

# Beauty and the beat

Who said you can't have beautiful hi-fi and keen pricing? **Richard Black** looks at Primare's new £1,250-per-box CD and matching integrated

**P**rimare doesn't launch new products every day, so we were excited to be offered the first chance to try these newcomers. Replacing the CD21 and I21, they are the company's budget models, though obviously that's a relative term.

Still, £1,250 is a keen price although we can't think of much hi-fi that looks this impressive for that kind of sum. The sound's the thing, of course, but there's also no denying that visually, these units just ooze class.

That's partly due to clever design that shares as much hardware as

possible with other models. The basic chassis is common to several Primare products and is based on thick steel sheet – you could probably stand on these without leaving a mark. The front panel is satin-finish aluminium, thick and very well made, complete with etched logo and very well-finished display windows, plus a volume knob that feels particularly solid and businesslike.

There's a pleasing simplicity to the front panel design, too, or at least visually pleasing: we're going to have to repeat a mild, but heartfelt rebuke we've issued to Primare in the past concerning operation of the CD player, as we would really like just a few more functions to be available from the front panel. In addition, since one's reliance on the remote control is increased, one is more likely to notice that it's not quite the remote one would wish to accompany

## DETAILS

**PRODUCT:**  
Primare CD22  
and I22

**ORIGIN:**  
Sweden

**TYPE:**  
CD player/integrated  
amplifier

**DIMENSIONS:**  
(WxHxD) Both  
430x106x375mm

**WEIGHT:**  
(CD22) 10.5kg/  
(I22) 10.0kg

**FEATURES:**  
• CD22: Single  
unbalanced output  
• Electrical and  
optical digital  
outputs  
• USB-A input  
• Plays MP3 and  
WMA files from  
CD-ROM or USB  
(amp info opposite)





such attractive hardware. It does everything, of course (controlling a complete Primare system if you've got one), but it just looks a bit, well, cheap and cheerful. End of complaint – one can't have everything!

The CD22 is a conventional beast underneath its top cover, with an audio CD transport (not a CD-ROM one – luckily, those slow, noisy things seem to have fallen out of favour almost everywhere), a control board, a linear power supply with an R-core transformer and a dedicated D-A and audio output board. This last carries most of the mission-critical stuff, including the DAC chip and the upsampling chip or Asynchronous Sample Rate Convertor (ASRC).

### Upsampling flexibility

It's not at all unusual to find an ASRC in a CD player, where they are used both for their digital filtering

**“We've seldom heard energy and detail so well balanced in an affordable system.”**

(upsampling) and jitter-reduction properties, but Primare has applied an unusual twist here in offering various upsampling options: none, 48kHz, 96kHz and 192kHz. If 'none' is selected there is still digital filtering applied by the DAC, though its precise characteristics are noticeably different from those of the ASRC.

The really unusual feature is the option of 48kHz upsampling, which most manufacturers evidently regard as not worth bothering with. There's no obvious reason why not, though, and although the response in this mode is very similar indeed to that for 96kHz or 192kHz upsampling it's

### DETAILS

#### FEATURES:

- I22: Single loudspeaker output
- Four line inputs
- Optional digital input board - electrical, optical and USB inputs
- Preamp and recording line outputs
- DAC board (£340)

**DISTRIBUTOR:**  
Karma AV

**TELEPHONE:**  
01423 358846

**WEBSITE:**  
primare.se

not absolutely identical and it's perfectly possible that sound will differ a little.

For the rest, features are a largely standard set. The player will read data discs with MP3 and WMA files on them and also features a USB-A socket at the rear for USB sticks with the same formats of files. There are digital outputs (electrical and optical) and a dimmable display. Everything is very well assembled, but nothing out of the ordinary.

### The switch routine

The I22 is rather less traditional, mainly because of its employment of Class D for the power amplification. In fact, Primare has gone to town on this and developed its own Class D amplifier circuit, something relatively few hi-fi specialists have done as there are some very decent pre-assembled modules available.

Primare's 'Ultra-Fast Power Device' circuit reckons to improve on these, not least through the implications of the 'ultra-fast' bit. The claimed 'instantaneous' rise time of the circuit may be physically impossible, but it's a well-established fact that switching power amps work better if they can switch faster and Primare has evidently put some work into achieving exactly that.

The other feature that makes this circuit work well is the way the output filter has been integrated into the design, rather than being a separate module added on after the amp proper was signed off as a design. To be fair, some other current designs do this, but it was not always thus and poorly executed output filters probably had a lot to do with the dodgy reputation enjoyed by Class D in its early days. Primare explains that the way the amplifier and filter have been designed together means that feedback around the circuit is constant over the audio band, a highly desirable state-of-affairs in any amplifier circuit and generally quite tricky to arrange.

Switching technology is also used in the power supply for the I22, which is a switch-mode type. Again, these have been accused of causing all sorts of problems because the noise they inject into the mains wiring, but it ain't necessarily so; and it's hardly as if conventional transformer-based supplies are blameless either. This supply circuit benefits from 'power factor correction', which to some extent alleviates the noise and makes the amp a much friendlier load on the mains supply.





## Q&A...

WE SPOKE WITH PRIMARE MANAGING DIRECTOR LARS PEDERSEN



**HFC:** Tell us about UFPD – what singles it out from other Class D solutions available?

**LP:** It's an audiophile Class D. The limitations of conventional Class D are well known: while it's great for bass, distortion rises with frequency because it can't control feedback, which is the essential motor of Class D amplification. With UFPD we found a way to expand the operating window to encompass the range of audibility and beyond, while keeping distortion very low and feedback and impedance stable. This means it can drive any speaker while maintaining accuracy.

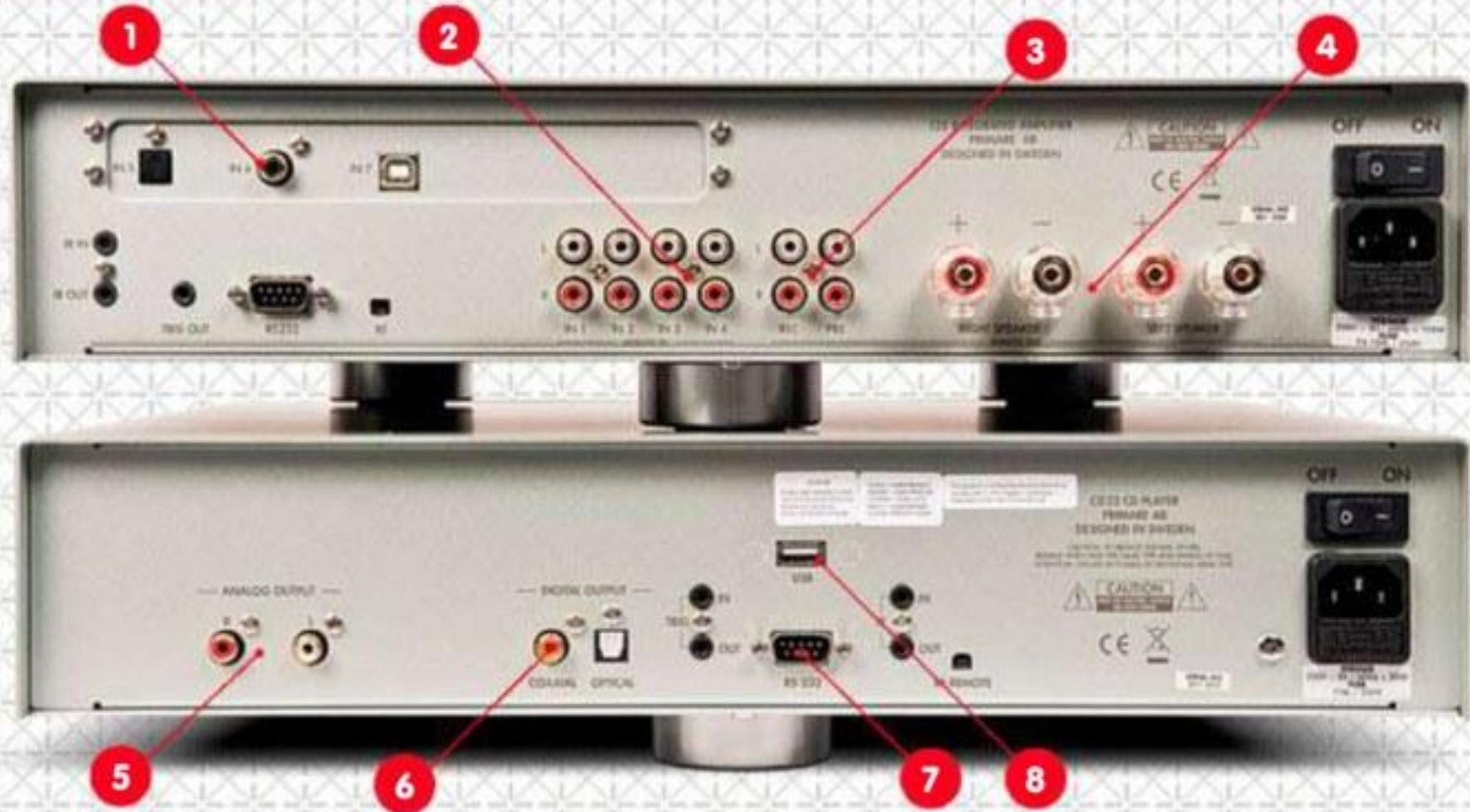
**Compared with 'traditional' Class A/AB designs, does Class D potentially offer higher quality or is it simply more power-efficient and sonically, at best, comparable?**

With UFPD Class D we've demonstrated that if you keep the loop gain stable you can achieve extremely low-distortion across the audio band and the result is superior to conventional Class A/AB designs. It's not as warm-sounding as conventional designs, but when you analyse it, the 'warmth' is an illusion of distortion. More conservative listeners may have difficulty in accepting that: but quite simply, they're encountering very low distortion, perhaps for the first time.

**Switch-mode power supplies are known to generate mains noise. What has Primare done to counter this?**

In conjunction with UFPD, Primare uses an isolated PFC (Power Factor Control) technology in the power supply, which controls the current from the mains voltage so that it is a pure sine wave with the same frequency and phase as the mains voltage. This means that even if 1,000 watts is taken from the mains, other equipment in the room will not be affected. The isolating stage of the convertor works in a ZVS [Zero Volt Switch] mode and, as a result, the switch flanks contain a lower quantity of harmonics, providing lower EMI (Electromagnetic interference) and a clean environment for the amplifiers to work in.

## CONNECTIONS



- 1 Digital inputs on optional extra board
- 2 Four analogue line-level inputs
- 3 Record (fixed-level) and preamp (volume controlled outputs)
- 4 Speaker terminals accept 4mm plugs, spade terminals or bare wire
- 5 Unbalanced output
- 6 Both normal types of digital output
- 7 RS232 socket allow for integration in home automation system
- 8 USB socket for memory stick, MP3 player etc.



**TALKING POINT**  
**CLASS D AMPLIFIERS** come in various flavours. The essential point that distinguishes them from the more familiar Class A/B types is that instead of modulating the electrical voltage in a linear fashion, so that it represents the acoustic waveform at all times, they chop it up so that it averages that same voltage. When we say 'average', we mean over a very short time – microseconds, in fact. This is the same idea used in digital audio, though Class D isn't strictly digital. Actually that's a very fine point, down to the way in which it chops up the signal: a true digital product chops it into fixed-time segments, while Class D has infinitely variable segments. The end result is the same, though, and while it's far from intuitively obvious that decent fidelity can be achieved, the theory behind it is solid.

Input provision on the standard I22 is modest at just four, all unbalanced analogue. However, an optional module is available that adds three digital inputs, one each electrical, optical and USB, making this a rather well-connected amp. Usefully, the USB input is 'isochronous', in other words it's one of the modern breed that tells the computer how fast to send data, completely avoiding the need for it to synchronise to the incoming data stream and removing at a stroke the main source of jitter in USB digital audio streaming. It handles sampling rates up to 96kHz and word lengths up to 24 bits, so it's a genuinely audiophile component.

Both I22 and CD22 are well built, neatly assembled on multiple circuit boards with good-quality components but no fancy 'boutique' parts. Socketry is decent rather than outstanding.

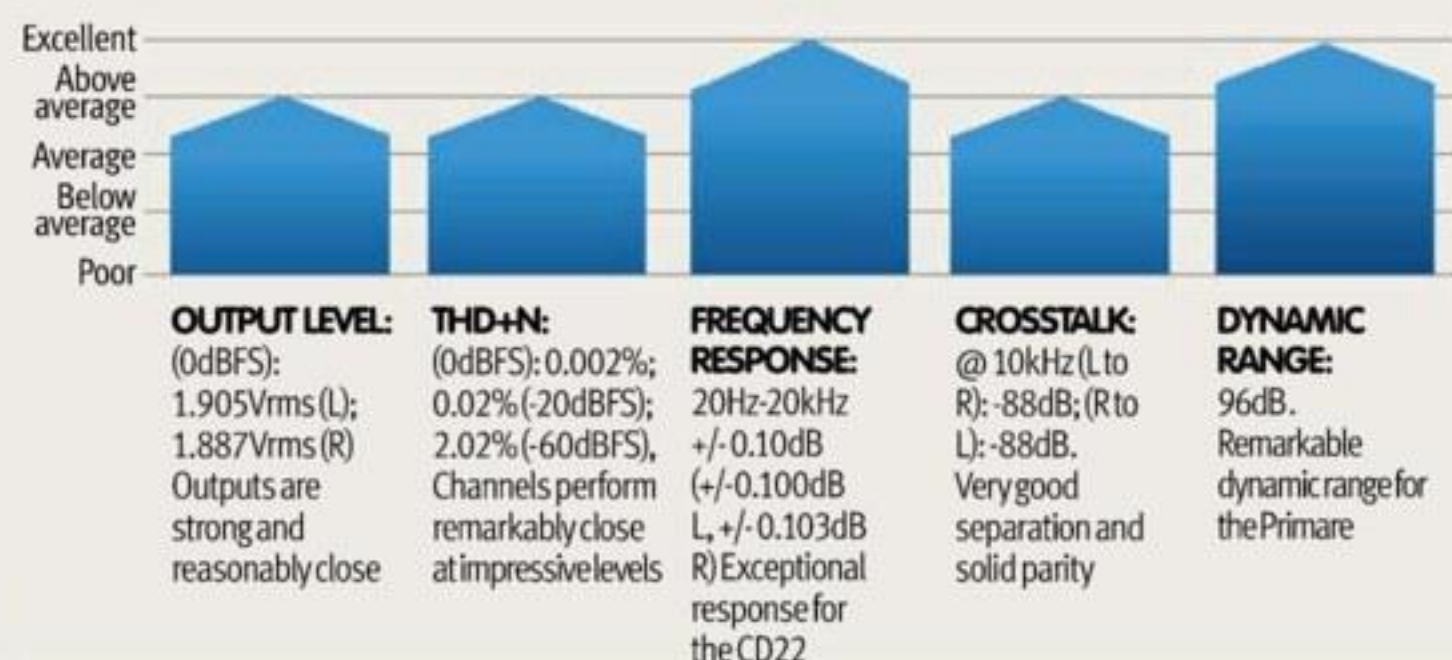
## Matched to perfection

Obviously, we were inclined to keep the two units together for most of our listening sessions and we had no reason to regret that. They seem very well matched in practically every respect and the sounds they made individually, when heard through familiar reference kit, had more than a hint of family likeness. In other words, you can safely assume that the following comments apply not only to the combination, but also to each component on its own, unless specified otherwise.

One's first impression of this pair is of good energy. It's not the last word in liveliness, and some may regret that, but there is a such a thing as too much energy in an honest sound-reproduction system (we've all heard systems that border on the simply manic) and Primare has stopped well short of crossing the

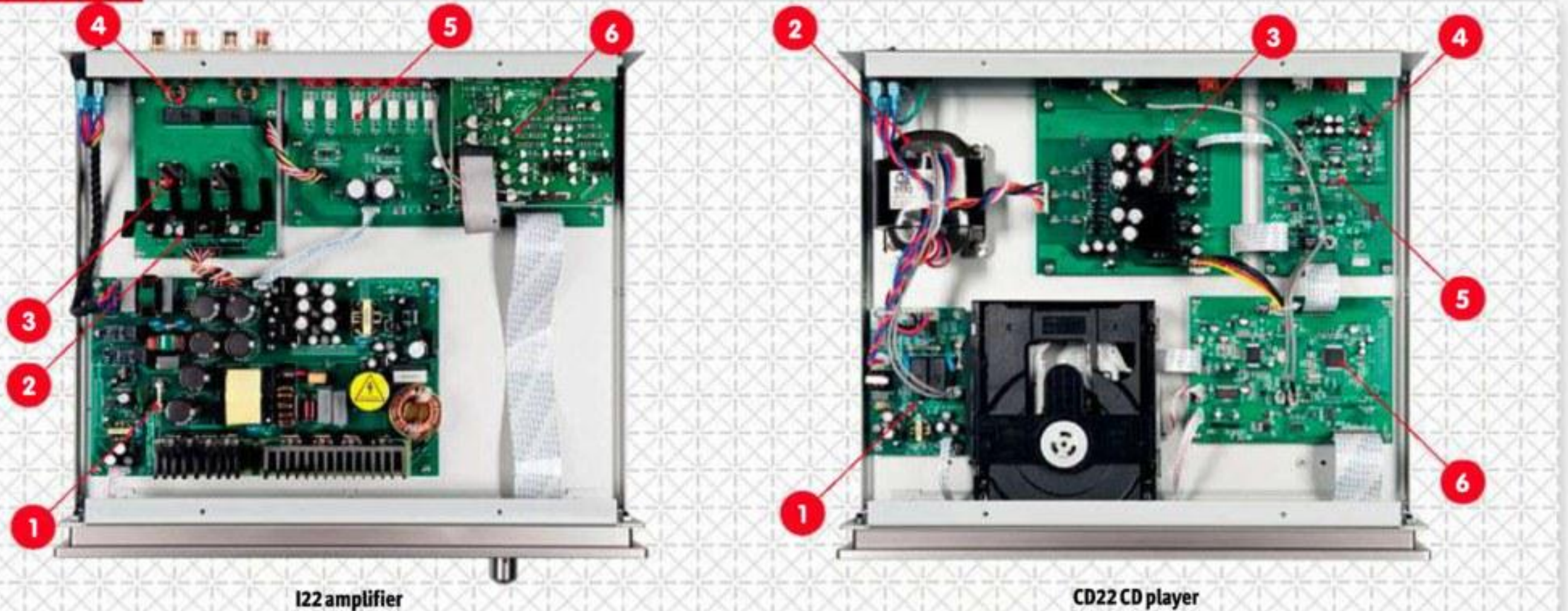
## TECH LABS

### RESULTS AT A GLANCE: CD22 CD PLAYER





**HIDDEN TECH**



I22 amplifier

CD22 CD player

- |  |   |                              |  |  |  |
|--|---|------------------------------|--|--|--|
| <b>1</b> Switch-mode power supply with power factor correction | <b>2</b> Main switching (output) transistors on small heatsinks | <b>3</b> Main output filters | <b>1</b> Low-power switch-mode supply for remote control etc.              | <b>2</b> R-core transformer for audio circuits | <b>3</b> Power supply smoothing and regulation         |
| <b>4</b> Common-mode output filters                            | <b>5</b> Muting relays  | <b>6</b> Digital-input board | <b>4</b> Gap in ground plane between digital and analogue circuit segments | <b>5</b> DAC chip                              | <b>6</b> Transport and error-correction logic circuits |

line into that territory. What you get is a lively rendition with clearly defined rhythm in all its constituent elements, but no sense that the music is in danger of rushing away.

**A question of balance**

At the same time, the more subtle aspects of sound such as detail and imaging are very well attended to. Indeed, we'd go so far as to say that we've seldom heard energy and detail so well balanced in an affordable system.

We were particularly aware of this neat balancing trick when listening to a recently bought CD, of the Canadian piano virtuoso Marc-André Hamelin playing some of his own compositions. He plays so many notes per second that it's quite a tall order for a hi-fi system to reproduce them all clearly and we've heard one or two that manage that, but lose the

overall shape of the music. In this case, however, we were able to hear with great precision, not only which notes were going down, but where the general progression was leading and what the piano itself sounded like.

In similar vein, a couple of very familiar rock recordings seemed unusually clear, both as regards the drum kit underlay and the sense of the lyrics. The songs really seemed to have purpose and direction, while the way the structure had been built up vertically was also beautifully clear.

So with all this praise floating about, is there also a downside? Well, although the balance of both units seems exemplary across the midrange, there's a hint of dryness in the high treble that just slightly detracts from the sweetness of well-recorded high frequencies. In addition (and this applies principally to the I22), the bass isn't always quite as extended as



**HOW IT COMPARES**

There's no shortage of comparisons around this price. £1,250 is bang in the middle of today's midrange for both amps and sources.

As alternatives to these units, you might, for instance, look at the Creek Destiny units (£1,400 CD, £1,600 amp), a shade dearer but oh! so civilised (in a good way, though) and while the Primare sound may be more immediate, Creek probably just slightly has the edge in resolution and extension.

Dividing the budget differently Rega's Saturn CD (£898) and Elicit amp (£1,595) offer large soundscapes with great impact and immediacy. Units from the Roksan Caspian range (£1,600 each) would be among the strongest contenders, if rhythm and timing are your main concerns.

None of these makes currently includes a digital input board for the amp, but you could add a DAC from, for instance, Cambridge or Arcam for a similar sum to the Primare add-on.

some. We recalled some truly seismic bass from the I32, though in the company of its peers the I22 is hardly bass-shy. Imaging depth isn't quite the best ever, but again for the price it's really very fine. Which could stand as a summary of both units, really! ●

**Hi-Fi Choice**

**OUR VERDICT: CD22**

**SOUND QUALITY** ★★★★★ **LIKE:** Excellent balance between timing and detail

**VALUE FOR MONEY** ★★★★★ **DISLIKE:** Operation from the front panel is inconvenient

**BUILD QUALITY** ★★★★★ **WE SAY:** Positively aspirational externally, the CD22 packs plenty of performance and will not disappoint

**FEATURES** ★★★★★

**OVERALL** ★★★★★

**Hi-Fi Choice**

**OUR VERDICT: I22**

**SOUND QUALITY** ★★★★★ **LIKE:** Energetic, no loss of precision and environmentally engaging

**VALUE FOR MONEY** ★★★★★ **DISLIKE:** Bass doesn't quite have the reach of some; images could use a little more depth

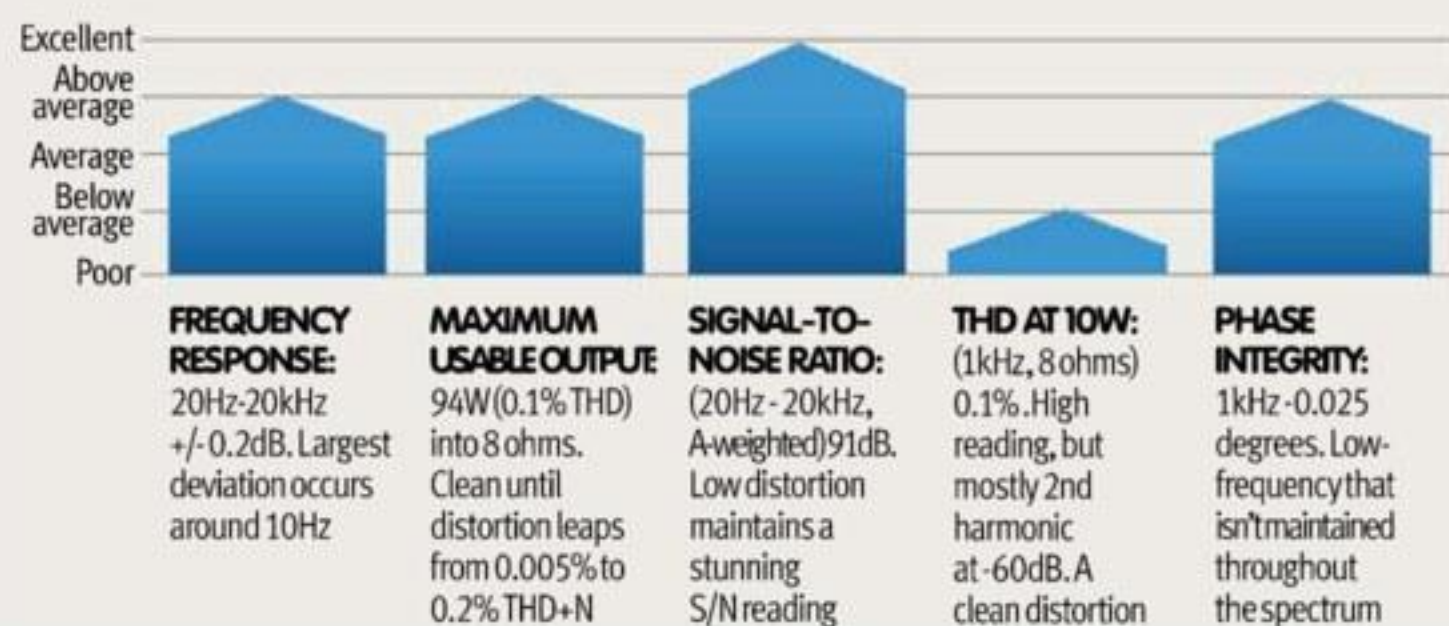
**BUILD QUALITY** ★★★★★ **WE SAY:** An attractive unit with more than a hint of the true high end

**FEATURES** ★★★★★

**OVERALL** ★★★★★

**TECH LABS**

**RESULTS AT A GLANCE: I22 AMPLIFIER**







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you can afford!**

Exclusive in-depth test of the new entry-level actives and preamp/processor combo

**Turntable temptation**



Can Audio Note's new £3,000 TT-2 Deluxe beat our favourite deck of 2011?

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# 21

pecially selected reviews including: Audiolab, Denon, T+A, Totem and more...



## Beauty and the beat

Exclusive! Our verdict on the classy new £1,250 CD22 and I22 integrated



## Burmester revealed

Behind-the-scenes look at the incredible Berlin factory







**92**  
**Dealer systems:** the Definitive sound



"We've seldom heard detail so well balanced in an affordable system."

*Richard Black: Primare CD22 and I22 p56*

**TESTED THIS MONTH**



**60**  
**Audio Note** TT-2 turntable with Arm One



**66**  
**Totem** Arro loudspeaker



**72**  
**T+A** E Series Music Receiver



**80**  
**Meridian Audio** Core 200/DSP3200 system



**56** **Primare**  
CD22 CD player and I22 amplifier

**REVIEWS**

Definitive verdicts on the latest new kit

**56** **Primare**  
CD22 CD player and I22 amplifier

**60** **Audio Note**  
TT-2 turntable and Arm One

**65** **Icon Audio**  
Stereo 20 integrated amplifier

**66** **Totem**  
Arro loudspeaker

**71** **Audiolab**  
8200 CD player

**72** **T+A**  
E Series music receiver

**77** **Cocktail Audio**  
X10 music server system

**79** **Denon**  
DNP-720AE network audio player

**80** **Meridian**  
Audio Core 200 preamplifier and DSP3200 active loudspeakers

**GROUP TEST**

Standmounts  
£1,000-£1,600

**43** **Amphion**  
Argon 1

**45** **DALI**  
Mentor 1

**47** **Dynaudio**  
Excite X16

**49** **Quadral**  
Aurum Megan VIII

**51** **Spendor**  
SP3/1R

**53** **Totem**  
Rainmaker

**MINI TEST**

Interconnects  
**102** **Furutech**  
Alpha-Line Plus

**102** **Kimber**  
Hero

**103** **Oyaide**  
Across 750

**103** **van den Hul**  
The River

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# All new Q

Q Acoustics claims that its new range is the best ever

**Q** Acoustics has launched the all-new 2000i series of speakers. The company is clearly confident, describing them as 'the best affordable speakers ever produced.'

The range includes two standmount models with a floorstanding flagship, plus

a centre speaker and subwoofer are also available. All models use a 25mm tweeter with multi-layer cone material and 'super decoupling' from the cabinet. The mid-bass drivers are carbon fibre and ceramic-coated paper. The range is available in graphite, walnut and high-gloss finishes.



**PRICE:** £105-£550 **AVAILABLE:** NOW **CONTACT:** 01279 719953 **WEB:** QACOUSTICS.CO.UK



## Universally yours

**PRIMARE'S** new BD32 universal Blu-ray player (£3,250) is 3D-capable and handles Blu-ray, DVD, DVD-A, SACD and CD. The BD32 is also capable of streaming audio and video over a network, via both an ethernet connection and supplied USB dongle. The outputs include a balanced XLR connection, for optimal two-channel performance, as well as HDMI 1.4 and multichannel pre out for AV duties.

Internally, high-quality Crystal DACs are used for decoding duties, mated to Primare-tuned output stages. The SACD replay is handled by a dedicated separate decoding circuit to ensure optimal performance. The power supply is entirely linear and includes an R-Core transformer with separate windings for analogue and digital. Colour finishes include black and titanium.

**PRICE:** £3,250 **AVAILABLE:** NOW  
**CONTACT:** 01423 358846  
**WEB:** PRIMARE.NET

# Send and receive

NAD launches wireless DAC

**N**AD's new DAC1 is a wireless, two-box transmitter and receiver that works independently of an existing wireless network and can operate at ranges of up to 40 metres. The bandwidth allows for lossless transmission up to 16-bit/ 48kHz files.

The DAC transmitter operates as a PC soundcard and sends a digital signal

wirelessly to the Receiver. This uses a Burr-Brown DAC with high-quality op amps to decode the signal, although NAD also provides a coaxial digital output to allow for decoding via another DAC if preferred.

NAD says that a particular advantage of this system is that services such as Spotify are easy to access.



**PRICE:** £295 **AVAILABLE:** NOW **CONTACT:** 01279 501111 **WEB:** NADELECTRONICS.COM



# Switching opinion

**Richard Black** takes a closer look at switch-mode power supplies

**A** linear supply, used in practically all AC mains-powered appliances made up to the mid-1990s, uses a transformer to step down the mains to something a bit closer to what's required by the equipment, followed by a rectifier to turn AC into DC and a capacitor to smooth the resulting waveform so that it more or less approximates a truly steady voltage. It's a perfectly viable way of doing things, the biggest practical drawback being that a mains transformer to handle more than a couple of watts is inevitably a big, heavy and expensive component.

A switching power supply goes about things differently. There is generally a rectifier as the first stage in the supply, converting the mains directly to DC. Following this, a 'chopper' circuit switches on and off rapidly, allowing current to flow intermittently. This effectively turns the DC back into AC, but with the important difference that it is at a much higher frequency than the mains itself. This means that it can be stepped down to the required voltage with a much smaller transformer, because the amount of iron and copper required in a transformer is inversely proportional to frequency.

The circuitry following this smaller transformer includes another rectifier and capacitor circuit and the capacitor value can be much smaller than in a linear supply, again because of the higher operating frequency. In addition, a feedback control circuit can be used to vary the way the high-voltage DC is chopped into the transformer, which allows a regulated supply to be constructed with very low loss. 'Regulated' means that the voltage stays constant whatever the load current and in a linear circuit this invariably involves throwing away rather a lot of power as heat. In a sophisticated switch-mode supply, much less power is wasted.

There are limits to how far all this can be taken, of course. On the face of it, it would

seem attractive to push operating frequencies up as far as possible so that transformers and capacitors could be tiny, but the transistors used to do the switching have limits to how fast they can operate and losses in the core of a transformer tend to increase with frequency, too. As a result, the frequency at which a switch-mode supply operates is usually in the region of 10kHz to 500kHz, depending partly on how much power it is handling. That's still enough to give a significant saving in size and cost compared to a linear supply in most applications.

But there's a down side, too. All that high-frequency switching is apt to generate electrical noise which can get conducted and radiated in all directions and could, if not dealt with, play havoc with the finely balanced operation of sensitive audio equipment. Indeed, never mind electrical noise, some switch-mode supplies have been known to whistle audibly at their operating frequency – if it's in the audio band, transformers will tend to resonate at a frequency we can hear very acutely.

## Tough regulations

The good news is that modern switch-mode supplies are generally very carefully designed to minimise HF noise. To a large extent, we've regulations to thank for this: since the 1980s, increasingly tough rules have been brought in by national and international bodies that restrict the amount of noise equipment can generate. Many manufacturers have ended up going way over the top in terms of meeting target figures, after they noticed that performance often benefits in other ways when interference is attended to properly.

As a result, there is really no reason to avoid equipment just because it contains a switching supply. Linear supplies are by no means entirely noise-free, so it's not as if there's a noise-free reference available. In general, these days, switch-mode power supplies are pretty close to blameless.

There is really no reason to avoid equipment just because it contains a switching supply. In general, these days switch-mode power supplies are pretty close to blameless



Primare's I22 integrated amp utilises switch-mode (see p56)



**RICHARD BLACK**  
A musician and recording engineer, Richard knows a thing or two about hi-fi – he's been writing about it for over two decades

**WHAT DO YOU THINK?**  
Are you put off equipment with switch-mode supplies? Tell us why.  
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