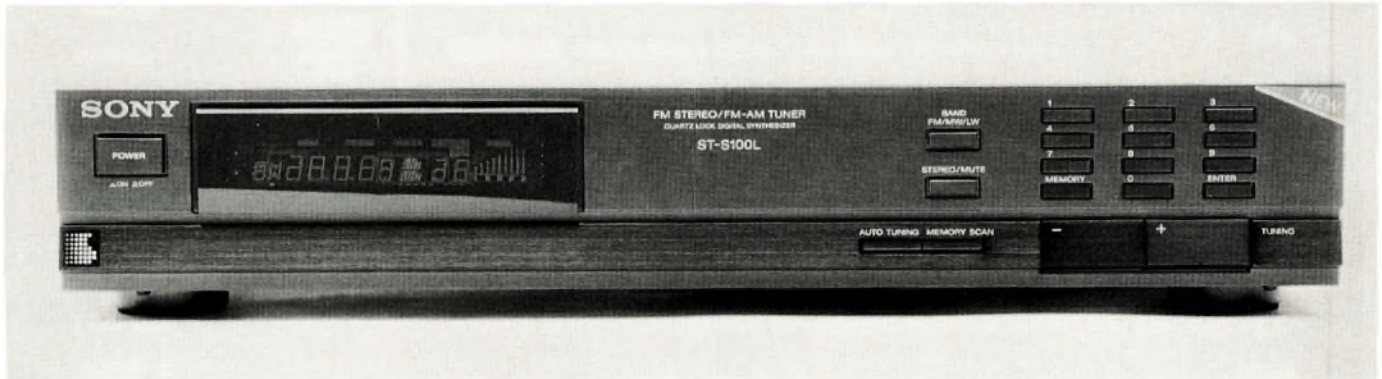
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Because they are extremely similar internally I am combining the reviews of these two Sony tuners into one. As far as the radio section is concerned, the '300' has a double-tuned quad detector coil, while the '100' makes do with the single-tuned variety. One would expect the distortion figures to reflect this, and indeed they do. There is a birdie filter and an extra FM ceramic on the '300' model, which they generally leave out on the '100'. The exceptions are the sets sold to West German and Italian customers who get a much better deal for their trouble.

The West Germans do seem to have their radio administration much better organised than we do over here, because they appear to be able to insist on receivers meeting minimum standards of performance. Quite often we see much better FM front-ends, and filtering generally, available only to the West Germans.

At £100 (*ST-S100L*), or £140 (*ST-S300L*), these tuners can hardly be expected to be lavish, yet they have the usual excellent finish and feel we have come to expect from Sony products. The rotary knob on the '100' is a little bit of a con-trick: it doesn't rotate – it just rocks: up/down in a different disguise. But it is, unquestionably, a better way of doing it. If we must stagger around on up/down buttons, let's do it this way every time.

Personally I found the consecutive nature of the memory entry horrendous. I kept going from 1 to 12 to 23 while trying to go one, two, three – but maybe I'm just less patient than most people. One can disable the stereo and the muting, but only at the same time. For want of a button these two facilities have been annoyingly combined into one.

Inside, the board is compact and straightforward. The circuit boards are the same in the '100' and '300L': only minor component changes differentiate the two. A Sanyo LA1266 IC does the usual receiver honours on both AM and FM, while the LA3401 decodes in the normal manner.

LAB REPORT

In the lab report for this combined review, we've averaged the results from the two tuners where the components responsible for them are the same, and only drawn a distinc-

tion where there is a reason why there should be one. Where two figures are quoted, the first is for the '300', while the figure in brackets refers to the cheaper '100'.

In a nutshell we have the sort of results we might expect from the entry point in the tuner market, with or without certain pivotal components. The RF overload looks worse on the cheaper model, because it is as much a measure of IF skirt sensitivity as anything else, and three filters are clearly better than two.

Muting on the '100' produced synth. whine actually higher than the off-air noise floor – which, if inconsequential in normal use, is still not something to be proud of. The sensitivity, noise, frequency response and AM performance were as alike as any two samples of mass produce might be expected to be, while the distortion figure reflects the increased complexity of the '300' detector (one more coil, 20 pence to you, guv!).

AIRCHECK

Putting these tuners through their paces on the air was quite rewarding. Of course, the front-end looks like it could have been part of a transistor radio, so that strong signal environments (or even weak signal environments) are not places where this tuner will shine. But deliver Radio 3 from a good aerial between 48 and 60dB μ V – and sit back!

They liked it. Indeed, the listening panel – if anything – preferred the Sony tuners to my Hitachi reference, on FM at least. Again I think we have a case in point of a design winning through on sound through sheer simplicity. However, it is so simple that only in textbook circumstances will it give of its best. Both too little and too much signal will impair the noise floor, and it would be worth checking the signal level going in carefully, using a plug-in attenuator, if required, to eliminate all RF intermodulation distortion.

AM let the side down somewhat. Though the tuner was sensitive, it was criticised for a 'dull', 'muffled' sound, and the frequency response says it all.

CONCLUSIONS

If you live not too near and not too far from the stations you want to listen to, and you've

a proper roof aerial delivering between about 48 and 66dB to the plug, then either of these Sony tuners will do you fine. They're not tuners for special work or long-distance, but they produce BBC network sound as well as much more expensive sets.

Both are Recommended – the cheaper '100' would have made a Best Buy, were it not for the fact that both models will be very critical of location and aerial performance, and may give very disappointing results if the aerial signals swell or fade beyond their limited means of handling such things.

TEST RESULTS

FM SECTION: Front End	
S/N at 10 μ V input (CCIR/PPM)	– 50dB
(CCIR/RMS)	– 55dB
RF Noise figure	7dB
RF overload	82dB/ μ V (74)
Intermodulation	poor
Adjacent Channel Protection	
at \pm 300kHz	+ 20dB (+8)
at \pm 400kHz	+ 45dBmin*
*Limit of measurement	
Stereo Crosstalk (programme)	
level (CCIR/PPM)	– 30dB
quality	very distorted
Detector & Decoder	
Noise floor (mono) (CCIR/PPM)	– 68dB
(CCIR/RMS)	– 73dB
Noise floor (stereo) (CCIR/PPM)	– 62dB
(CCIR/RMS)	– 67dB
Saturation sensitivity (mono)	+ 36dB/ μ V
(stereo)	+ 50dB/ μ V
Distortion (100% modulation)	– 48dB (– 42)
Frequency Response (10kHz)	– 0.5dB
(12.5kHz)	– 1dB
(16.0kHz)	– 8dB
AM SECTION: RF Performance	
Sensitivity	good
Image Rejection	poor
Audio Performance	
Distortion (100Hz)	– 30dB
(90% modulation) (1kHz)	– 30dB
Frequency Response (5kHz)	– 12dB
(6.3kHz)	– 18dB
(8kHz)	– 23dB
Subjective sound quality	poor
Wavebands	FM, MW, LW
Dimensions	ST-S300L: 430 x 80 x 355mm (w x h x d)
	ST-S100L: 430 x 80 x 246 (w x h x d)
Typical retail price	ST-S300L £140; ST-S100L £100
Results averaged, except where figure in brackets represents	
ST-S100L	

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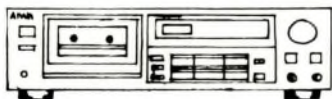
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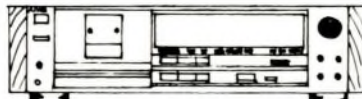


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TUNERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

A rundown of the findings throughout the tuner tests plus those models which are particularly good value.

I'm grateful to have had this opportunity to look closely at a few of the tuners on sale in the UK. When this project was mentioned to various broadcast engineers, they all wanted to hear about it, as broadcasters are genuinely concerned about the quality of equipment in use at the far end of the broadcast chain.

THE BROADCAST CHAIN

It's worth stressing the nature of the broadcast signal path. When you play a record in your home, the chain of reproduction is straightforward, local and completely under your control. Of course, ultimately there are the limitations of the recording itself, but there are plenty of good ones to choose from.

When a local radio station is playing a record, however, in addition to the cartridge preamplifier in the studio, the signal will have passed through: (i) the mixing circuits in the studio control desk; (ii) studio switching and distribution amplifiers; (iii) a multi-band limited and compressor, as likely as not; (iv) the STL (studio/transmitter link) – this may be a landline or a radio circuit or both; (v) the coder, transmitter and aerial; (vi) the airwaves themselves; (vii) the receiving aerial installation.

Given that we are trespassing on a world where an inferior connecting lead is suspected to have a material effect on sound quality, I leave it to you to ponder the sonic consequences of that little lot!

In *network* radio, as provided by the BBC, the chain is even more complicated, and includes a 10-bit NICAM digital audio circuit which has been in operation in England since 1973.

In those days, digital audio was known as PCM (pulse code modulation), but it was the same thing and it's been around for 15 years! You thought it all started with CDs? Broadcasters were into digital audio in the days when Dolby noise reduction was a neat new idea.

With a chain as complicated as

this, it's important to have high standards of performance from every item of equipment, so that even when the signal is passing through a complex path, it is not unduly degraded in the process. Broadcasters still rely on very conventional measurements of frequency response, noise and distortion, because as yet no one has been able to devise technical measurements which correlate with sound quality as predictably as these do.

Hence there is such a thing as 'broadcast spec', and in the context of tuners there's no point in going ooh and aah at figures which exceed broadcast spec. by a large amount, for the very simple reason that when the tuner is used on an aerial rather than in a laboratory, no-one will be able to detect these fantastic improvements.



The Best Buy Akai AT-52L.

A chain can only be as good as its weakest link. In certain respects some of these tuners exceed official specifications by a very substantial margin. But if these achievements are accompanied by obvious shortcomings in other areas, there's still work to be done.

A NOTE ON MEASUREMENT

Most, if not all, of my own measurements deal with straightforward and demonstrably relevant parameters intelligible to audiophile and broadcaster alike. In the introduction, I mentioned that the most important task facing engineers is to try to recover what was once a very fruitful consensus about quality – its assessment and measurement – which used to exist between various audio practitioners.

One measurement in

particular, which is worth explaining in more detail is that it's widely believed, and often stated, that the frequency response of an FM tuner should be flat. Wrong. The frequency response of a properly designed FM receiver is not flat at all: the treble response falls according to what is known as the 'fifty microsecond de-emphasis' curve. This is 3dB down at a frequency of just over 3kHz, and is about 12dB down at 12kHz. To compensate for this response, the treble of the transmissions is boosted with an inverse network on the input to the stereo coder.

I do not, however, pre-emphasise my test signals to produce a flat response output from the tuner. This is because it's prodigiously difficult to construct a pre-emphasis network to measurement

another, identical 50µS curve on the detected audio.

This can easily be engineered by a simple IC circuit with a 'Q' of around 80 at 450kHz, but manufacturers seem largely to have abandoned pleasant-sounding tuned circuits in favour of unpleasant-sounding narrow ceramic filters. Nevertheless, it is interesting to note that the receivers rated by the listening panel as having the better AM performance were also the ones closest to the 'double 50' curve.

The assumed pre-emphasis for the AM transmissions is as follows:

rel 315Hz
5kHz + 10.72dB
6.3kHz + 13.75dB
8kHz + 17.20dB

BEST BUYS AND RECOMMENDATIONS

In 'marking' the tuners, I have adopted the policy of being relatively open-handed about Recommendations, but quite tight-fisted over Best Buys. Practically any tuner which turns in a competent set of FM figures appropriate to its position in the market will be Recommended, but a Best Buy has to represent significantly above-average value for money. In my opinion, only the Akai AT-52L merited the top award in this batch, for an FM performance which in many respects surpassed my Hitachi FT550C Mk II reference. If I had to choose one other tuner for special mention, it would be the other Akai, the AT-93L – not only was the AM performance one of the best (not that that's saying very much), but the ability to switch aerials on the front panel is so very useful.

BEST BUY

Akai AT-52L (£150)

RECOMMENDED

Sony ST-S100L (£100)
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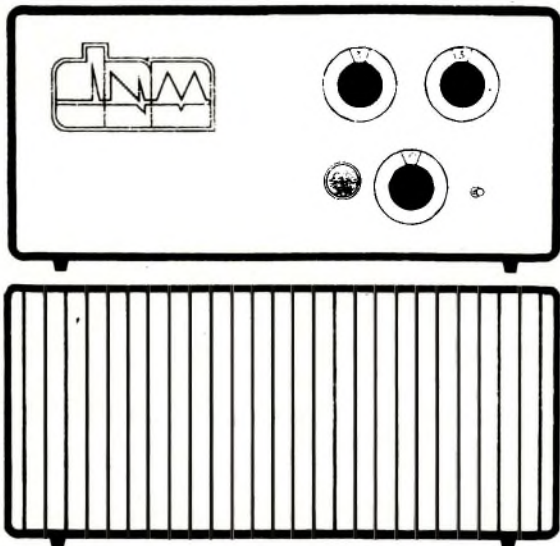
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RAYLEIGH HI FI, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St, On the Parkway, Chelmsford, Essex. (0245) 265242. A&R, Audiolab, Beyer, BLQ, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access, Visa. 3 years parts and labour guarantee on hi-fi systems. BADA MEMBER **31131**

BRENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood. (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harman Kardon, Marantz, QED, Quad, Yamaha. Dem and home trial facilities. Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Free installation, credit facilities. Access, Visa, Hi-Fi Markets. Service dept.

LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN (0206) 560259. Audiolab, Beard, Celestion, QED, Rogers, Denon, NAD, Rotel, J.A. Michell, Roksan, Gale, Quad. Dem facilities. Mon-Sat 9-5. Installations. Credit facilities up to £1000. Access, Visa, Hi-Fi Markets, Eurocheque. Service dept available.

GLOUCESTERSHIRE

ABSOLUTE SOUND AND VIDEO, 40/42 Albion St, Cheltenham (0242) 583960. A-R, Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed) BADA MEMBER **31132**

AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 30045. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon. BADA MEMBER **31133**

ROBBS OF CHELTENHAM, 3 Clarence St, Cheltenham (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Mon-Sat 9-5.30. Instant free credit. Visa, Access. Service dept.

HAMPSHIRE

ABSOLUTE SOUND AND VIDEO, 4 Feathers Lane, Basingstoke, Hants RG21 1AS (0256) 24311. A&R, Audiolab, Denon, Dual, Linn, Mission, NAD, Rotel, Technics, Yamaha. Dem and home trial facilities. Mon, Tues, Thurs, Fri 9.30-6, Sat 9.30-5.30. Closed Wed. Free installation. Credit facilities. Access, Visa, Connect, Amex, Diners. Service dept. BADA MEMBER **31134**

HAMPSHIRE AUDIO Ltd, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER **31135**

TRUE-FI SOUND AND VISION, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPW, Mission, Mordaunt Short, Nagaoka, Sony, etc. Dem facilities. Mon-Sat 9.30-6.00. Free installation, credit to £1,200. Access, Visa. Service dept.

HERTFORDSHIRE

ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Mon-Sat 9.30-5.30. BADA MEMBER **31136**

THE AUDIO FILE, 40 Hockerill St, Bishops Stortford, Herts CM23 2DW. (0279) 506576. 9.30-5.30 6 days. Linn, Roksan, Rega, Naim, Denon, Mission, Cyrus, Marantz, Quad, Tannoy, Sony. 2 dem rooms. Home trial, free installation. Service dept. Interest free. Bada Charge Card. BADA MEMBER **31137**

ISLE OF MAN

ISLAND COMPACT DISC CENTRE, Parliament Square, Ramsey (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman, Bose, Sansui. Mon-Sat 9.5.00. Dem and home trial facilities. Free installation. Full credit, no limit. Access, Elite. Service dept.

KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem and home trial facilities. Mon-Sat 9.5.30 closed Thurs. Free

installation. Credit to £1,000. Access, Visa, Creditcharge. Service dept.

VJ HI FI, 29 Guildhall St, Folkestone (0303) 56860. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Tannoy, Rogers, Mordaunt Short, Dual. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

LANGASHIRE

MONITOR SOUND, 54 Chapel St, Chorley (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spendor, Thorens, Nakamichi, Yamaha, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1,000. Access, Visa. Service dept.

LEICESTERSHIRE

SOUND ADVICE, The Sound Factory, Duke St, Loughborough LE11 1ED (0509) 218254. A&R, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, appointment reqd. Mon-Sat 9.30-6. Free installation. Credit facilities. Access, Visa, Amex. Service dept. BADA MEMBER **31138**

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester, LE1 5FQ. (0533) 518597 or 530330. Aiwa, Akai, Ariston, Bose, Cambridge, Celestion, Denon, Harman Kardon, Musical Fidelity, Rotel, etc. Mon-Sat 9.30-5.30. Free installation. Credit to £1,000. Dem facilities. Access, Visa.

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

LONDON

A.T.LABS, 159 Chase Side, Enfield, Middlesex (01) 367 3132. Mon-Sat 10-6. Two single speaker dem rooms. Service dept, car park. Amex, Visa, Access. BADA MEMBER **31139**

AUDIO T, 190 West End Lane, London NW6 (01) 794 7848. Mon-Sat, 10-6. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER **31140**

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1 (01) 631 0472. Mon-Sat 10-7. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. 2 dem rooms, full delivery and installation. Credit facilities. Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, A&R Cambridge, Nakamichi, Rotel, etc. Dem facilities - no appointment reqd. Mon-Sat 10-7.30. Home trial facilities, free installation. Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 15 Monmouth St, London WC2H 9HB. (01) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 Dem rooms. BADA MEMBER **31141**

GRAHAMS HI FI, 86-88 Pentonville Rd, London N1. (01) 5374412. 'FBA Dealer of the year 1985'. Linn, Naim, Rega etc. £300-£3,000. BADA MEMBER **31142**

H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE. (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities. Mon-Sat 9.5.30, Thurs 9-1. Credit to £1,000. Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (01) 486 8262. A&R, Audio Lab, B&W. Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Nakamichi, etc. **SUBJECTIVE AUDIO LTD**, 12 Park Avenue, Palmers Green, London N13 5PF. (01) 882 4975. Air Tangent, Apogee, Alphason, Audio Research, Koetsu, Krell, Meridian, Nakamichi, Oxford Acoustics, Tandberg, etc. 2 dem rooms, appointment reqd. Tues-Fri 10-6, Sat 9-5. Home trial facilities. Design & installation service. All major creditcards. Service dept.

THE SOUND ORGANISATION Ltd, No 1, Cathedral St, London Bridge, London SE1 9DE. (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME etc. Dem facilities, appointment reqd. Tues-Sat 10-7. Free installation. Access, Visa. Service dept.

RICHER SOUNDS, 2, 6 London Bridge Walk, London SE1. (01) 403 1988. Major names in esoteric hi-fi, unusually matched to discount offers and special end-of-line purchases. Dem facilities, expert advice, free local delivery & installation (£500+), plus 2 Yr G'tee. Hi-Fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-7, Sat 10-5. Access, Visa, Richer ChargeCard. Service Department.

RICHER SOUNDS, 2 London Bridge Walk, London SE1 2SX (01) 403 1201/4710. The original bargain hi-fi store, now refitted, 100s of regular and special discounts on

most budget/mid price major names. By London Bridge. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters, mail order, part exchange. Open Mon-Fri 10-7, Sat 10-6 Access, Visa, Richer ChargeCard Service Department.

MIDDLESEX

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 33474/31993. A&R, AR, Ariston, Creek, Cyrus, Denon, Dual, JPW, KEF, Manticore, Meridian, NAD, Nakamichi, Quad, Rotel, Wharfedale, Yamaha, etc. 2 dem rooms. Mon-Sat 10-6. BADA MEMBER **3672**

MERSEYSIDE

W.A. BRADY & SON, 401 Smithdown Rd, Liverpool. (051) 733 6859. Largest choice of specialist Hi-Fi in NW £100-£200. All credit cards. 3 dem rooms.

BADA MEMBER **3674**

PURE SOUND - Birkenhead 051 645 6690 Wallasey 051 630 5055. Acoustic Energy, ADC, Audio Quest, Beard, Denon, Incatech, Mordaunt Short, QED, Radford, Meridian, etc Home dems a pleasure, plus evenings and weekends. (Sundays by appointment)

RICHER SOUNDS, 69B Church St, Liverpool L1 1DN. (051) 708 7484 Virtually every major 'budget' name - small store with big discounts and special offers. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters, mail order, part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard.

NORFOLK

SOUND APPROACH, 161 Unthank Road, Norwich. (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Heybrook, Mantra, Musical Fidelity, Revolver, Yamaha. Dem and home trial facilities. Mon-Sat 9-6.30 Free installation. Credit to £1,500 Visa, Access, Diners Club Service dept.

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. ADC, Marantz, Onkyo, Sansui, Teac, Harman Kardon, Pioneer, Proton, Ariston, Thorens, Mantra, Goodmans, Castle, JPL, Mordaunt Short, Selego TV, Monitor Cable + others.

THE AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Tannoy, Mordaunt Short, Castle, Royd, B&W, Goodmans, Ion Systems, Audio Technica, QED, Rotel. Dem room. Ring for opening times.

WEST MIDLANDS

SOUND ADVICE, 162 Alcester Road, Moseley, Birmingham B13 8HS. (021) 449 3328. A&R, Creek, Linn, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Tues-Sat 9.30-6. BADA MEMBER **3674**

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Tues-Sat 10-6, closed Mon. Home trial facilities, 3 dem rooms, free installation, instant credit. Access, Visa, Amex. Service dept.

BADA MEMBER **3674**

FIVEWAYS HI-FIDELITY Ltd, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem and home trial facilities. Tues-Sat 9.30-6. Free installation, credit facilities. Access, Visa. Service dept.

GRIFFIN AUDIO Ltd, 94 Bristol St, Birmingham. (021) 692 1359. Linn, Naim Audio, Rega, Creek, Denon, Nakamichi, Quad, Mission, Monitor Audio, Rotel. BADA MEMBER **3674**

HI-FI EXCELLENCE, 163 Medieval Spon St, Coventry. (0203) 525200. Linn, Musical Fidelity, Quad, Mission, Cyrus, Denon, A&R Cambridge, Rotel, Nad, Nakamichi etc. Three floors of carefully selected hi-fi amidst the eloquence of our 14th century showroom. Dem, home trial and credit facilities. Access, Visa, Diners, Am. Exp. Mon-Sat 9.30-5.30. Closed Thurs.

BADA MEMBER **3674**

HORTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Dual, Marantz, Goodmans, JVC, Mission, Sony, Technics, Wharfedale, Sennheiser. Dem facilities. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

RICHER SOUNDS 2, 12 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 6664. Popular esoteric hi-fi for upgrades, monthly special offers. Dem facilities, expert advice, free local delivery/installation (£500+), 2 Yr G'tee. Hi-Fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

RICHER SOUNDS, 10 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 1516. An A-Z of affordable, popular hi-fi, no-frills environment. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters, part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

OXFORDSHIRE

ABSOLUTE SOUND AND VIDEO, 19 Old High St, Headington, Oxford. (0865) 65961. A&R, Denon, Linn, Mission, NAD, Rotel, Yamaha. Also 256, Banbury Rd, Summertown. BADA MEMBER **3674**

WESTWOOD AND MASON, 46 George St, Oxford. (0865) 247783. Linn, Naim, Rega, A&R, Heybrook, Dual, Mordaunt Short, Spendor, Tannoy, Quad, etc. BADA MEMBER **3674**

WITNEY AUDIO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Dual, KEF, Mordaunt Short, Pioneer, Philips, Sony, Yamaha. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI Ltd, 12 Barker St, Shrewsbury. (0743) 55166. A&R, B&W, JBL, Dual, NAD, Nakamichi, Revolver, Trio, Quad, Yamaha. Dem and home trial facilities. Mon-Sat 9-5.30, closed Thur. Free installation, credit to £1,000. Access, Visa. Service dept.

MID SHROPSHIRE AUDIO, 24 Peverilly Bank, Dawley, Telford. (0952) 502828. Ex dem and used hi-fi equipment - including Ariston, Autophon, Helius, Incatech, Ion Systems, Michelle, Monster Cable, Ross, Ruark, Sansui. 6 months guarantee. Appts req'd. Home trial and free installation. Service dept. 7 days a week

CREATIVE AUDIO, 9 Dogpole Lane, Shrewsbury. (0743) 241924. Marantz, Meridian, Linn, Naim, A&R, Mission, Nakamichi, Revolver, Castle, Audio Technica. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.

SOMERSET

WATTS RADIO - THE ENGINEERS, Jim Badman, 1 West Street, Somerton. (0458) 72440. Castle, Dual, Denon, KEF, Mordaunt Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1, 2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.

STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branson Road, Burton-on-Trent. (0283) 33655. Pink Triangle, Voyd Valdi, Marantz, Audio File, Systemdek, Audio Innovations, Cambridge, Quad, Rotel, Snell, etc. 2 dem rooms - no appointment req'd. Mon, Tues, Thurs, Fri, Sat. 9-6 Wed 9-1. Free installation. Credit facilities. Visa, Access. Service dept.

SUFFOLK

EASTERN AUDIO, 41 Bramford Rd, Ipswich. (0473) 217217. Quad, Audio Lab, Denon, Dual, Marantz, Mission, NAD, Nakamichi, Technics, Arcam. Mon-Sat 9.30-6. BADA MEMBER **3674**

SURREY

AERCO Ltd, 11 The Broadway, Woking. (04862) 4667. A&R, Ariston, Exposure, HK, A.R., Heybrook, JBL, KEF, Magnum, NAD, Pt. Quad, Revox. BADA MEMBER **3674**

ROGERS HI-FI, 13 Bridge Street, Guildford. (0483) 61049. Ariston, Acoustic Research, Akai, Denon, JPW, Mordaunt Short, Marantz, Onkyo, QED, Tannoy etc. Mon-Sat 9.30-6. Dem. facilities. Instant Credit. Access, Visa. Service dept.

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey. (01) 546 5549. Quad, Dual, Denon, Kenwood, Nakamichi, Rotel, Pioneer, QED, B&W, Tannoy, Mordaunt Short, Castle, KBL. Dem and home trial facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept.

TRU-FI SOUND AND VISION, 2 Cromwell Rd, Redhill, Surrey. (0737) 66128. Akai, Aiwa, Rand W. Nakamichi, JPW, Mission, Mordaunt Short, Nagaoka, Sony, Technics. Dem. facilities. Mon-Sat 9.30-6. Free installation, credit to £1,200. Access, Visa. Service dept.

UNILFT PRODUCTS Ltd, 35 High St, New Malden, Surrey KT3 4RY. (01) 942 9567. Mon-Sat 9-6. Thurs 9-7. Dem facilities. Large stock. Amex, Access, Diners, Visa

SUSSEX (EAST)

DEFINITIVE AUDIO, 30 Islington Street, Brighton, East Sussex BN2 2UR. (0273) 672796. Voyd, Systemdek, Helius, Audio Note, Sugden, JPW, Snell, Marantz, Denon, Rotel, etc. Wed-Sat 11-7. Home dems throughout Sussex. Credit facilities. Visa

JEFFRIES HI-FI, 69 London Rd, Brighton, East Sussex.

(0273) 609 431. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities.

BADA MEMBER **3674**

JEFFRIES HI-FI, 4 Albert Parade, Green St, Eastbourne, East Sussex. (0323) 31336. 2 dem rooms, closed Mon. Late night Wed. Parking, bus route. Credit facilities.

BADA MEMBER **3674**

HASTINGS HI-FI, 31-32 Western Rd, St Leonards On Sea. (0424) 442975. A&R, B&W, Mission/Cyrus, NAD, Nakamichi, Quad, Rotel, Systemdek, Tannoy, Yamaha. 2 dem rooms. Mon-Sat 9-6. Home trial facilities. Free installation. Credit facilities. Access, Amex, Visa. Service dept.

SUSSEX (WEST)

BOWERS AND WILKINS Ltd, 1 Becket Buildings, Littlehampton Rd, Worthing. (0903) 64141. B&W, Dual, JVC, KEF, Nakamichi, Philips, Shure, Quad, Sony, Technics. 2 dem rooms. Mon-Sat 9-5.30, Weds 9-1. Home trial facilities, free installation, credit to £1,000. Access, Visa. Service dept.

CHICHESTER HI-FI, 40 Little London, Chichester PO19 1PL. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon etc. Tues-Sat, 10-1, 2-5.15 (closed Mon). BADA MEMBER **3674**

TYNE & WEAR

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (Sunderland) 5672087. Aiwa, Bose, Denon, JVC, Luxman, Michell, Pickering, Spendor, Thorens, Trio. Dem facilities. Mon-Sat 9-5.30. Free installation, interest free credit. Visa. Service dept.

LINTONE AUDIO LTD, 7-11 Park Lane, Gateshead. (091) 477 4167. Linn, Naim, Rega, Musical Fidelity, Audio Lab, Quad, Cyrus, Denon, Nad, plus all leading Japanese manufacturers. Dem and home trial facilities. Free installation. Access, Visa, Amex, Diners. Credit to £1000. 9-6 Mon-Sat. Service dept.

WILTSHIRE

ABSOLUTE SOUND AND VIDEO, 60 Fleet Street, Swindon. (0793) 38222. A&R, Denon, Dual, Linn, Meridian, NAD, Rotel, Technics, Yamaha. (Closed Wed)

BADA MEMBER **3674**

PR SOUNDS, 5 King St, Melksham. (0225) 708045. Pioneer, Akai, JVC, Dual, Ortofon, Philips, Toshiba, B&W, Celestion. Mon-Sat 9-6. Dem and home trial facilities, free installation. Credit to £1,000. Access. Service dept.

YORKSHIRE (NORTH)

ELITE HI-FI, 178 Kings Road, Harrogate HG1 5JG. (0423) 521 831. Voyd, Elite Rock, Systemdek, Celestion, Helius, Audionote, Snell Acoustics, JPW, Nakamichi, Teac. 2 dem rooms. 7 days a week 9-6. Free installation. Service dept.

THE SOUND ORGANISATION, 36 Gillygate, York. (0904) 27108. Linn, Naim, Rega, Roksan, Epos, Ruark, Gale, Denon, Rotel, Mantra. Tues-Sat 10-6

BADA MEMBER **3674**

RICHER SOUNDS, 6 Feasegate, York YO1 2SQ. (0904) 645535. Probably the smallest hi-fi store in York; but stocks the A-Z of popular budget hi-fi at special discount prices. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; mail order, part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard

YORKSHIRE (SOUTH)

MOORGATE ACOUSTICS Ltd, 2 Westgate, Rotherham S60 1AP. (0709) 370666. South Yorkshire's leading specialist hi-fi dealer. Roksan, Meridian, Mission, Quad, Musical Fidelity, Rogers, Beard, Bryston etc. Single speaker dem facilities. BADA MEMBER **3674**

THE AUDIO CLINIC, 2A Brunswick St, Bishopthorpe Rd, York YO2 1ED. (0904) 646309. ADC, Allison, Hafler, JPW, Luxman, Proton, Quart, Studio Power, Systemdek, Thorens and more. Second hand hi-fi available. Appt's req'd, home trial and dem facilities. Free installation. Access and Visa. 10-5 Mon-Sat. Service dept.

YORKSHIRE (WEST)

AUDIO PROJECTS, 45 Headingly Lane, Leeds. (0532) 304565. A&R, Audiolab, Creek, Heybrook, Linn, Musical Fidelity, Naim, Quad, Rega, etc. Tues-Fri 9.30-6, Sat 2.30-5.30. BADA MEMBER **3674**

FERRICKS, Hi-Fi Experience, Fotosonic House, Rawson Square, Bradford. (0274) 309266. Dem facilities. Sales/service agents for A&R, Linn, Quad, Naim, Nakamichi, Mission etc. BADA MEMBER **3674**

HIDDERSFIELD HI-FI CENTRE, 4 Cross Church St, Huddersfield. (0484) 544668. B&W Loudspeakers, Kenwood, Denon, Dual, A&R Cambridge, Musical Fidelity, Quad, NVA, Audio Lab, Philips, etc. Dem facilities -

SELECTED DEALER DIRECTORY

appointment reqd. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa. IMAGE HI-FI Ltd, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. BADA MEMBER **1137**. RICHER SOUNDS, 55 The Headrow, Leeds LS1 6LR. (0532) 455717. Affordable special deals on every big budget line from Akai to Yamaha; separates & systems. City centre store opposite Lewis's. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. SELECTIVE AUDIO, The Forge Cottage, 19 Crossgate, Otley. (0943) 467689. Exclusively handles Alphason, Roksan, NVA, ProAc in the area and other minimalist British designer products for the discerning listener. Dem facility. Member of the CognoScenti. Mon-Sat 10-6.

IRELAND

CLONEY AUDIO, 34 Main St, Blackrock, Co. Dublin. 0001 889449. Linn, Naim, Roksan, Rega, Rogers, Spendor, Musical Fidelity, Cambridge Audio, Accoustat. Tues-Sat 10-6, Thurs & Fri til 9. Free installation. Visa, Access. Service dept.

SCOTLAND

EDINBURGH

BILL HUTCHINSON Ltd, 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission,

Mordaunt-Short, Omar, Technics, Yamaha. Dem facilities. Mon-Sat 10-6. Free installation. Instant credit. Credit cards: Access, Visa. Service dept. RICHER SOUNDS, 1B Chambers St, Edinburgh EH1 1HR. (031) 226 3544. Discount hi-fi near the Royal Scottish Museum; affordable culture with monthly special offers on major names. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard.

GLASGOW

BILL HUTCHINSON Ltd, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept. RICHER SOUNDS, 24 Gordon St, Glasgow G1 3PU. (041) 221 9147. The affordable hi-fi alphabet in an unpretentious atmosphere; regular special offers. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. STEREO STEREO, 278 St. Vincent St, Glasgow G2 5RL. (041) 248 4079. Linn, Naim, Rega, A&R, Aiwa, Denon, Dual, Epos, Heybrook, Mission, QED, Rotel, etc. BADA MEMBER **1137**.

GRAMPIAN

HOLBURN HI FI Ltd, 441 Holburn St, Aberdeen (0224) 585713. Linn, Rega, Quad, Audiolab, Mission, Rotel, QED, NAD, Krell, Nakamichi, Denon, Sony, KEF, Wharfedale, etc. BADA MEMBER **1137**.

WALES

CLWYD

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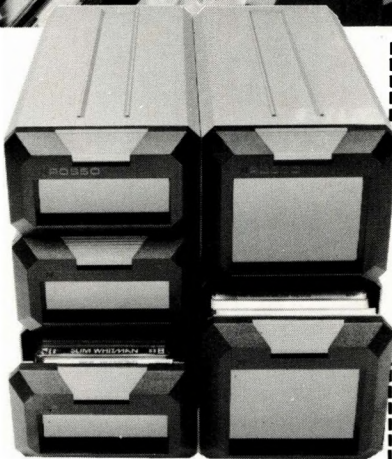
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GLOSSARY

The Hi-Fi Choice dictionary of audio terminology, explaining all the weird and wonderful adjectives used by our reviewers, as well as technical abbreviations.

AM: Amplitude modulated; see 'Medium Wave'.

ACOUSTIC BREAKTHROUGH: Sound that gets into the turntable and hence the cartridge from the air and thereby creates a risk of acoustic feedback.

ACOUSTIC FEEDBACK: If any sound in the room can find its way through the body of the record deck to the cartridge stylus, then that sound will be reproduced from the loudspeakers, along with the wanted programme material. If too much of this sound from the loudspeakers is picked up by the cartridge in this way then a vicious circle of acoustic feedback will be created.

ACTIVE: Speaker systems which contain electronic crossovers and where the drive units are connected directly to power amplifiers.

ALIGNMENT PROTRACTOR: A device used to minimise the lateral tracking error of a cartridge/arm combination.

AMPLITUDE: Size or magnitude; hence the amplitude/frequency response, known normally simply as the frequency response, which describes the relative loudness of the system at different frequencies with a constant input voltage.

ANECHOIC: Without echo; a special room or 'chamber' with thick sound absorbing materials on all surfaces to prevent reflections.

ARM MASS: More accurately called *effective* arm mass, because it is *not* the weight of the arm on a pair of scales. It is the mass of the arm and cartridge combination that appears to be concentrated at, and thus felt by, the stylus tip which is tracking a record groove. There is nothing inherently good or bad about arms with light or heavy effective mass; what matters is the manner and choice of their combination with cartridges of different compliance and the low frequency resonance produced by such combination.

AZIMUTH: With reference to tape and cassette recorders, the alignment of head gap to tape path.

BALANCE: 1) The overall relative loudness perceived at different frequencies (eg bass, treble); 2) the accuracy of the match between the two channels of a stereo transducer (eg cartridge or pair of loudspeakers).

BANDWIDTH: A range of frequencies with presumed defined upper and lower limits.

BASS: Lower part of the frequency spectrum.

BELT DRIVE: The motor has its rotational speed geared down to the required platter speed (33 $\frac{1}{3}$ rpm for LP discs) by a rubber or similar resilient belt which runs round a small pulley on the motor shaft and a large pulley attached to or part of the platter.

BEXTRENE: A plastics material frequently used for bass and mid range cones.

BIAS: (*turntable/arms*) Because the cartridge on a pivotal arm is being drawn across the record surface by the stylus tracking at an angle offset from the pivots, groove friction produces an imbalance of lateral force. Bias is the application of a compensatory lateral force acting in the opposite direction.

BIAS: (*tape*) This refers to a high frequency current passing through the record head which allows the audio current also passing through the head to produce reasonably linear magnetisation of the tape at all levels permitted by the combina-

tion of each machine with the tape. The lowest level of bias is required for ferric cassettes, a slightly higher one for ferrichrome, an even higher one for chrome or pseudochrome, and the highest for metal.

BOTTOMING: The stylus scraping on the distorted rounded bottom of the groove due to incorrect stylus geometry.

CANTILEVER: The thin rod or tube that connects the stylus to the armature and hence the cartridge body.

CAPACITANCE: An element of electrical impedance that is particularly important when matching pickup cartridge, arm leads and amplifier input characteristics to achieve a flat frequency response from discs.

CLIPPING: This is reached when a circuit is overloaded and overdriven, resulting in bad waveform distortion and audibly unpleasant effects.

COLORATION: A general term used to describe the audible effects of distortions, particularly in loudspeakers and record players. These are usually caused by frequency response irregularities and/or resonances.

COMPATIBILITY: The selection of interdependent components to achieve optimum system performance; notably arm/cartridge mass/compliance matching, cartridge electrical loading, or loudspeaker compatibility with amplifiers.

COMPLIANCE: A measure of the springiness of the cantilever/armature seen from the stylus, expressed in compliance units (Cu), where 1 cu = 10⁻⁶ cm/dyne.

CROSSOVER: An electrical circuit which uses combinations of inductors, capacitors and resistors to divide the signal from the power amp into the required frequency bands and with any necessary equalisation for feeding to the individual drive units of the speaker system.

CROSSTALK: The leakage from one channel to the other in a two channel stereo system.

CUTTER: Mechanism used to cut recorded signal onto lacquer master; consists of turntable, lathe, cutting head, cutting and servo amps.

DIN: German standards body, responsible amongst other things for a popular range of standard plugs and socket specifications.

DAMPING: A means of controlling resonances by means of a resistive medium (electrical, mechanical, or acoustic depending on situation).

DECIBEL (dB): A logarithmic unit that is convenient for expressing ratios that span a wide range on a linear scale. For simplicity it can be regarded as a measure of relative loudness.

DISTORTION: Literally this can mean any deviation from the original, but usually refers to harmonic rather than intermodulation distortions when not specified.

DOLBY: Covers various signal processing/deprocessing systems, but normally refers to the B & C noise reduction systems used in cassette record/replay, and the B system used for music-cassette replay.

DOPING: A technique involving the application of damping to a loudspeaker driver cone in order to assist in controlling resonances.

DOWNFORCE: The weight, measured at the stylus, which holds it down in the groove.

DRIVE UNIT (DRIVER): The term used to distinguish the loudspeaker unit itself, be it bass, midrange, treble or fullrange in application, from the complete loudspeaker system which combines drive units, cabinet and crossover into a total design.

DROPOUTS: Momentary reductions of programme level due to inadequate head/tape contact caused by oxide particles shedding off the tape onto the head gap, or inadequacies in tape transport or tape.

DYNAMIC RANGE: The ratio in dBs between the quietest sound that can be successfully recorded and the loudest which can be accepted without serious distortion on an average programme.

EFFECTIVE MASS: The inertia, or mass-controlled resistance to movement, of a device, particularly important with regard to tonearms.

EFFICIENCY: The amount of acoustic power delivered for a given electrical input power.

ELECTROSTATIC: A principle employed in some loudspeaker transducers using static electricity effects to set up a polarising field within which the modulated transducer medium moves.

ELLIPTICAL STYLUS: A specially shaped stylus profile that makes the 'plan view' radius along the length of the groove smaller than the 'elevation view' contact radius viewed from the front.

EQUALISATION: (*general*) The deliberate modification of frequency response, usually in response to some engineering limitation or deficiency.

EQUALISATION: (*tape*) This refers to the necessary change in frequency response required of an amplifier so that overall flat frequency response is obtained from a tape medium. Equalisation is required both on record and replay. Any tape recorded on a good cassette recorder should have the same inherent response when played back on another correctly set up machine, since all playback equalisations should have been standardised. These standards are normally specified by the time constants of the circuits involved, eg 79 μ s or 120 μ s (see 'Microseconds').

FARAD: Measure of capacitance.

FM: Frequency modulated; often used to describe radio transmissions of high fidelity potential on the VHF band.

FARAD: Measure of capacitance.

FERRITE ROD: A short rod type aerial used for AM reception; may be fitted internally or externally to a tuner or receiver.

FERRO-FLUID: A magnetic fluid which is introduced into the voice-coil gap to provide damping and/or improved cooling.

FILTER: A circuit (normally) used to restrict the bandwidth of a system; may be fixed or switchable.

FREQUENCY RANGE OF SPECTRUM: Can refer to any particular group of frequencies, but commonly applied to the audible band from 20 to 20,000 cycles per second (Hz), extending from the deepest bass to the highest audible harmonics.

FREQUENCY RESPONSE: The variation in output over a frequency range, particularly of a transducer; can be expressed as a range with decibel limits, or depicted graphically.

Hz (HERTZ): 1 Hz = 1 cycle per second and is a measure of frequency which corresponds to musi-

cal pitch (the higher the frequency the higher the pitch).

HF: High frequency

HARMONIC: Harmonics are the whole number multiples of a base frequency called the *fundamental*

HARMONIC DISTORTION: The addition of unwanted harmonics to a signal.

HUM: A low frequency interfering sound produced by break-through or interference from mains wiring or circuitry.

IHF: American Institute of High Fidelity, an important standards body.

IEC: An international standards body

IMPEDANCE: Measure of resistance (and reactance) in alternating (ie audio) signals; this is of some importance in the compatibility of both cartridges and headphones with amplifiers. For convenience sake is measured in ohms

INTEGRATION: Used to describe the success with which the output from two drive units combine to give smooth output through the crossover region.

INTERMODULATION (IM): A form of distortion arising from two or more signals producing non-harmonic signals that correspond to the sum or difference of the two frequencies

KILO (k): prefix meaning one thousand

LED: Light Emitting Diode, an indicator light

LF: Low frequency

LATERAL FRICTION: The resistance to movement of an arm and cartridge combination in the horizontal plane (ie across a record), caused by friction in its bearings.

LINEAR: A transducer that produces an output that exactly portrays its input over the required operating range is described as linear, and is hence distortion free. Hence also nonlinearities (distortions)

LINE-CONTACT: A special stylus profile that extends the ellipse, increasing contact length up and down the sides of the groove.

LOAD OR LOADING: The impedance (including resistive and reactive components, ie ohms, mH, pF) seen by one component looking back to its interconnected component, of importance in compatibility of cartridge/amp, and amp/headphone

'LOUDNESS': An equalisation circuit frequency switchable on amplifiers which is designed to compensate for presumed hearing characteristics at low listening levels by boosting bass and treble.

MOL: Maximum operating level of tape normally referring to 5% distortion of 315Hz or 315kHz

MEDIUM WAVE: An AM transmission band incapable of high fidelity signals.

MICRO-(μ): Prefix for units meaning one millionth of.

MICROSECONDS (μ s): The time constant of a resistor capacitor combination involving a frequency response change (equalisation)

MIDRANGE, MIDBAND: The central part of the audible frequency range where the ear is most sensitive

MILLI-(m): Prefix for units meaning one thousandth of

MODULATION: The audio signal is 'stored' by means of modulations within a medium, eg the 'wiggles' in the groove of a plastic disc, or the

magnetic coding on a tape

MODULATION NOISE: An additional noise added to tape noise, which increases with the degree of modulation of the tape, caused by the properties of the magnetic coating. This noise has most of its energy near the modulation frequency (causatory tone)

MOVING COIL: A transducer (eg cartridge or headphone) where the signal is generated by the movement of a coil within a magnetic field

MOVING MAGNET: The most common form of cartridge transduction, where the magnet moves while the coils are held relatively stationary

MULTIPLEX FILTER (MPX): A circuit which introduces severe attenuation at supersonic frequencies to decrease interference encountered with the output from some stereo FM tuners

NANO (n): Prefix meaning a thousandth of a millionth of.

NOISE: Random unwanted low level signals

NOISE MODULATION: An unwelcome breathing effect that can be heard on some programme material, produced by poor noise reduction systems, or circuits

OCTAVE: Two-to-one ratio of pitch or frequency

OFFSET ANGLE: The angle measured between the centre line of the pickup cartridge and the line which joins stylus and arm pivot point.

OHM: Unit of electrical impedance (including reactance) or resistance, also kohm, where 1 kohm = 1,000 ohms

OVERHANG: The extent to which the cartridge stylus extends beyond the centre of the platter is critical, and controlled by fore and aft adjustment of the cartridge on the arm.

PASSIVE: The most common type of system, where drivers and crossover are driven from a single power amplifier.

PEAK RECORDING LEVEL: A level above which distortion becomes apparent. This distortion is introduced when the oxide particles almost reach magnetic saturation, and thus will accept no more level

PHONO: The most commonly used plug/socket combination in audio components

PICO (p): Prefix meaning one millionth of a millionth of.

PORT: An opening in a cabinet which is tuned to characteristics of the bass driver and the enclosure volume to provide reflex type bass loading

POWER AMPLIFIER: The part of an amplifier that provides power to drive the loudspeakers. usually integrated, it is sometimes a separate component

PREAMPLIFIER: The part of an amplifier that accepts the input signals, sorts them, applies any necessary equalisation, and then passes the signal to the (normally integral) power amplifiers

PRESENCE: A quality of forwardness or immediacy in a sound balance, generally related to an upper-middle frequency response boost.

PRINT-THROUGH: A pre- or post-echo of a loud signal created by magnetisation occurring from one layer to an adjacent layer after the tape has spooled or been recorded.

Q: A measure of the magnitude and shape of a resonance, the higher the Q, the sharper and more severe in amplitude the resonance.

REFLEX: a system of bass loading (using port or ABR) which offers improved efficiency and bass power handling at the expense of subsonic control compared to a sealed box.

RUMBLE: The low or medium frequency sound produced mechanically by any moving parts in a turntable, mainly the motor and platter bearings.

SENSITIVITY: The volume of sound output for a specific electrical voltage input.

SEPARATION: As between the two channels of a stereo pickup; see *crosstalk*.

SHIBATA: A special stylus extending the elliptical to a 'line-contact' type of profile.

SIDE-THRUST: A force acting on cartridges in pivoted (ie not parallel tracking) arms, due to the stylus/vinyl 'friction' acting along the line of the offset angle; hence bias or side-thrust compensation.

SIGNAL-TO-NOISE, SIGNAL/NOISE, S/N: The difference in total output when an applied signal is removed.

STYLUS: The specially shaped piece of diamond in contact with the groove and connected to the cantilever.

SUBSONIC: Below the audible range, ie below 20Hz.

SQUARE WAVE: A signal which consists of a fundamental plus a (theoretically infinite) series of odd (3rd, 5th etc) harmonics in a precise phase and amplitude relationship. It is useful for examining transient performance, symmetry, resonance control and 'ringing'.

THD: Total harmonic distortion.

TRACING: The following of the groove modulations by the stylus; hence for example tracing distortion, caused by the inability of a spherical stylus to trace the high frequency inner grooves on a disc.

TRACKABILITY: The ability of cartridge to cope with large amplitude modulations (or of the arm and cartridge to follow the groove itself properly).

TRACKING ERROR: The discrepancy between the truly tangential angle at which a record is cut and the slightly off-tangential angle at which it is tracked by a stylus on a pivoted arm during some parts of the arm's travel.

TRANSIENT: Signal of very short duration.

TREBLE: Upper part of frequency spectrum, typically above about 3kHz.

TWEETER: A small drive unit designed to operate over the high frequency range.

ULTRASONIC: Frequencies above audibility, ie greater than 20kHz; also *supersonic*.

VERTICAL TRACKING ANGLE (VTA): The angle at which the plane of motivation of the stylus is set with respect to the vertical when viewed from a side elevation of the cartridge. Should match the 20° cutter standard.

WEIGHTING: A factor or function that is applied to a measurement to increase its relevance and usefulness

WOOFER: A drive unit that operates over the bass portion of the audio range.

WOW AND FLUTTER: Low and high frequency pitch variations (from poor tape transport of turntable platters with speed drift).

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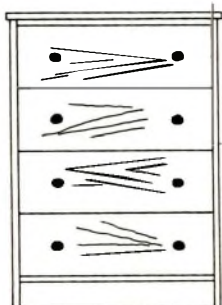
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THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the *Ariston AD90 Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories – i.e. a cassette deck rated 'excellent' in sound quality will not usually offer

the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!)

The Comments column contains a potted summary based on the original review, emphasising the salient points of a product's character and some performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and it is best to refer to the original review for this, of which more later.

The next column(s) varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability, for instance arm matching figures are given with the cartridges which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the Directory are those found in the Value column, the *Rs* and *Bs* denoting the Recommended and Best Buy ratings that are appended to products we consider meritworthy. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price

limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – i.e. cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different pre-recorded music media competing for the attention of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system. Furthermore the vinyl repertoire is still the cheapest, largest and most varied.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence. It is worth remembering that though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

There is some debate about the best form of fixing, however, adjustable spikes through to the

floor proper or seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed.

Most decent quality turntables are fairly immune to feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealer before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

THE DIRECTORY

TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality

improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. **Lab performance** summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of mechanically compatible cartridges (see cartridge listings).

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S-MCS £695/£412	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	60
Ariston Q-Deck £150	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average+ Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average+ Average+	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 5g (B&O carts. only)		48 (Summary)
Dual CS503-1 £114	Poor Average	Stated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,000	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £279/£249	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Kuzma Stabi/Stogi £575/£349	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis £345	Good+ Good+	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full!	Manual, subchassis player, belt drive, 14g	R	60
Mantecore Mantra £300/£330 (Arm)	Good+ Good+	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coil
NAD 5120 £90	Average Average—	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Rega Planar 2 £135	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
Rega Planar 3 £188	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Integrated turntable, manual, 11.5g	BB	48
Revox B291 £660	Average— Average—	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Source/Odyssey RP1 From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
Systemdek II £199	Good+ Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good+ Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average— Average—	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi-automatic, solid plinth, electronic, 6g P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average—	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
Thorens TD166III £179	Good Good	Old turntables never die, this revived 166 yet again takes its place near the top of its class	Auto lift, subchassis, 7g	BB	48
Thorens TD316 £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
Thorens TD320 £319	Good+ Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis, 7g (available without arm)	R	48

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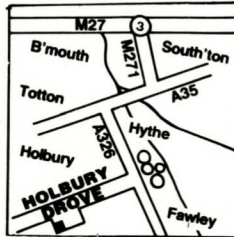
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THE DIRECTORY

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston RD90 Superior £900	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
Audio Labor Konstant £2,560	Good++ Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
Goldmund Studio £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	60
Michell Synchro £265	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	55
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Turntable £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set up, the price (necessarily) includes stand	Manual, belt drive subchassis, stand, 33 $\frac{1}{3}$ rpm		60
Oracle Delphi III £1450	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service – but very expensive	Manual, belt drive, subchassis	R	60
Oxford Acoustics Crystal Reference £1955	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R	60
Pink Triangle PT T00 £539	Very Good Very Good	A substantial improvement on its predecessor, the T00's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting up is critical, and for experts only	Manual, belt drive, solid/decoupled	R	60
SEE Revolver £135	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IV £448	Good+ Good+	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average+	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average+	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities such as ability to accommodate 12 inch arm compensate	Manual, belt, suspended motor unit, 78rpm, pitch control		55
Townshend Rock £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR1 00S £395	Good++ Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average+	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48/Summary
Eminent Technology £960	Good+ Good++	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good+	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Very expensive but with a performance that merits recommendation	12g	R	48
Linn LV Plus £129	Good+ Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £429	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Manticore (Logic) Datum 2 £140	Very Good Good++	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'untidy'	15g	R	48/Coll
Mission Mechanic £700	Good Good+	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £65	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £90	Good++ Good++	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
SME 3009 Series IIIS £156	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1138	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good++ Good++	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

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Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries).

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
A&R E77Mg £47	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
A&R P77Mg £57	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal, MM		38
ADC TRX II £69.60	Average Average +	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal, MM		38 (Summary)
Audionote IO2VDH £795	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity'. But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer), MC		43
Audioquest MC5 £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose "overall performance was very good for the price"	6-16g Normal, MM		43
Audio Technica AT95E £14.95	Average – Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal, MM		43
Audio Technica AT3200XEI £42.95	Average + Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal, MC	R	43
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low, MC	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricy product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal, MM		43
Audio Technica ATF50CC £100	Average + Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low, MC	BB	54
Audio Technica AT33ML £238.95	Average + Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low, MC		43
Audio Technica ATDC7 £245	Good + Good +	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low, MC	R	54
Audio Technica ATDC9 £400	Average + Very Good	Tonal colours were reproduced faithfully while stereo images were clearly isolated and focused despite contributing to a thoroughly integrated whole. Slightly less transparent than more costly MCs	6-14g Low, MC	R	60
Azden YMT0VE £12.50	Average Average –	A good tracker. Sounds rather bunched-up but not totally incoherent – for very basic systems only	5-15g Normal, MM		54
Azden GM1E £30	Average – Average –	Of academic interest only, this high o/p MC is seriously flawed in sonic terms	8-18g Low/normal, MC		54
Azden GMP5L £99	Average + Average +	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low, MC	R	54
B&O MMC5 £21	Average + Average	Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £33	Good Average +	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £75	Good Average +	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p, MC	R	48/Coll
Clear Audio Gamma £285	Average Average +	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average + Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Pradikat £1225	Average + Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g MC		Coll
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
Denon DL110 £60	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £80	Average + Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low, MC		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Dynavector DV-50X £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector DV XX-1 £360	Good Good+	The XX-1 embodies a power and solidity rarely encountered amongst the breed, nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems	7-17g Normal, MC		60
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average+	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal, MM	R	48
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal, MM	BB	54
Goldring G1020 £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal, MM		43
Goldring G1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model - no great actress	8-16g Normal, MM		48
Goldring Eroica L £91	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low, MC	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal, MC		43
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low, MC		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery - consider this model	5-10g Normal, MM		48
Grado XTE +1 £20	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Grado XF3E + £45	Average- Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Highphonic MCA3 £360	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
Kiseki Blue Silver Spot £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low, MC		54
Kiseki Purpleheart Sapphire £695	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1595	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £3500	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble fizz. Listen before deciding	6-18g Low, MC	R	48/Coll
Koetsu Red £896	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low, MC	R	48/Coll
Koetsu Red Signature £1300	Good Excellent	Technically this cartridge suffers no faults whilst on a subjective level it offers rare musical insight	10-21g Low, MC	R	60
Linn Basik £19.50	Average- Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal, MM	BB	48/Systems
Linn K9 £69	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coll
Linn Asaka £279	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coll
Linn Karma £435	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	48/Coll
Linn Troika £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after filling a Troika	8-18g Low, MC		Coll
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal, MM		48
London Super Gold £248	Average- Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal, MM	R	48/Coll
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low, MC		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £298	Average+ Good+	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low, MC	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low, MC		Collection
NAD 9100 £12	Average- Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal, MM	BB	38
NAD 9200 £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal, MM		28
Nagaoka MM4 £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MPT0 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Nagaoka MP11 Boron £38	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP10SB £40	Average Average +	Stilton's mods have improved the line detail resolution of this popular budget model	5-15g Normal, MM	R	54
Nagaoka MP11 Gold £45	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka MP11 Gold SB £70	Average - Average	Excessive price loading for a blob of aluminium	2-6g Normal, MM		54
Ortofon OM5E £12	Average - Average -	The OM10 is a hi-fi cartridge - the OM5E is not	5-16g Normal, MM		43
Ortofon VMS5E II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal, MM		38 (Summary)
Ortofon OM10 £15	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon VMS 10E II £21	Average - Average -	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal, MM		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal, MM		48
Ortofon OM20 £45	Average Average +	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon VMS30E II £52	Average + Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal, MM		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon OM40 £75	Average Average +	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal, MC		48
Ortofon MC20 Super £139	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	48/Coil
Ortofon MC30 Super £199	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coil
Ortofon MC3000 £800	Good Excellent	Quite simply, the most accurate transcription device yet created - not one for the faint hearted	6-16g V. Low, MC	R	60
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega RB100 £38	Average Average +	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal, MM	R	48
Shure M92E £15	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £26	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £24	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £32	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £44	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £45	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting, smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £195	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Supex SM100E £115	Average Average +	Delivers as much musical information as many moving coils - the bass in particular having an attractive bounce	6-15g Normal, MM		38
Supex SD900IV £350	Average + Good +	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low, MC		48/Coil
Supex SD901IV £375	Average + Good +	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price tag	8-18g Normal, MC	R	48
Supex SDX2000 £651 L £721 H	Good Good +	The high-o/p 2000 was preferred on listening tests to the low-o/p model, which even so has a unique place among the top designs	6-16g Either, MC		48
Van den Hul MC10 £699	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
Van den Hul MC One £799	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60

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AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) – but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research AR-04 £160	Very Good Good	A powerful, well equipped model precisely tailored to UK standards. Performance is close to the class winners	40W, MM/MC, 5 inputs, hdph, tone controls	BB	62
A&R Arcam Alpha £150	Average + Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation	5 inputs hdph MM/MC tone controls 30W		50
A&R Arcam Delta 60 £250	Very Good Fair	Our first pre-production review sample was not up to expectations but better ones have arrived since. It gave a solid technical performance	55W, MM/MC, 5 inputs, hdph		62
A&R Arcam Delta 90 £330	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey	70W MM/MC 5 inputs tone controls		50
Albarray M408 II £649 pr.	Good + Good +	Unusually styled transistor monoblok power amplifiers reintroduced with improved performance and sound quality. Needs good warm-up for best sweetness and clarity	40W Power amp only	R	56
Albarray M1008 II £899	Very Good Good	A larger version of the similarly styled M408II, fairly good all round but only of average quality for the price	80W, monoblok		62
Aria Acoustics Aria 12 £299	Poor Very Good	A plain looking valve power amp that's something of a wolf in sheep's clothing giving many dearer amps a run for their money	12W	BB	63
Audio Innovations Series 300 £339	Poor Good + +	Something of an anomaly the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system	10W, MM, 6 inputs	BB	63
Audio Innovations Series 1000/2nd Audio Amplifier £1199/1999	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
Audio Research SP9 £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound	5 inputs, MM/MC	R	60
Audio Research SP8 £1998	Very Good Good +	The sound from this valve preamp was good enough to do justice to the finest ancillaries	5 inputs MM		39
Audio Research M100 £2850 each	Good + Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them	100W	R	60
Audio Research SP11 II £5350	Very Good Excellent	Current state of the valve preamp art. A reference point	Straight line MM/MC Disc + phase invert	R	60
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000A £350	Very Good Good	A long running and high dependable classic, versatile and consistent via all inputs	50W, MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000P £495	Excellent Very Good	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Beard Audio CA35/P35mkII £595/£795	Fair + Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/MC, 4 inputs	R	63
Beard 506 £1195	Good + Good +	A versatile valve preamp – the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/MC		50
Beard M70 £1995 pair	Good Good +	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Burmester 838 £1490	Very Good Good	A disc-only minimalist preamp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing	MC only, MM option		Collection
Burmester 846 £1599	Very Good Good +	Usually coupled with the 838 this high-level preamp provides many and versatile input facilities	6 inputs		Collection
Burmester 850 £3995	Good + Good	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range	100W		Collection
Cambridge Audio P40 £200	Good Good +	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability	5 inputs 40W MM/MC straight line	BB	50
Cambridge Audio C75 £279	Good + Good +	Whilst not quite on par with its A75 companion this preamp provided excellent stereo imagery but was a touch "heavy" in character	MM/MC disc	R	50
Cambridge Audio P55 £290	Very Good Very Good	A grown up P40, the P55 suffers slight noise on the moving coil input but offers great sound for the money	55W, MM/MC, 5 inputs, hdph	BB	62
Cambridge Audio A75 £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies	100W	R	50
Cello Audio Suite £5280	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Conrad Johnson PV7 £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money	5 inputs, MM disc		57
Conrad Johnson MV50 £1795	Good + Good +	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson PV5 £2010	Good + Good +	The PV5 is a classy sounding valve preamp, and natural partner to the MV50	5 inputs MM		Collection
Conrad Johnson Motif MC-8 £2500	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
Conrad Johnson Premier Three £3775	Good + Very Good	The Three is a musically accurate and graceful preamp which proved versatile on a wide range of inputs	5 inputs MM/MC	R	Collection
Conrad Johnson Premier Four £3900	Good + Very Good	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations	100W		Collection
Copland Pre and power amps £649 each	Good + Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear	3 inputs MM, 12W		50

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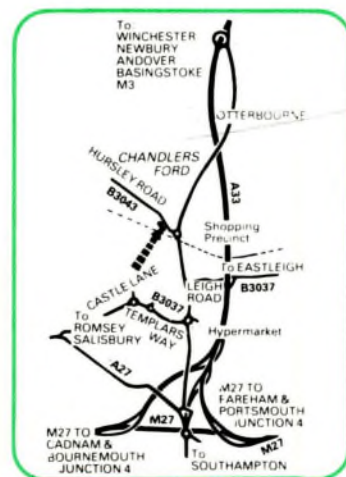
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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Counterpoint SA7 £747	Average + Good	Simple valve Californian preamp offering inspiring transparency for the price	4 inputs straight line MM/MC		Collection
Counterpoint SA12 £1250	Good + Good +	A real power-house power amp, beely and load-tolerant although like the SA7 a trifle untidy at frequency extremes	100W		Collection
Creek 4040 £145	Average + Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance	4 inputs MM 12W	R	50
Creek CAS 4040 II £160	Good Good	The Mk II has no problems and is a fine all rounder	30W, MM, 4 inputs, tone controls	BB	62
Creek CAS 4140 £219	Good + Good	Redesigned for '88, this is a fine allrounder with good moving coil input, plain presentation	40W MM/MC 3 line inputs	BB	62
Croft Micro £150	Average + Good	A real upsetter, this excellent valve preamp put the cat among the pigeons proving good sounds can be made at budget price levels	4 inputs MM straight line	R	Collection
Croft Super Micro A £500	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £730	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
DBX CX3/DX3 £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4-channel surround		56
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA 250 II £125	Good Fair	Despite a claimed increase in power this competent model now slips behind the competition on sound quality grounds	30W, MM, hdph, tone controls		62
Denon POA-6600 £1,000/pair	Excellent Excellent	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3 £1000	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
E.A.R. 802/509mkII £920/£1550	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
E.A.R. £3,000/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £360/£340	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Goldmund Mimesis 6 £2,500	Very Good Very Good	Small and discrete for those who'd rather not flaunt it, this is no powerhouse but sounds subtle, delicate and refined	80W stereo power amp		60
Grant G60AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 41 8ohms	R	57
Haffer DH120 kit form £295	Fair	We didn't build one, see below	60W		44
Haffer DH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harman Kardon 640 Vxi £225	Good + + Good	Moderately priced but built to HK's high standards, good value and good load tolerance	50W MM, 5 line inputs tone controls		56
Harman Kardon PM645VXi £300	Very Good Good	Fits in well with the Harman Kardon series, giving a competent all round performance at a fair price	75W, MM/MC, 5 inputs, hdph, tone controls		62
Harman Kardon 655 Vxi £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls		56
Harman Kardon PM665VXi £699	Good Good	A versatile and meaty amplifier with high current capability, but sound quality lags behind certain home grown alternatives	150W MM/MC tone controls (switchable)		60
Hitachi HA-006 £120	Very Good Fair	Despite reasonable lab test results this did not make the grade on sound quality	55W, MM, 4 inputs, hdph, tone controls		62
Hitachi HA007 £150	Good + Fair	Decent but unexceptional performance and sound quality, plus good facilities, represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
Inca Tech Dirk £215	Good + Good +	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
Inca Tech Claymore £345	Good + Good +	Limited facilities but a strong, clear, well-focused sound results in auspicious <i>Choice</i> debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
ITL MA-80 £150	Good Good	A promising start for this young company, the MA-80 gave a fine sound with CD but was less wonderful on the moving coil input	30W, MM/MC, 5 inputs	R	62
Jadis JP30/JA30 £6,790	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
JVC AX-222 £110	Good Fair	Not very impressive, JVC need to pull their socks up if their budget amplifiers are to score	35W, MM, 4 inputs, hdph, tone controls		62
Kelvin Labs Junior/J30 £295/£295	Good Good	Their heart is in the right place but the class A Junior combination is a bit expensive for what you get	20W, MM/MC, 5 inputs		62
Kenwood KA-550D £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
Krell PAM5 £1589	Very Good Good	Superbly built, the Pam 5 preamp gave good definition throughout the frequency range with a good measure of excitement	MM/MC		50
Krell KSA50 Mk2 £2540	Very Good Good +	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W		50
Le Tube £585	Good + Good	If moving coil sensitivity is not required then this preamplifier will offer a clean view with very good stereo	3 inputs MM	R	44
LFD £2,995 +	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components (cartridge, power amp)	MC (with care), passive line extra	R	60
Linn LK2 £440	Good + Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition. Latest version, the LK2.75, not yet tested	5 inputs MM/MC	*	50

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Linn LK1 £459	Good+ Fair	This preamp was marginally less successful than the LK2 but the pair (of Linn's) worked well together and are well worth considering. Recent modifications as yet unchecked	60W	*	50
Linn Stratos £999	Good+ Good	Facing strong competition in the UK this New Zealand pre/power combination gives good sound quality... but not exceptional at the price	120W MM/MC straight line		50
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Luxman LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 80W, MM/MC tone controls		57
Magnum A100 £1995 pair	Good + + Good+	Given their massive power rating a pair of A100's make a fine stereo power amp; ideal for high levels and with a wide dynamic range for digital programme	320W		50
Marantz PM25 £125	Good Fair	Soft and sweet like the rest of the range, the PM25 is inoffensive and undemanding	25W, MM, 5 inputs, hdph, tone controls		62
Marantz PM35 £170	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality; well equipped and versatile	45W MM/MC 3 line inputs tone controls		56
Marantz PM45 £200	Good+ Fair	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls		50
Marantz PM94 £1,000	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/MC tone controls (switchable)		60
Meridian 201/205 £550/£395 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/—	62
Mission Cyrus One £180	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built - however, the headphone socket will only take a 3.5mm jack	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Mission Cyrus PSX £200	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
Mission Cyrus Two £300	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Again, only 3.5mm headphone socket	50W, MM/MC, 5 inputs, hdph, straight line	R	62
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all rounder	50W, MM/MC, 6 inputs, hdph, tone controls	R	62
Musical Fidelity A1 £249	Good Good+	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	BB	56
Musical Fidelity B200 £299	Very Good Good+	Running cooler than other MF's, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/MC 4 line inputs straight line	BB	62
Musical Fidelity Pre 3/P140 £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
Musical Fidelity A100 £439	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs straight line	R	62
Musical Fidelity P170 £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity MVT Mk 3 £1199	Very Good Very Good	The MVT preamp was "strong in its class", providing competition for £1500-plus amplifier systems, now rivalled by the MF3B	MM/MC 5 inputs	R	50
Musical Fidelity P270 £1199	Very Good Excellent	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R	50
Musical Fidelity MVX £2,000	Very Good Excellent	Soundwise this preamp puts Musical Fidelity on terms with much more expensive exotics, with top class transparency, focus and dynamics	MM/MC, phase invert	R	60
Musical Fidelity A370 £2199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
NAD 3020e £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	R	50
NAD 3220PE £140	Good Fair	Like the 3020E but with more peak power and loudness thanks to the 'power envelope'	20W, MM, 5 inputs, hdph		62
NAD 2200 £339	Good + + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
Naim NAIT 2 £322	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-c£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/MC etc	R	60
Nakamichi CA-5E £750	Very Good Good	A fine lab performance and high build quality but rather disappointing sound quality for a preamp of this price	MM/MC, 6 inputs, hdph, tone controls		62
Nakamichi PA-5E £1150	Very Good Good	A strong sound in several respects but one which ultimately failed to satisfy	100W		62
Nakamichi CA7E/PA7E £2500/£1700	Very good Good/Good+	Exceptional build and finish, plus good general performance, remote control and versatility, but expensive	200W MM/MC 6 line inputs, remote, tone controls		56
Nuance £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer	4 inputs MC		50
Oakley-Image £425	Poor Very Good	An interesting valve preamp from Yugoslavia, the Image on first impression needs a bit of tweaking to warrant Choice commendation but is a nice product nonetheless	MM, 5 inputs straight line		63
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/MC, 4 inputs, battery supply	R	62
Pioneer A333 £149	Very Good Fair	A rather average but nonetheless competent performer that is pleasant enough	55W, MM, 5 inputs, hdph, tone controls		62

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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Philips FA860 £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
Philips FA960 £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
QED A240 CD II £169	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £219	Good++ Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	62
Quad 34 £289	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Quad 405 £349	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Quicksilver Mono £1495	Good Good+	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblok 4/8ohms		57
Radford SC25 £862	Very Good Very Good	A very fair price for a solid, well built valve preamp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
Radford MA75 £977	Good Very Good	A fine quality valve monoblok with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monobloks	R	57
Radford STA25 Renaissance £1115	Good Good+	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
Revox B250 £128	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Robertson Forty Ten £987	Very Good Good	Here is a neat little power amp (60W) you can fit and forget; it proved most satisfying over long listening sessions	60W		Collection
Rose RV-23 £370	Average Very Good	A very attractive little British valve preamp with a sound that was rich, colourful and reasonably sharp via the CD input but was less impressive on disc	MM, 4 inputs, straight line		63
Rotel RA810A £100	Very Good Fair	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA820A £130	Good++ Good	This A version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
Rotel RB/RC850 £140/£119	Good++ Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/MC 4 line inputs tone controls	BB	62
Rotel RA820BX3 £160	Very Good Good	The latest upgrade is not that impressive, but the BX remains a fine amplifier and now has a moving coil disc input	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Rotel RA870BX £325	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/MC 7 line inputs tone controls	R	56
Sansui AU-G11X £139	Good+ Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls		50
Sansui AU-G30X £199	Good++ Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls hdph		50
Sansui B2301 £1880	Very Good Good+	Rating better than the preamp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Collection
Sansui C2301 £2306	Excellent Good	Sansui's flagship preamp did not really rate well given its price, but is not short on features	All facilities		Collection
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
Sony TAF 700ES £500	Good++ Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
Sumo Nine+ £1200	Very Good Excellent	Macho styling of this class A stereo power amp conceals a sonic subtlety that is exceptional for the price. Limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Tannoy SR-840 £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)		50
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var. loudness		56
YBA 2 pre & pwr £1395/£1695	Good++ V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62

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THE DIRECTORY

LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallest enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the **sensitivity** of the loudspeaker (how loud it goes for a given electrical input) against the **bass** extension (how low does it go) for the given box **size**. After that such subtleties as coloration and

dispersion come into the equation.

Careful **placement** of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal **placement** depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £700	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/W 60Hz	R	59
Acoustic Research BBX £100	Average Average—	Spacious and informative sound quality with bass well under control. Not that there was much bass to control!	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £170	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	59
Acoustic Research 35BX £200	Average Average—	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
Apogee Caliper £2550	n/a Very Good	Near state of the art performance, not materially worse than bigger Apogees, just less bass. Rich, subtle and slightly dull, with a clear, articulate midband, but uncommonly system fussy	122.5 x 71 x 10cm ex. rear foot, free standing, away from walls	n/a n/a	R	60
Apogee Scintilla £4990	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/Coil
A&R Arcam Three £150	Average+ Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/W 95Hz		53
A&R Arcam Two £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "bailsy" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		59
A&R Arcam One Plus £359	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/W 60Hz		59
Ariston QLN1 £350	Very Good Good+	This very sophisticated loudspeaker has much of the euphony of a LS3/5A but with rather more "oomph". A little "romantic" for some tastes - Schubert and Sting rather than Stockhausen or the Stones perhaps?	35 x 25 x 26.5cm free space, 24 inch stands	84.5dB/W 65Hz	R	59
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average+ Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average+ Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
Avance Concrete 2000 £970	Below Average Below Average	Very low cabinet talk, but the system sounds terminally uneven - lumpy bass and over-forward midband dominate	86.5 x 29.2 x 43cm clear of walls	94dB/W 40Hz		60
B&W DM100i £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband.	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 90Hz	R	59
B&W DM110i £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive.	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		59
B&W LM1 Mk II £249	Average+ Average	Probably one of the best "micros" ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz	*	31
B&W DM1600 £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	59
B&W Matrix 1E £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
BBC LS3/5A £265	Good+ Average+	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not yet checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coil
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/W 70Hz		59
Bose 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		59
Boston A4011 £110	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Castle Clyde £139	Average+ Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
Castle Durham £189	Average+ Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/W 67Hz	R	46
Castle Pembroke £289	Good Average+	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31
Celestion DL6 Series Two £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		59
Celestion DL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open stands	87.5dB/W 60Hz	R	59
Celestion SL6S £350	Good Good+	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
Celestion SL600 £700	Good Good++	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
Celestion SL700 £1220 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/W 45Hz		60
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/W	R	60
Chameleon 500 £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		59

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THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
dbx 1000 £450	Average— Average—	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor.	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
Gale 301 £279	Average Average+	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £699	Average+ Average+	Clean but rich and powerful bass, stereo focus was not a strong point, but it is worth considering. (Recent revisions not yet checked)	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz	*	46
Goodmans Maxim Two £80	Average+ Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/W 85Hz	BB	59
Goodmans Point 3 £90	Average+ Average—	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/ high stand near wall	90dB/W 80Hz	R	53
Goodmans Point 7 £170	Average+ Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	89dB/W 47Hz		53
Harbeth HL Compact From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/W 65Hz		59
Harbeth HL Mk 4 £525	Good+ Good+	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
Heybrook Point Five £139	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		59
Heybrook HB1 £189	Good Average+	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
Infinity RS2000 £130	Good Good+	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	59
JBL TLX-3 GI £130	Average Average—	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46
JBL L 60T £399	Good+ Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL L80T £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
JBL 18Ti £599	Good+ Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. Try the cheaper L20T	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
JBL 250Ti £3599	Good+ Good+	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
JPW P1 £125	Good Average+	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/W 60Hz	R	59
JPW AP2 £145	Good Average+	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	R	53
JPW AP3 £210	Good Average+	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
KEF C10 £94	Good Average—	Listening panelists gave this a poor reception	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
KEF C40 £209	Average+ Average—	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
KEF R102 £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect, what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
KEF 103/3 £630	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £806 (£905)	Very Good Good++	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	89dB/W 50Hz	R	60
KEF 107 £1890	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	60
Linn Nexus £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		59
Linn Sara £729	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before	43 x 34.4 x 26.5cm stand mounting, near wall	88dB/W 50Hz	R	60
Linn Isobarik £1695	Good Good++	Exceptional capabilities in the dynamic range and bass performance, demands serious consideration as a state of the art contender, but odd stereo	76 x 33 x 41.5cm low stands against rear wall		R*	Col II
Magneplanar SM6a £697	Average— Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MG2.5R £1897		Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/W 35Hz		60
Magneplanar MG11a £2650	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz		46
Marantz LD20 DMS £150	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/W 55Hz		53
MB Quart 390 £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/W 60Hz		59
Meridian M30 £725	Average+ Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70 II £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 700LE £140	Good Average	Mission re-submitted this popular model and again got a positive review - which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	59
Mission R737 Renaissance £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition - wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		59
Mission Argonaut £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cm floor- standing near wall	91dB/W 40Hz	R	60
Monitor Audio R100 £139	Average+ Average—	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Monitor Audio R252 £159	Average+ Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
Monitor Audio R352 £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
Monitor Audio R700 MD £269	Average+ Average+	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R	46
Monitor Audio R352 MD £299	Good Average+	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB	53
Monitor Audio R452/MD £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz		59
Monitor Audio R652 MD £369	Average Average+	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz		53
Monitor Audio R852/MD £380	Good+ Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good – an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	59
Mordaunt Short MS10 II £90	Average Average-	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
Mordaunt Short MS100 £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
Mordaunt Short 45Ti £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unobtrusive	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
Mordaunt Short MS300 £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46
Mordaunt Short 442 £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/W 40Hz	R	60
Musical Fidelity MC-2 £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear: the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	59
Musical Fidelity MC-4 £499	Very Good+ Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	59
Quad ESL-63 £1538	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/W 34Hz	R	60
Rogers LS2 £170	Good Average+	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R	46
Rogers LS6 £240	Good+ Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition – well balanced with an open and informative nature	51 x 27 x 28cm open stands, free space	87.5dB/W 50Hz	BB	46
Rogers LS7t £360	Good+ Good+	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	59
Roksan Darius £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
Rotel RL850 II £120	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	59
Royd A7 Series 11 £99	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/W 75Hz	R	53
Royd A25 £100	Average+ Average-	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
SD Acoustics SD1 £1050	Average Good	A large scale, airy and unusually detailed system with excellent dynamics. Balance is light and bright, and can upset some systems/listeners	123.5 x 38.2 x 31.9cm free standing, away from walls	90dB/W 50Hz	R	60
Sony APM 10ES £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	59
Sony APM 22ES £249	Good+ Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
Sony APM 66ES £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		59
Spendor Prelude II £350	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
Spendor SP2 £450	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	59
Spendor SP1 £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	60
Spendor SA3 Passive £1400	— Good+	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
Spendor SA3 Active £2708	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
Spica TC-50 £595	Average+ Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R	59
Spica Angelus £1195	Good Average	A little bass shy and soft in the bass and lower mid, the Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm free standing away from walls	86.5dB/W 50Hz		60
Tannoy Eclipse £120	Average+ Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	59

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Tannoy Mercury II £160	Good Average+	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as yet unchecked	50 x 25 x 23.5cm open space 45cm stands	88dB/W 55Hz	BB*	53
Tannoy Westminster £3500	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
Technics SBC 250 £130	Average+ Average-	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average+	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB	59
Wharfedale Delta 50 £99	Average+ Average-	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
Wharfedale Diamond 111 £100	Below Average Average-	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz		59
Wharfedale 504 £139	Average+ Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R	46
Wharfedale Super Diamond £140	Average Average-	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/W 57Hz		53
Wharfedale 510.2 £299	Average Average-	Even in its latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz		59
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R	46

* rating refers to original, tested model.

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides, the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
Aiwa AD-WX707 £180	Poor Average	Not bad value for a twin deck, but marginal from the high fidelity viewpoint. The review sample was poorly set up.	Dual deck, auto-reverse, Dolby B & C, bias adjust		57
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-52 £249	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-6 £350	Good Good	There is a strong sense that someone has really thought this one through, it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Denon DR-M07 £125	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	BB	52
Denon DR-M10HX £180	Good Good	Very well laid out, a sensible range of features and smooth cam-operated transport. Replay-only sound quality suspect, but the deck is successful as a recorder – clean, precise but slightly 'grainy'	Dolby B, C, HX Pro, memory counter, bias adjust	R	63
Denon DR-M12HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good+	This deck will slot into many high grade systems without disgracing itself – or the cassette medium. Very presentable high resolution sound with gain stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	R	60
Denon DR-M34HR £320	Very Good Good+	Prerecorded cassettes sounded grey and dull, but this may have been a sample fault. As a recorder, the DR-M34 is refined and detailed – and good value	Dolby B, C, HX Pro, 3 Head, manual tape calibration, memory counter		63
Denon DR-M44HX £400	Excellent Excellent	A well designed deck that also performed fine sonically, working very well with ferric and metal tapes	Real-time counter, Dolby B, C, HX Pro, tape alignment adjust, remote control, 3 Head	R	60
Dual CC8010 £110	Average Average+	The only limitation worth noting is a slight opaqueness, the Dual otherwise sounds stable and effective. An excellent low-cost design	Dolby B & C, microphone input	BB	63
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Hitachi D-003 £130	Average- Average-	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £180	Average- Poor	This double 'dubbing' deck proved a mixed bag – good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
JVC TD-V711 £380	Very Good Excellent	This is a complex recorder which is built on the back of some important ideas with audiophile roots. It has a (mostly) superb technical performance and is very capable, if not always strictly accurate	Dolby B, C, HX Pro, 3 Head, variable bias, track search, 3 line inputs	R	63
JVC TD-W222 £150	Below Average Below Average	Well endowed but somewhat user-hostile twin deck. Sound quality is very tape dependent, but offers tolerable stability with considerable loss of resolution and scrappy musical presentation.	Dual deck, auto reverse, Dolby B/C		63

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Kenwood KX-440HX £140	Average + Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		63
Kenwood KX-660HX £170	Good Good	Well designed control system with useful search aids. Sound quality is positive and detailed	Dolby B, C, HX Pro, track & blank search, intro-scan, bias adjust	R	63
Luxman K-105 £349	Average Average	Rating quite well for an auto reverse deck, and featuring complex track search facilities, it was not sonically competitive on price	Auto reverse, track search, Dolby B & C, remote control		52
Luxman K-112 £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lassy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
Marantz SD-35 £160	Good Good +	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	R	52
Marantz SD-45II £200	Good + Good +	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
NAD 6300 £649.95	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good +	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good +	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good + Very Good +	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote control		60
Onkyo TA-2120 £120	Average + Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/side repeat	R	63
Onkyo TA 2130 £140	Average + Average +	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust		52
Philips FC566 £179	Average + Average +	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-443 £180	Average Good	Structurally sound and subtly musical recorder. Sophisticated, mildly damped sound quality	Dolby B & C, line bias adjust, track search	R	63
Pioneer CT-737 £300	Average – Average –	Interesting design and a pleasure to use with rather too many rough edges to really work properly	Dolby B, C, HX Pro, 3 Head, bias adjust, memory counter		63
Proton AD-200 £140	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unrelenting hardness and an almost total lack of detail	Dolby B & C		57
Proton AD-300 £200	Average – Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
Revox B215 £1461	Good Average +	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
SAE C102 £549	Average + Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sony TC-FX 150 £90	Average + Average +	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C		52
Sony TC-W300 £150	Poor Poor	Deeply unimpressive and messy sounding deck with bloated quality and poor pitch integrity	Dual deck, Dolby B & C		63
Sony TC-RX50 £180	Average – Poor	Terminal inability to play at a steady pitch, or (on prerecorded material) in tune spoiled this simple but otherwise attractive design	Auto-reverse, Dolby B/C/HX Pro		63
Sony (WMD6C) ProWalkman £249	Good + Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-RX60ES £250	Average Average	For once a stable sounding auto-reverse deck but sound quality is rather 'dirty' and compressed, especially with Dolby C	Auto-reverse, Dolby B/C/HX Pro, auto tape recognition		63
Sony TC-RX80ES £350	Average + Good	Clean, powerful and detailed sound, especially without Dolby C. Stable pitch – but prerecorded cassettes sounded disappointing	Auto reverse, Dolby B/C/HX Pro, bias/level adjust	R	63
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	60
Tandberg 3014A £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
Teac V-250 £89	Average Average	Ultra-basic design which works quite well. Lack of pitch integrity is the main shortcoming, but it wasn't always noticeable	Dolby B	R	63
Teac V-270C £109	Average – Average –	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac R-515 £299	Average + Average +	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
Teac V-870 £399	Good + Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
Teac V-970X £499	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics RS-T230 £160	Average - Average	Satisfactory with prerecorded material but otherwise unexceptional, the main features of this deck are its excellent user interface and value for money	Dual deck, Dolby B/C		63
Technics RS-B355 £140	Good Good	Good sound let down by inadequate meters and poor prerecorded replay only sound quality	Dolby B, C, microphone inputs, cue and review	R	63
Technics RS-B505 £160	Average + Average +	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57
Technics RS-B605 £180	Good Average +	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx		57
Technics RS-T330R £200	Average + Average +	One of the very few dual cassette decks with any real pretensions to audio quality, the RS-T330R is a considerable success musically as well as being a pleasure to use	Dual deck, Dolby B & C	R	63
Technics RS-B705 £250	Average Average -	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Technics RS-T80R £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52
Yamaha KX-200 £140	Good - Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most - the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	R	52
Yamaha KX-300 £150	Average + Average -	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-400 £200	Good Good +	A highly commercial package with every widget under the sun. Happily it sounds good too.	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-1200 £500	Excellent Average +	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES - but with an inferior front panel design	Track ID and search, remote	R	63
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Pioneer D-1000 n/a	Excellent Excellent	Fine, clear, colourful and consistent sounding deck. The Pioneer is lavishly (uneconomically?) constructed and equipped. It shows what is possible, but will probably never go on sale	Many search and memory facilities	R	63
Sony DTC-M100 £799	Very Good Very Good	Clear, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Midi-width, alpha-numeric display, remote, optical interfaces	R	63
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan - frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving

than top quality vinyl replay.

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. Sound quality variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good + Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming		58
ADC CD 2000E £330	Good + Fair +	One of the slimmest players in the business but nothing special inside. Nice ergonomics but overpriced	Remote, timeshared 16 bit		64
Aiwa DX-M45 £149	Fair Fair	Cutdown Philips technology, but results are quite good for this British made machine	Manual	R	64
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect	Track entry/volume remote, direct recorder connection etc		58
Aiwa XC-007 £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation - though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Arcam Delta Black Box £249	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straight forward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphone socket etc.	R	58
Cambridge Audio CD2 £650	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
dbx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD 610 £200	Good+ Fair+	Lots of Denon player for the money, well equipped with good all round performance	Remote, versatile programming 2x 0/S	BB	64
Denon DCD 810 £250	Very Good Fair+	A good value allrounder bettered on sheet value by the 610 and 910; power volume could sound better	Remote, digital output, programming	R	64
Denon DCD 910 £300	Very Good Fair+	A well equipped deck of impressive appearance and solid sonic and lab performance	Remote volume, programming, 8x 0/S	BB	64
Denon DCD-1500II £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented.	Track entry/volume remote, menu display etc.	R	60
Denon DCD 1700 £650	Good+ Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphone socket, programmable	R	58
Denon DCD-3300 £1200	Good++ Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphone		51
Dual CD 1030 RC £170	Fair Fair	An up and down performance on test but it is hard to deny the overall value for a machine that includes remote control at this price	Remote, headphone socket, 2x 0/S, timeshared 16 bit	R	64
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group, don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/S, timeshare 16 bit		64
Goodmans GCD550 £199	Average+ Fair+	A slow autochanger with a weakish lab performance but the sound is fair enough, the features good and the price is low	Remote, 6 disc autochanger, 2x 0/S	BB	64
Hitachi DA-7000 £150	Good Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities - a good budget starter	Memory and repeat, plus the basics		58
JVC XL-2444 £255	Good Fair+	An average performer, unremarkable though well equipped and fair value for money	Full feature remote, digital output, headphone socket		64
Kenwood DP-660SG £180	Below Average Below Average	Build quality and ergonomics are good, and the range of features far exceeds the price norm. However, sound quality is messy with a soft bass, recessed mid and sometimes spiky top.	Remote control, calendar/menu display, keypad, 20 track memory		62
Kenwood DP-880SG £250	Very good+ Fair+	A fine CD transport for the price, fine sound, very good lab results, good for a decoder?	Remote volume, programming, headphone socket	BB	64
Kenwood DP-990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58
Kenwood DP-1100SG £450	Very Good Good	Something of a high tech flagship, this model doesn't quite make the grade on sonic grounds but is well built	Full remote, optical and coax digital outputs, headphones		64
Kinergetics KCD-30 £1700	Very Good Very Good	Definitely a technical oddball with its distortion-cancelling circuits, the pricey KCD-30 nevertheless does sound very good, and also noticeably 'different' - not necessarily to our collective tastes, but possibly to yours	Favourite track selection, remote, high output (vol, bal)		60
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation.	Track entry remote, programming etc.	R	58
Marantz CD65IISE £300	Very Good Very Good	Scorching sound quality from a competitively priced player, which is the new middle market reference	Remote, programming, digital output	BB	64
Marantz CD94 £800	Good++ Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphone socket, favourite track selection, remote	R	58
Marantz CD94/CDA94 £1600	Very Good Excellent	Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price which seems a little steep. Very refined	Favourite track selection, remote, balanced output etc	R	60
Meridian 207 £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile - on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	Dn-board preamp, remote (inc volume)	R	64
Mission PCM2 £690	Good+ Good	A matured design with good features it is the best sounding power volume player available, it even tests well. It accepts the £200 PSX power supply option	Remote volume, display and phase invert	R	64
NAD 5220 £230	Average- Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		62
Nakamichi OMS-1E £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi OMS-3E £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphone socket		51
Nakamichi OMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
Nakamichi OMS-5EII £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
Onkyo DX-1500 £170	Average Fair	Ruled out on the grounds of its poor DAC filter, but it's not so bad really given the price	Manual, 2x 0/S, timeshared 16 bit		64
Onkyo DX-2500 £200	Average- Above Average	Attractive, easy on the ear sound quality at the cost of some loss of low level clarity and dynamics. Good tracking	Keypad remote, memory, headphone socket (variable)	R	61
Philips CD473 £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet, we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc.	R	60

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CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Pioneer PD-6100 £249	Good Good	A budget audiophile player, fine sound even if its lab performance seems a little uneven	Full feature remote, digital output, variable hdph	BB	64
Pioneer PD-M500 £269	Good Good	A high performance autochanger for the money, good value all round and generously featured specification	Full remote, digital output, variable hdph	BB	64
Pioneer PD-M700 £400	Very Good Fair+	Top class autochanger, surprisingly fast, high specification and a good allrounder	Remote, optical digital output, headphone socket		64
Pioneer PD-91 £800	Excellent Excellent	Close to state of the art in nearly all areas - soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	64
Revox B226 £658	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	Infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD820B £210	Good+ Fair+	A budget Philips based player of dependable sound quality and offering very good value. Build is a touch lightweight	Remote, basic facilities	BB	64
Rotel RCD820BX2 £250	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and comfortably deserves Recommendation.	Direct track entry remote etc.	R	58
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
Sansui CD-X501i £300	Fair Fair	Weak dynamic range for an upmarket player which shows in both lab and listening tests	Remote, programmable, digital output, headphones		64
Sharp DX-620 £199	Good Good	A surprising achievement but it shows what can be done. Another high value budget package	Remote, headphone output, 2x 0/S, timeshare 16 bit	BB	64
Sharp DX-R700H £225	Average-Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
Shure Ultra D6000 £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe S01 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-M35 £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony CDP-550 £200	Good+ Fair+	Another dependable Sony, it doesn't have a digital output but at the price who's complaining? Fit and forget	Full remote/headphone output, 4x 0/S	BB	64
Sony CDP-M75 £230	Good Good	This midi version of the '750 saves £20 on the price (see CDP-750 review).	Track entry remote, menu display ect.	BB	58
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.	BB	58
Sony CDP-M95 £280	Very Good Fair+	Very well equipped mid sized player fine build and finish, incorporating Sony's custom file disc labelling	Remote, programmable, variable hdph output	R	64
Sony CDP-337ESD £550	Good Very Good+	Well built, high grade player with excellent if undemonstrative sound. Excellent resolution, dynamics and bass weight, though arguably not control	Random access remote, calendar display, FTS, memory	R	61
Sony 557ESD £1000	Excellent Good+	Superbly built flagship model that produced excellent lab results and very good sound. Many luxury features though not that good value	Full remote, disc directory, digital output, power volume, 8x 0/S, 18 bit		64
Teac PD135 £180	Fair Fair	Particularly easy to use, this lags a little behind the pack when it comes to sound quality, but it still represents a valid alternative for those who find the presentation attractive.	Skip, scan, programming, repeat		58
Technics SL-P350 £250	Very Good+ Good	Nicely built, good features and fine sound, what more do you want for £250?	Remote, digital output, variable hdph output	BB	64
Technics SL-P770 £350	Excellent Good	Sophisticated, high resolution player, but inconsistent with level with some coarseness and compression during loud passages	Remote, 18 bit, rotary cue wheel, comprehensive display	R	61
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good+ Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good	Headphones, remote control, search dial cueing, etc		51
Toshiba XR-9318 £150	Good Fair+	A basic Philips based player perhaps but just look at the price/performance equation	Remote via system, manual, non compressed, 16 bit	BB	64
Toshiba XR-9128 £200	Very Good Good	A well equipped Philips clone with a very good performance for the price	Remote, programmable, digital output, hdph	BB	64

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across

the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

(The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	This
Akai AT-93L £250	Good+ Good+	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	This
A&R Arcam Alpha £149	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets, FM/MW, LW display manual tune	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only	FM only	BB	50

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TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Denon TU 450L £130	Average+ Average+	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation	FM/AM Digital	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/FM, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Hitachi FT-MD 5500 £200	Excellent Good++	A powerful, good sounding tuner with versatile facilities	16 presets, FM, AM, MW auto scan digital signal meter	BB	55
Hitachi FT5500 II £200	Very Good Good+	Soundwise highly rated on FM, and on AM basically satisfactory - a versatile all-rounder	Auto and manual tuning, 16 presets	R	44
Kenwood KT-660L £130	Fairly Good Fairly Good	You get your money's worth of gadgets and the radio's basically sound although programming is complicated. AM - fairly good	Timer, clock, all bands	R	This
Kenwood KT-1100D £300	Good+ Good+	Behind a gaudy and rather useless display the radio is much better than you might first think. AM - good	Firework display, FM/MW bands only	R	This
Marantz ST35L £125	Good+ Average-	It works well enough but the sound could be better for the money	16 presets, AM/FM, digital auto scan, active tracking		55
Meridian 204 £495	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity TI £300	Good+ Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CB!	FM only, analogue box dial, manual tune, signal meter	R	55
NAD 4020B £139	Good Average+	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being 'musical and ambient'	Analogue FM/AM	BB	50
Naim NAT 01 £1098	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only. Analogue	R	50
Nakamichi ST-7E £750	Good+ Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schotz enhanced sensitivity, auto tune digital		55
Pioneer F551L £100	Good+ Good+	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	55
Pioneer FT 443L £130	Poor Poor	The pretentious 'computer controlled' features don't amount to much. AM - very poor	All bands		This
Pioneer F-737 £230	Good+ Good+	Terrific separation and selectivity on FM, but AM still lacking. AM - fair	FM/MW only	R	This
Pioneer F91 £350	Excellent Good++	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/MW only	R	This
Quad FM4 £289	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £918	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
SAE T-102 £449	Good+ Good+	Expensive for all the radio you get, but sounds interesting. AM - Poor	FM/MW only	R	This
Sansui TU-D99XL £249	Very Good Good+	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST-S300L/ ST-S100L £140/£100	Good Good	A reasonable entry point, not for difficult areas. AM - Poor	All bands	R	This
Sony ST 500ES £200	Good++ Average-	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 pre-sets, digital scan	BB	60
Yamaha TX-L400 £130	Good+ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on sound quality, but there's no denying the attractiveness or popularity of this approach - the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa X-55 £380	Average Average-	The turntable was slightly better than usual, the cassette deck highly limited, but the dreadful loudspeakers are the clincher	Combined cassette tuner-timer/amp, dedicated T/T speakers, & optional CD		This
Aiwa X-78 £550	Average+ Good	Good. The loudspeakers are disappointing and the turntable is excessively microphonic, but the rest of the system works well.	Auto reverse cassette/tuner/amp & timer, T/T and CD	R	This
Aiwa V1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54

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CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai M.50CD £550	Poor Poor	Cassette lacks Type II compatibility, general sonics mediocre or less	Devolved from M.80 but simplified, part remote		This
Akai M.80CD £800	Good Good	Good all rounder with minor ergonomic shortcomings but generally practical layout	Separates based, twin auto-reverse cassette	R	This
Goodmans 5300CDM £400	Average— Average+	Crisply styled system with gutsy amplifier and sophisticated speakers. CD player works well, other sources are variously mediocre	Combined cassette/tuner/amp, plus T/T and CD with remote	R	This
Goodmans Maxim-Midi System £520	Average Average+	De-luxe version of 5200 system – very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54
IVC Midi-W900CD £1000	Good Good+	A competent allrounder, with important convenience related features, and powerful linked recording facilities. Less strident speakers would be appreciated	Separates system, equaliser, auto-reverse cassette	R	This
Marantz MX583 £750	Below Average Poor	The system has potential in an A/V context, but is patently lacking in a purely audio one. Only the CD excels	Component system with A/V amp, no speakers		This
Marantz MX673CD System £900	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional		54
Philips F777 £850	Good Good	Excellent CD player, tuner and amplifier, offset partly by poor cassette deck and turntable	Separates system, optional remote, no speakers		This
Pioneer System 300 £1000	Very Good Very Good	Sharp, articulate and powerful system that works. The turntable is a weakness as usual, but the only real weakness in an uncommonly sophisticated package	Remote separates system, optional multi-disc CD	R	This
Proton AI-3000 £550	Good Good	There are a host of minor problems, including no LW, but the unit is attractively packaged and can be made to sound very good despite a woolly sounding amplifier	One piece CD, cassette, tuner and amp, remote	R	This
Sanyo System 22 £350	Average Average+	Some careful detail design has given this system sound quality out of keeping with ordinary appearance. More than the sum of its parts	Single piece, plus speakers	BB	This
Sanyo W40CD £380	Average Average	Low cost, no options package with attractive displays, cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sanyo System 33 £400	Average Average+	Similar to the 22, and better when extended, but the price (and value) advantage is dissipated	As 22, separate T/T, remote	R	This
Sharp SA-CD800H £700	Average Average—	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 350CD £480	Average— Average—	Visually stunning appearance hides very basic audio attributes, the turntable and cassette deck suffering severe pitch related shortcomings. CD is too expensive in this company	Integrated one piece, (ex CD), 5 disc non-cartridge player		This
Sony Compact 500CD £550	Average+ Average+	Impressive visuals are matched to electronics which in audio terms lack inspiration. The speakers are particularly poor	Combined amp/cassette, 36 preset tuner, T/T component CD		This
Sony Compact 700CD £700	Average+ Good	Loudspeakers and (to a lesser extent) turntable spoil a fine sounding and stylish – if rather costly – package	Separates system, auto reverse cassette, 36 preset tuner		This
Sony Series 1000CD £1500	Very Good Excellent	Very sharp, articulate sounding system from CD and FM. Cassette deck good and flexible, turntable as usual is not in keeping	Separates system, twin auto-reverse cassette, amp with DAC	R	This
Technics X900CD £470	Average Average—	Good build and mostly good sound is offset by mediocre amplifier and loudspeaker and some operational oddities	Main cassette/tuner/amp, separate T/T and CD		This
Technics X950 System £850	Good Good	Fine sound from CD, FM and AM radio and cassette. The record deck is a little better than normal too, but the loudspeakers are disappointing	Component based, CD, twin auto-reverse cassette, tuner, auto T/T, amp and speakers	R	This
Technics X990D System £1250	Good Very Good	Powerful, flexible and well built system – loudspeakers apart. Even the turntable is on the rough side and the loudspeakers should be changed if possible. The rest of the system is A1	Twin deck, programmable T/T, amp, CD, speakers	R	This
Toshiba V17CD £370	Average Average+	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54
Toshiba V18CD £400	Poor Poor	Neat and simple to use basic system with good CD but poor elsewhere and abysmal loudspeakers	Integrated amp/cassette deck, other components separate but dedicated		This

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jeklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit *via* a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head, supra-aural designs press on the outer ear (pinna), and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HP-X8 £49	Good Very Good	Very slick Walkman oriented phones which are tonally well balanced and go loud without becoming painful	Supra-aural, closed-back, dynamic	R	63
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £35	Fair Poor	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K240 Monitor £60	Good Very Good	Something of a classic these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £110	Very Good Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
Audio Technica ATH 909 £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at high levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £65	Good Average	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio Technica ATH-911 £75	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £30	Fair Very Good	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £45	Poor Good	Not the most revealing phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55

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HEADPHONES

NAME PRICE	SOUND* COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange, not suitable for 'headbangers'!	Circumaural, semi-open, dynamic		55
Beyer DT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones, they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic	R	55
Jecklin Float Model One £79	Very Good Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Very Good Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
Jecklin Float Electrostatic £399	Excellent Good	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Koss K/6X Plus £30	Poor Fair	'Sixties-style' phones from the good old US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Quart Phone 30 £40	Fair Good	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition -- though not stunning	Circumaural, semi-open, dynamic		63
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart PMB 65 £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Quart PMB 85 £90	Very Good Fair	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
Ross RE-2760 £35	Fair Poor	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
Sennheiser HD30 £13.50	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones	Supra-aural, semi-open back, dynamic		55
Sennheiser HD450 £27	Fair Good	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
Sennheiser HD480 £37	Fair Good	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
Sennheiser HD420SL £47	Good Good	The 420s gave a full and tangible quality to instruments and voices, whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £160	Very Good Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony MDR V3 £30	Good Fair	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
Sony MDR V6 £70	Good Very Good	A lot more civilised and dynamic than the V4s, these were pretty good for their type and fold up to boot	Circumaural, closed-back, dynamic	R	55
Sony MDR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
Stax SR34 £140	Very Good Fair	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Stax Gamma pro/SRD-X pro £296/£230	Excellent Very Good	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax SR Gamma £299 (inc. SRD-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price.	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £545 (inc. SRD-7SB Mk 2 Adaptor at £185)	Excellent Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55

PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony *Walkman* in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals, some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape type compatibility on many machines and

some even record, but usually only from a microphone or built in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub £50) players.

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £30	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/FM		56

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PERSONAL STEREOS

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/FM, recorder		56
Sanyo MGR-77 £35	Very Poor Very Poor	Rather a basic machine with a raw edgy sound, not helped by poor speed stability	Graphic EQ, AM/FM		56
Sanyo MGR-87 £50	Very Poor Fair	The 87 came up with a slightly fast but rhythmic sound. Although lacking in finesse, it worked OK with pop material	Autoreverse, graphic EQ, AM/FM		56
Sanyo MGP 600D £50	Average+ Average-	With styling aimed at the fairer sex the 600D sounded a little better than the similarly priced MGR-87. Lacking in clarity, it was still quite durable	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sanyo JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating	Dolby, types I, II & IV	BB	56
Sony WM-F63 £100	Average- Average-	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good+ Excellent	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most subtle music	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful	Dolby, autoreverse, graphic EQ, types I, II, AM/FM	R	56

CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/FM radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some.

In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson RCD02 £300	Poor	A large, slightly tinny mid system-esque unit with removable speakers and a slightly brash sounding CD player	Twin cassette, graphic equaliser, spare input (DIN)		53
Fisher PH-D473F £300	Average	The Fisher is quite a neat and compact player which is nice to use but doesn't offer particularly great sound quality	Autoreverse, AFC		53
Hitachi CX-W800 £300	Average+	This meaty Hitachi lives up to Blaster expectations, its super woofer bass speaker giving maximum street credibility	Twin cassette, graphic equaliser, phono input	R	53
Memorex CD-3300 £280	Average	A little bit tacky, the Memorex put in a plausible if unenthralling performance, and will work with external speakers	Spare input		53
Panasonic RX-FD80L £300	Average-	Shiny in a glitzy way, this Panasonic features a reasonable cassette deck but a below par CD player with tiny transport controls	Autoreverse, spare input		53
Sharp WQ-CD15 £250	Good	A reasonably compact machine with a quite impressive CD player and a novel twin cassette mechanism	Twin cassette, graphic equaliser, spare input	R	53
Sony CFD-66L £350	Good	A very attractive player in the true yuppie mould of white plastic with silver details, it even sounds OK	Spare input, shuffle play, AMS (tape search system)	R	53
Toshiba RT-7096 £250	Poor	Quite a large box for the money, the Toshiba isn't too special when it comes to sound quality but does have partly wooden detachable speakers	Twin cassette, graphic equaliser, spare input		53

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £40	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more	19 x 19cm 53cm		58
Appolo A10 £47.25	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Foundation Fred £65	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £250	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Heybrook Point 5 £50	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent — a good value stand	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £75	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £74	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £80	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Mordaunt-Short IS1 II £45	3 leg Good	Suited to low mass speakers, preferably using spikes to effect coupling, they sounded slightly 'jazzed up' but the overall sound was quite unmingled.	18 x 15cm 56cm	R	58
Origin Live £117	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
Partington PP4 £50	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
Partington Dreadnought II £120 (filled)	1 leg Very Good	Ideal for systems on the light/bright side of neutral, the Dreadnought II's nevertheless still need some careful re-examination by Partington.	17.5 x 16.5cm 63cm		58
QED TS22 Tristand £50	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
RATA Torlyte £190	2 panel Excellent	Suited to low mass speakers, these unusual stands are hardly discreet but offer transparent and clean sound — much like the Torlyte table!	25 x 21cm 48cm	R	58
Target HS20 £53	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HT15/3 £83	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Audioquest Sorbothane Feet £10 each	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS5 £50	Table Very Good	A little too close to the ground for comfort, perhaps, but this novel and stylish little table is certainly worth seeking out.	29 x 43 x 33cm	R	57
Cornflake TCS6 £50	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Delttec Isolation Base £135	Platform Good	Designed for all CD players, amplifiers and separates, but not suspended sub-chassis turntables, the isolation is second to none.	50.5 x 40cm	R	57
RATA Model A £125	Table Very Good	A three-legged Torlyte turntable support that has become something of an industry reference.	46 x 46.5 x 38.5cm	R	57
RATA Amplat £40.25	Platform Very Good	A lightweight and rigid Torlyte slat with spikes for floor or shelf mounting, it works well in conjunction with the Target TT2.	4 x 44.5 x 35cm		57
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Target TT1 £46.50	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money.	26 x 46.5 x 35.5cm	BB	57
Target TT2 £47.50	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57
Townshend Suspension Base £145	Platform Fair	Designed to complement the Rock turntable, this platform will bring subjective improvement to a wide range of electronics.	43 x 36cm	R	57

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THE DIRECTORY

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as an amplifier does, it's really not too surprising that they can influence the quality of that

signal.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The

interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate to that length – some cables may well perform differently when used in longer lengths.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Apature LSD N/A in UK	Poor Fair	Faint resonant boom was audible at very low frequencies, but otherwise this cable sounded remarkably neutral.	Silver plated copper, PTFE dielectric		59
Audioquest Reference 2 £29	Good Fair	Ultimately Reference 2 simply damped much of the atmosphere and emotional charge of a musical performance.	OF copper		59
Audioquest Livewire Topaz £29	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £45	Fair Good	Smother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
Audioquest Livewire Quartz £65	Good Good	Quartz has an ideal, neutral balance that embodies sparkling clarity without the drawbacks of harshness or compression.	3 piece plugs, PTFE dielectric	R	59
Audio Technica AT6115 £50	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59
Audionote Copper ANC £35	Fair Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies.	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £85	Fair Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened.	Silver signal & Copper screen	R	59
Audionote Silver ANV £140	Poor Fair	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Aural Symphonics N/A in UK	Poor Good	This cable enjoyed an open and transparent midband and sounded remarkably neutral and faithful to the source.	OF copper PTFE dielectric	R	59
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltec Black Slink £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
Denon LC-OFC N/A separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £15-£25	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £4.60 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Kimber Kable PSB £32	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £47	Very Good Fair	Tonally faintly leaner and brighter than the more open-weave PSE, KC-1's treble detail was just too sharp and grainy.	Multi-gauge PTFE dielectric		59
Kimber Kable KC-AG £375	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
MDM Interconnect £14.95	Good Fair	The subjective performance of MDM did appear a little imprecise at the frequency extremes, but a worthwhile upgrade on budget interconnect.	Coaxial, solid core, gold plated plugs		59
MIT PC-Squared £75	Fair Good	This multi-gauge cable produced a very open and buoyant midband but sounded slightly 'peculiar' at frequency extremes.	OFC, multi-gauge	R	59
MIT Spectral MI330 £193	Poor Fair	MI330 displays a marvellously open and enticing midband quality, bass is warm and rich but this character has a tendency to dominate.	Multi-gauge balanced bandwidth		59
Monitor PC 0100381 £17	Good Fair	There is more than a hint of instrumental muddling and bass is slightly soft, however, the slightly 'shut-in' sound is par for the course at the price.	OFC, coaxial	R	59
Monster Interlink 400 £30	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger than life.	Multi-gauge	R	59
Monster Interlink CD £44	Fair Fair	Low frequency is commendably weighty, but the top-end sounds vague and lacking in image focus. Suited to some systems better than others.	Multi-gauge		59
Monster Interlink Reference £88	Good Fair	Protracted listening indicated a lack of dynamic speed – a subjective sluggishness. It may prove well suited to up-front systems.	Multi-gauge Balanced bandwidth Gold plated plugs		59
Myst Tm £15.60	Fair Good	Fairly neutral with a pleasantly open and transparent midband. Some deep bass detail is lost but treble is sharply focused.	Solid-silver PTFE dielectric	BB	59
Origin Live Soli-Core Super £60	Good Fair	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains.	Solid-core gold-plated AT plugs		59
QED Incon P1-Gold £14.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GP1 Gold £18.95	Fair Fair	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though.	OFHC Graphite shielding	R	59
Sony RK-C310ES £40	Excellent Good	Possessing deep firm bass and a sparkling top end it offers a balanced perspective with negligible coloration.	Coaxial LC-OFC	R	59
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Thorens SAC 100 £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and line detail lacks resolution.	Silver-plated OFC, coaxial		59
Van den Hul MC-D300II £59	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
Van den Hul MC-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution.	Twin axial silver plated copper	R	59

THE DIRECTORY

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Van den Hul MC-D502 £77	Fair Fair	The tonal balance was 'tilted' by a strong and authoritative bass line, which had the knock-on effect of muting treble detail. A bit dear.	Twin axial silver plated copper, teflon dielectric		59
Van den Hul Thunderline £147	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'lizzy' coarseness, bass is tight and dry.	Silver plated 'matched copper'		59
Van den Hul MC-Gold £247	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances.	Silver & gold plated copper		59
Van den Hul MC-Silver £747	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is meticulously clean. Very low frequencies were a little lacking in 'slam'.	LC-0FC signal & screen	R	59

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Absolute Wire Force 4 £4.50 per metre	Good Fair +	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound	744 OFC strands, PVC dielectric		64
Audionote OR-200 £16 per metre	Fair + Fair +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audionote AN-SP £100 per metre	Average— Good	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless	15 silver strands, polyethylene dielectric		64
Audioquest BC-4 £2 per metre	Average + Good +	There was a slowing of fast transient edges to contend with but in general BC-4 offered a delightful clarity and sparkle throughout the highest octaves	4 OFHC strands, PVC dielectric	BB	64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only — foam core construction	R	64
Audioquest Livewire Green £30 per metre	Good Fair +	Green proved more overtly dynamic and forward than BC-4 with simple music, but complex passages tended towards a mushy and ill-defined perspective. FCL — functionally crystal less	FCL, surface only — foam core construction		64
Audio Technica AT6120 £95 — 10m	Fair + Fair	Compared to earlier LC-0FC cables this PC-0CC derivative sounded smoother and less aggressive	PC-0CC, PVC dielectric		64
Bellwire 12p per metre	Poor Average—	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 — 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Black Sixteen £456 — 4.5m pair	Very Good Excellent	Bass was deep and rhythmically secure, the mid tonally pure and free of additional sibilance while the treble was both relaxed, sweet and highly detailed	16 silver plated OF copper strands, PTFE dielectric	R	64
DNM Solid core £2.30 per metre	Average Fair	DNM cable seems too unbalanced for general consumption but excellent results have been obtained in sympathetic systems	0.54mm single strand, webbed PVC dielectric	R	64
Exposure £2 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Kimber Kable 4PR £49.45 — 5m pair	Fair Fair +	This directionally marked cable benefitted from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC dielectric		64
Kimber Kable 4TC £16 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unflagging treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2 per metre	Good Fair	Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Marantz ML-55S £24.90 — 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC dielectric		64
Mission Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unflagging treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Superflex £2.50 per metre	Fair + Fair +	Treble detail was both reserved and confused though there was little in the way of harshness and grain. Deep bass notes were also found to be lacking	OFc, multistrand, Duraflex dielectric		64
Monster Original £4 per metre	Good Fair +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
Monster Powerline 2 £12 per metre	Good Good—	Powerline stamped its own hallmark on the sound with a strong taut bass and an essentially clear midband giving tactile stereo images	Multistrand, helical construction		64
Musical Fidelity Lifeline £11.50 per metre	Fair Good—	Lifeline did demonstrate a strong directional inclination, affording a laid back but fairly neutral balance when correctly oriented	4 x 0.8mm PC-0CC strands	R	64
Naim NAC-A4 £2.25 per metre	Good Fair +	Tinged with brightness while the deep bass response seemed both over heavy and poorly integrated compared to the immediate competition	Multistrand, webbed PVC dielectric		64
NVA £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
Origin Live Soli-Core Ordinary £1.80 per metre	Good Fair +	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
QED 79-Strand 90p per metre	Good Fair	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Incon Graphite £1.75 per metre	Fair + Fair +	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	OFHC, polymeric screen		64
QED Flat 200 £1.95 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
Rotel Supra 4 £2.49 per metre	Good + Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unflagging treble	1,036 OFC strands, webbed PVC dielectric	R	64
Rotel Supra 10 £6.49 per metre	Good + Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R	64
Sony RK-SSES £59.95 — 5m	Fair + Fair +	The sound of this cable was also somewhat controlled and over damped. The treble was relatively free and airy but lower octaves, including the midband, were constrained	350 x 0.08mm OFC strands, heat shrink dielectric		64
Solid core mains cable 3hp per metre	Fair + Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £499 — 5m pair	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation that totally confused more complex orchestral passages	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 — 5m pair	Fair + Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor — very thick	R	64

LOUDSPEAKER CABLES INTERCONNECT CABLES

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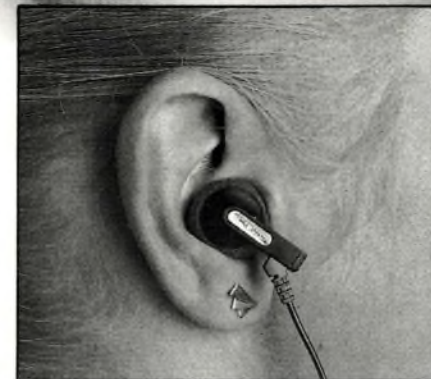
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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
van den Hul CS-122 £5.50 per metre	Fair+ Good-	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
van den Hul CS-352 £12.95 per metre	Good Fair+	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised dielectric		64
van den Hul SCS-12 £29.95 per linear metre	Good+ Good+	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good+ Good+	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-0FC PTFE insulated strands	BB	64
Vecteur S-CV90 £1.99 - 5m pair	Fair+ Fair+	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spruced up with a tighter sharper delivery	6 x 0.7mm LC-0FC strands		64

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier there is a wide variety of in-car machines to choose from, some of

them offering practically every gadget or feature under the sun. The majority of sub £300 players are integrated units featuring a cassette player, AM/FM tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis

is on the frequency modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
Aiwa CT-Z3500YL £199	Fair Fair	A nicely designed machine with a flip up lid for disguise purposes. Sound quality from cassette is a bit poor but the radio is exemplary especially on AM	Bass/Treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., 8.4W	R	62
Blaupunkt Paris SQM 48 £253	Average Average	A powerful and sensibly designed player but let down by a very dull sounding cassette. The radio is a bit better	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, 11.5W		62
Blaupunkt Windsor SQR 38 £275	Good Average	Not very enthralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport	5 FM, 10 AM presets, 3.1W		62
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its liftv SAM tuning system	Bass/treble controls, 12 FM/6 AM presets, Slot-in, 15.1W	R	61
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you - a lot of gizmos for the price and it even sounds OK	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	62
JVC RX-318 £200	Average Average	This JVC sounded quite enjoyable and turned in an impressive performance on FM. It even looks quite nice	Bass/treble controls, 5 FM, 10 AM presets, slot-in, 8.8W	R	62
JVC RX-418 £250	Average Fair	An attractively designed machine with a fair selection of features - even an aux socket for a portable CD player	Bass/treble controls, 10 FM, 10 AM presets, Dolby, chrome eq., slot-in, aux socket, 7.7W		62
Nakamichi TD-400E/PA-300 II £450/£275	Very Good Excellent	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging	Bass/treble controls, chrome, NR, 7W		62
Philips 553 £120	Average Average	Not the most ergonomic player on test but sound quality was quite refined for the price. Presets are a bit gauche	4 FM, 4 AM presets uni-directional cassette 3.1W		61
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
Pioneer KE-3030 £150	Poor Fair	A tasty looking, if sonically bass heavy, little box well suited to blasting out rock or dub	18 FM, 6 AM presets 4.2W		61
Pioneer KEH-5080B £230	Fair Good	A chunky and neatly styled player with healthy power output and an easy relaxed sound. Just the thing for pumping up the volume	Bass/treble controls, 18 FM, 6 AM presets, anti-theft device, slot-in, 9W	R	61
Sansui RX-3100L £180	Poor Fair	Quite flash looking with a reasonable feature count but FM sound and cassette replay quality could be a bit stronger at the price	Bass/treble controls, 12 FM, 12 AM presets, chrome eq., 8W		61
Sansui RX-5100L £250	Good Very Good	One of the cleaner machines around the 5100 has an excellent AM section and a reasonable cassette player	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., slot-in, 12.5W	R	61
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		62

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WHY MAKE LIFE DIFFICULT FOR YOURSELF

Many people think choosing a really good hi-fi system is difficult and excessively expensive. The truth is that it needn't be either if you approach it in a simple logical way.

There is a way of doing it which is as straight forward as it is effective, and we like to think, enjoyable. It will ensure you buy the hi-fi system that provides you with the most enjoyable sounds within the budget you have in mind.

The first step is to come and see US.

If you have visions of audiophiles bombarding you with jargon, or you think your ears won't be good enough, you may be pleasantly surprised.

For a start we are just as interested in listening to you as you are in listening to the music. We will save you time and money because we carry a choice of equipment that provides the best sound quality in its price range.

Without trying to baffle you with science we will listen to your needs and then let you relax in one of our demonstration rooms to compare things you will like. All you need to do is listen and trust your ears.

It's a good idea to bring along a few of your own records. You know how they sound on your old system so it will help you believe the differences that you will hear.

You will soon find that you don't have to be an "expert". In essence it's simply a matter of which sounds better and more natural.

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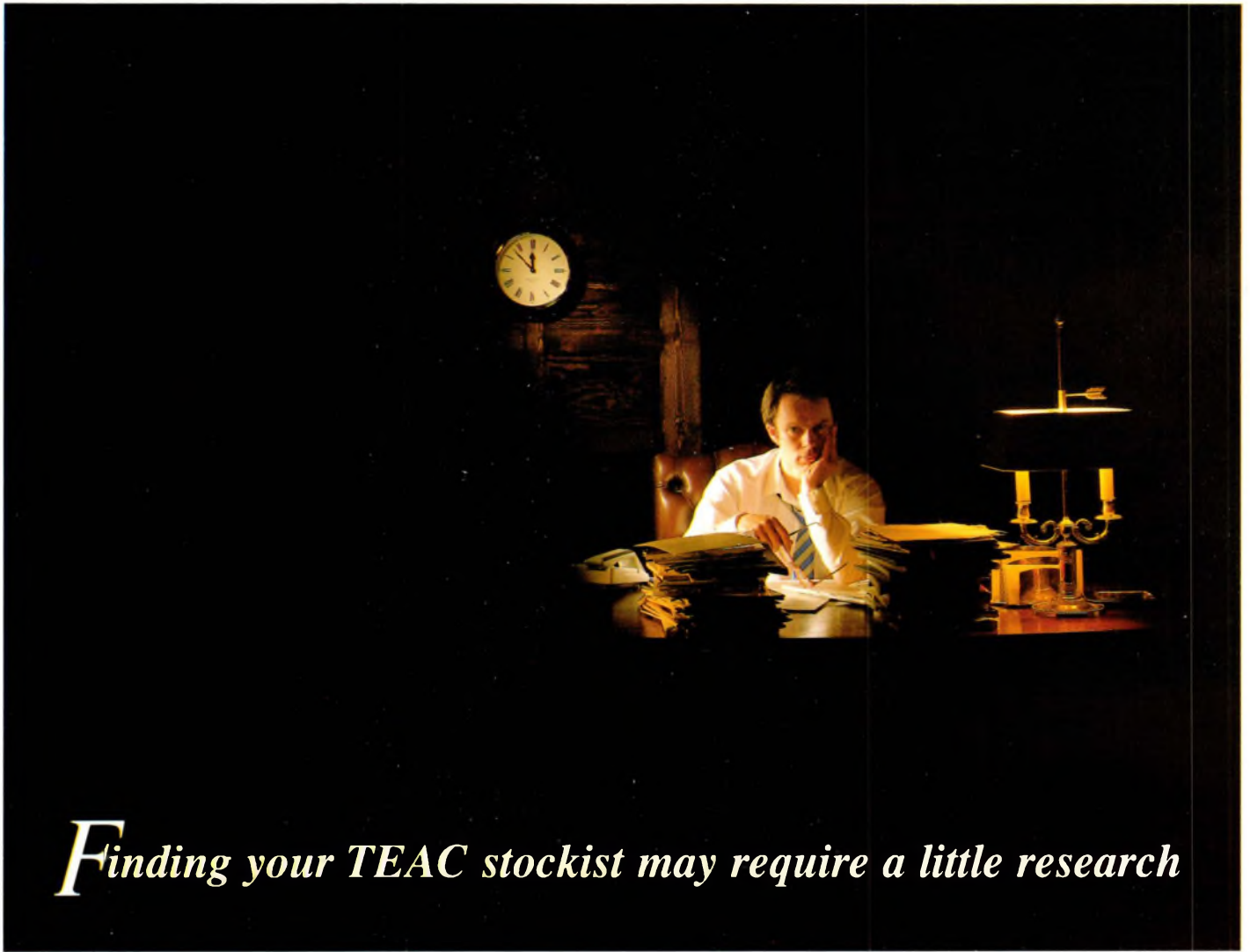
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