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# TAD-D600/C2000/M2500

(£27,000/£20,000/£18,000)

Another 'world first' for *HFN*: we get our hands on some of the high-end components designed to partner TAD loudspeakers: unavailable in Europe... until now  
Review: **John Bamford** Lab: **Paul Miller**

**T**A who? Eagle-eyed readers may recall we've mentioned TAD high-end loudspeakers – and its recently developed electronics components – in show reports from CES during recent years. And if you're a reader of audio magazines from the US you might have seen the fabulous TAD Reference One floorstander and smaller Compact Reference stand-mount monitor gracing some American magazine front covers. But TAD Labs' products – the acronym stands for Technical Audio Devices Laboratories by the way – have not been available outside of the US and Japan until now, so you won't have seen them reviewed over here.

### A NEW VENTURE

You may know little about TAD Labs, unless you're an acoustician and architect responsible for designing control and monitoring rooms for professional recording studios. Founded in 1975, TAD Labs is the audio research and development 'skunkworks' – the Formula One racing division, if you like – of Pioneer Corporation of Japan, with independent R&D and headquarters in the Shinjuku district of Tokyo. Its products are hand-crafted and extremely rare.

Late last century TAD Laboratories made a commercial decision to develop complete 'consumer' high-end hi-fi systems for audiophiles. Enter British design engineer Andrew Jones, who famously worked with Laurie Finckham at KEF during the 1980s. Living in Los Angeles, Jones was tasked with setting up a Californian branch office of TAD Labs [see box out, p23].

TAD Labs is now making several products to partner its ultra-luxurious speakers. Hand-built to order, they boast

battleship construction with eye-watering price tags to match. We've managed to get our hands on the company's flagship D600 'disc player', a CD/SACD/DAC component sporting 24-bit/192kHz-compatible digital inputs (S/PDIF and AES/EBU) that allows its on-board DACs to be used with other digital sources. A pure analogue preamp is also coming. Previewed at CES in January in prototype form, it's dubbed the C600 and in a cost-no-object system it would drive TAD Labs's monstrous M600 monoblocks.

In addition to its Reference series, TAD Labs makes a slightly less costly range of components called the 'Evolution' series. Again, a working prototype of TAD Lab's first Evolution speaker, a handsome circa-

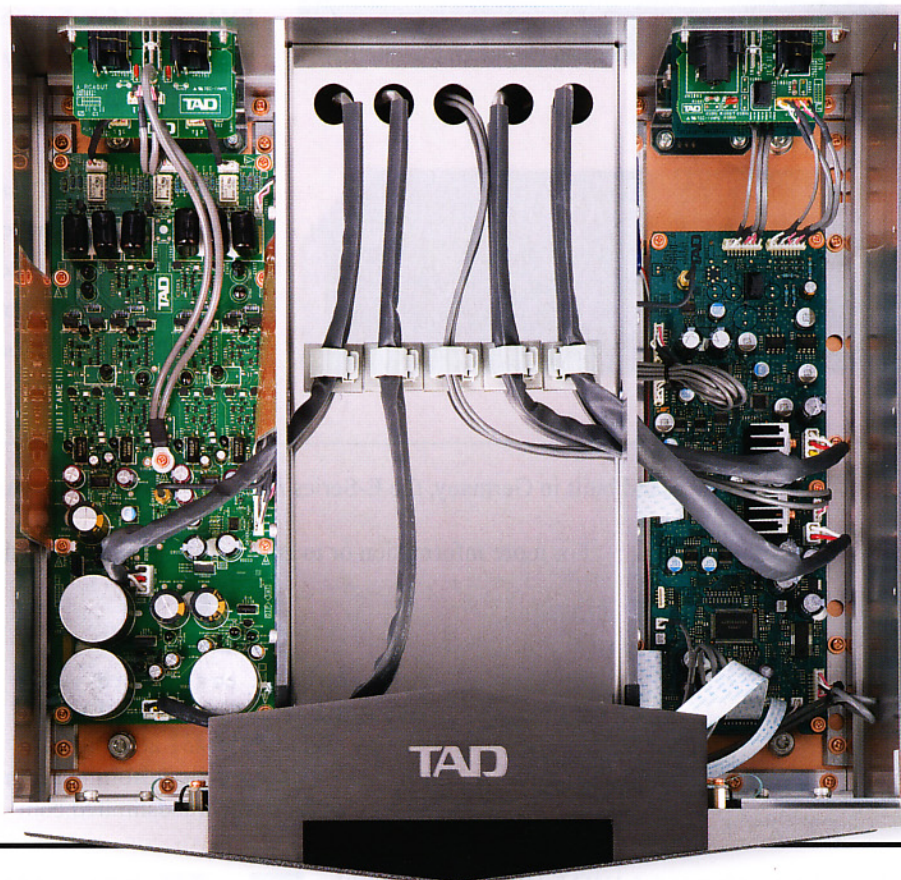
£24k floorstander, the TAD E1, was being demonstrated to trade visitors to CES in Las Vegas at the beginning of this year.

### WELCOME TO THE EVOLUTION

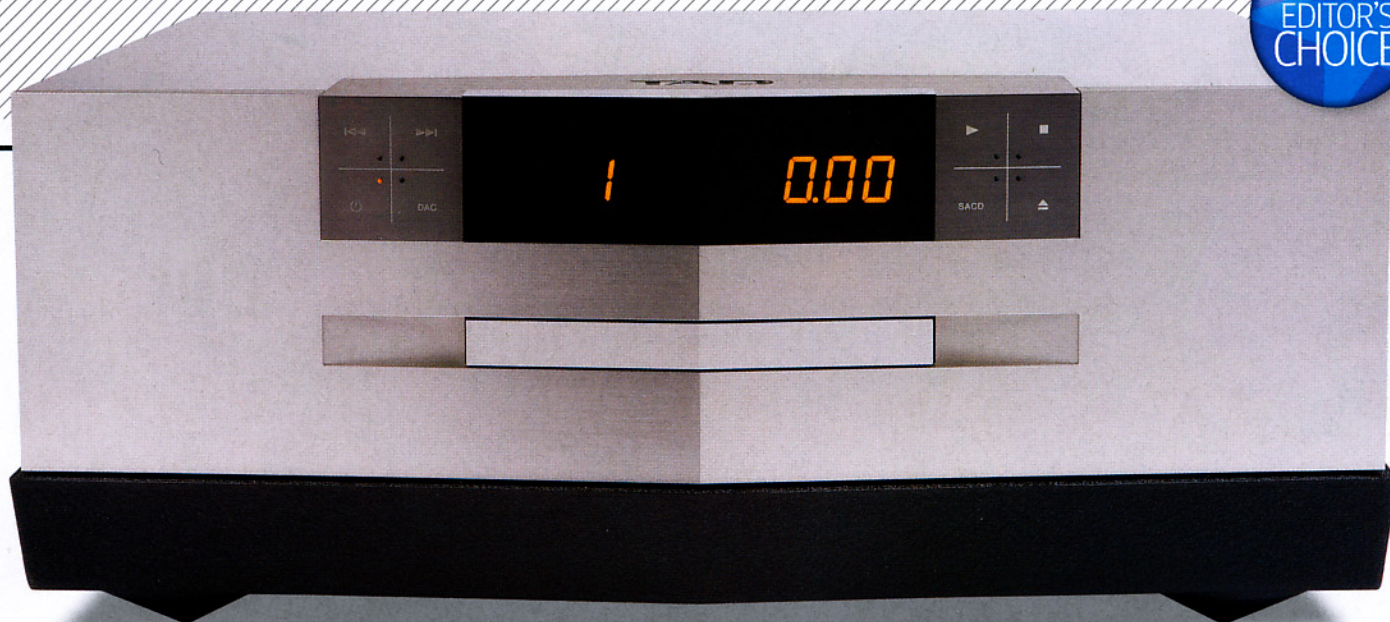
This review focuses on the company's C2000/M2500 pre/power combination that typically might partner the E1 loudspeaker in a stereo system. These are Evolution rather than Reference electronics – not that it's of much consequence since they are still hand-crafted, almost-go-for-broke high-end components.

As there isn't a disc player in TAD Labs' Evolution line-up, we've listened to the C2000/M2500 pre/power combo being driven by the Reference D600 disc player.

**RIGHT:** Chamber construction isolates the encapsulated disc transport mechanism from the analogue and digital circuits. Copper plating of the base can be seen below the circuit boards







Well... given the chance you would, wouldn't you?

Both the Reference and Evolution components are nothing if not sturdily built with an immaculate finish worthy of any high-end marque. They do however present different faces to the world. While the D600 (and its forthcoming C600 partner) has an angular fascia reminiscent of the bow of an ocean-going liner, the cosmetic design of the C2000/M2500 is a little more understated. Its two-tone livery bears an uncanny resemblance to Harman/Kardon's 900 series of components, albeit with the silver and black portions reversed. The casework is machined from solid blocks of aluminium to avoid any joints.

#### HEAVY METAL

Weighing 26.5kg the D600 player/DAC sits on a massive two-layer chassis of die-cast aluminium and copper-plated galvanised steel. Its separate power supply unit employs a 400VA transformer (sufficient to

drive many a power amplifier!) and hooks up to the D600 via two umbilical cables with locking multi-pin connectors. The cables supplied are only a little over half a metre long, just sufficient to position the supply on an adjacent shelf in an equipment rack. We're told the company is investigating the possibility of making longer lengths available to order, for those who might like to hide the supply away.

### 'Tad Labs' D600 is a disc player for grown-up analogue lovers'

The D600's pressure-sensitive touch controls are sited either side of its central display for very clean lines, but provide little in the way of tactile feedback and proved a little fiddly to operate. On a couple of occasions I inadvertently put the player into standby when all I wanted to do was skip to the previous track on a disc.

Under the bonnet the disc transport is cocooned in a separate enclosure for additional shielding. It employs a brushless DC motor and smooth loading mechanism that has metal shaft bearings and an aluminium disc tray with a blackened

**ABOVE:** Transport controls are pressure-sensitive rather than capacitive touch keys, while the large (defeatable) display uses static light-mode LEDs to avoid high frequency noise

surface 'to restrict the scattered reflection of laser light to increase reading precision'. The DACs chosen by TAD Labs are Burr-Brown PCM1794s, with pairs connected in a parallel/balanced configuration. SACD evangelists might groan that the D600 does not play DSD natively, SACDs being converted by the player to 24-bit/88.2kHz PCM. However, TAD Labs' engineers clearly have paid attention to 'digital housekeeping', the D600's custom-built Ultra-high Precision Crystal Generator (UPCG) master clock and associated circuitry resulting in state-of-the-art jitter performance [see Lab Report].

#### PURE ANALOGUE

Meanwhile the C2000 can be considered a 'pure analogue' preamp and a DAC in the same chassis. Its dual mono construction employs separate power supplies for each channel, the analogue section is fully balanced from input to output, and the digital section features the same UPCG clock and PCM1794 DACs used in the D600 disc player. In the C2000, however, RCA (S/PDIF) and XLR (AES/EBU) digital inputs are joined by an asynchronous USB input for convenient computer hook-up.

Via its website TAD Labs supplies a driver for its USB input to provide USB Audio Class 2.0 functionality with Windows-based PCs, enabling all sampling frequencies up to 192kHz to be accepted. Out-of-the-box, the C2000's front panel display reads 'D3:USB' when its third digital input is selected. After loading the drivers, and the PC is re-connected, the display subsequently changes to 'D3:USB2'. The sampling frequency of incoming data is also displayed on the C2000's front panel. ➔

#### TAD LABS' ANDREW JONES

TAD's hi-fi components have been more than a decade in the making. Says director of engineering, Andrew Jones: 'Being asked to design the best speaker I possibly could, with little-to-no regard for the bill of parts, was a design brief that any audio engineer might dream about. I'm still pinching myself. Having access to the precision manufacturing plant of a Japanese multinational allowed us to develop our unique concentric drivers in which both the tweeter dome and 16cm midrange cone are formed of beryllium, made by vapour deposition. Over the years we've demonstrated the speakers with amps from the likes of Pass Labs and Ayre – proving they sound great with all kinds of electronics – although now that we've developed our own electronics it gives us total control. We've around a dozen audiophile engineers working in TAD's Tokyo HQ. I've clocked up substantial Air Miles travelling to-and-fro from LA! I'm pleased to say we've never argued over what we're looking to achieve: a balanced design approach which maximises the original artistic intent across a wide musical spectrum.'





**LEFT:** Gain of each input and balance level can be preset via set-up menu keys on the fascia of the C2000 pre/DAC. Left rotary selects inputs

elements of the production were separated so clearly and methodically that each sound source could be heard to clearly occupy a separate location in the soundstage presented.

### SWEETLY SOPHISTICATED

Naturally, to assess the calibre of the D600 as a player in its own right, and to judge the relative performance of the C2000/M2500 pre/power amplifier combo, I mixed, matched, swapped and compared the TAD electronics over a period of a couple of weeks in my resident system, using Townshend Sir Galahad speakers. [To see John's system, please visit [www.hifinews.co.uk/news/article.asp?a=9884](http://www.hifinews.co.uk/news/article.asp?a=9884).]

Listening to the balanced outputs of the D600 hooked up to my luscious Levinson No.383 amplifier showed the disc player to possess immense bass power and depth, combined with a sophisticated sweetness that invites prolonged listening. Danny Thompson's string bass in Barb Jung's 'Lilac Wine' from the hybrid SACD *Just Like A Woman* [Linn AKD 309] sounded ↪

Like the D600, however, the C2000's maximum audio resolution is in fact 96kHz, governed by the low clock rate of TAD Labs' proprietary crystal oscillator. TAD Labs' engineers say that they determined it simply sounded better than when using an inferior-spec'd clock that *could* support 24-bit/192kHz operation.

The partnering M2500 power amp is a mightily powerful Class D design that is effectively two mono amplifiers in a common chassis. Typical of the breed it's very efficient, but while Class D designs can be compact and light in weight, especially when utilising a switch-mode power supply, the M2500 employs two massive linear supplies – one for each channel – its two toroidal transformers contributing significantly to its 43kg weight.

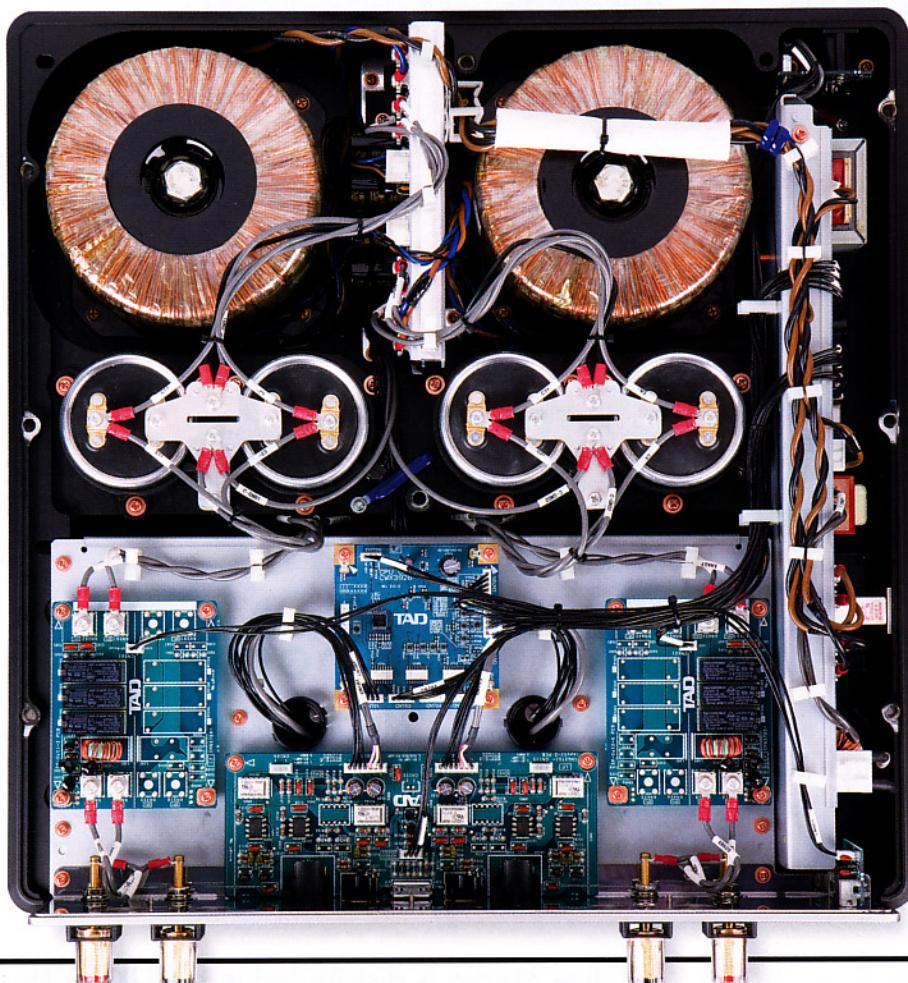
TAD Labs' switching amplifier design employs power MOSFETs described as having very low on-resistance and no lead wires. There's an alternative power amplifier in the range, the M4300. Appearing outwardly identical to the 2x500W M2500 featured here, it has instead four channels rated at 300W, designed for 'more bijou' bi-amped systems. You pay your (considerable) sum of money and take your (considered) choice – determined, presumably, by the size of your room and required SPLs.

### SPELLBINDING

I auditioned these TAD components through the TAD Compact Reference [CR1] speakers – which, by the way, *do* have to be heard to be believed. I was spellbound listening to the holographic imagery and

dynamic, pristine musical performance produced by the complete TAD system.

An example was Seal's 'Killer', the acoustic version released on the two-disc issue of the compilation set *Seal – Best 1991-2004* [Warner 9362-48958-2]. The system delivered one of those revelatory 'Jeez, I've never heard *that* before' kind of audio experiences, where individual



**RIGHT:** Inside the M2500 power amp – compact Class D output stages driven by substantial *linear* power supplies

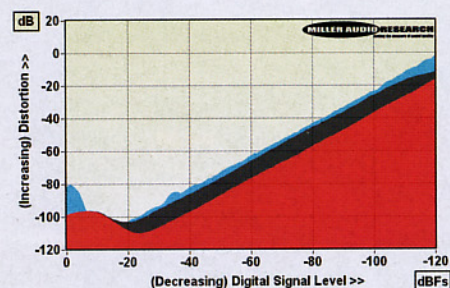


## LAB REPORT

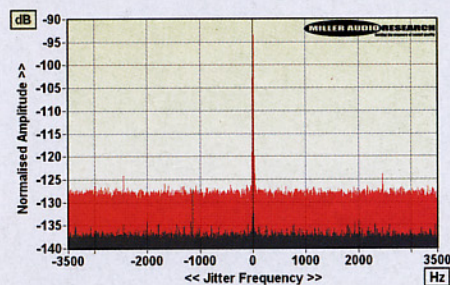
### TAD D600 (£27,000)

Exquisitely engineered, the D600 employs two Burr-Brown PCM1794 DACs in balanced mode to improve S/N ratio, linearity, dynamic range and distortion. TAD Labs has even designed a bespoke I-to-V stage to further its cause. The A-wtd S/N ratio meets its specification at a wide 115dB while low-level linearity is true to within an astonishing -0.3dB over a full 130dB with SACD. Distortion, however, is another matter. It's possible to achieve <0.0001% with PCM1794 DACs in double-differential mode but TAD Labs' implementation, or more likely its analogue stage, delivers closer to 0.001-0.01% from 20Hz-20kHz at its maximum 4.23V (balanced) output. This is mainly 2nd/3rd harmonic in nature and falls to 0.0008% through the midrange at slightly lower (-10dBFS) levels [see Graph 1]. Interestingly, TAD Labs offers no THD specification for its D600.

There's plenty of discussion about TAD Labs' 'Ultra-high C/N Master Clock UPG' on its website and here TAD Labs has been hugely successful, for not only is jitter vanishingly low at 35psec with SACD and <10psec with LPCM digital inputs, there is absolutely no spectral broadening of the signal right down into the noise [see Graph 2, below]. Finally, the D600's response is not quite as expected – SACD is downsampled to 88.2kHz while 192kHz digital inputs are downsampled to 96kHz (both yielding a -2dB/40kHz bandwidth). The player's output impedance also rises alarmingly to nearly 3kohm at 20Hz, possibly affecting subjective bass performance. Readers can download full QC Suite test reports for the TAD D600's CD, SACD and S/PDIF performance by navigating to [www.hifinews.co.uk](http://www.hifinews.co.uk) and clicking on the red 'download' button. PM



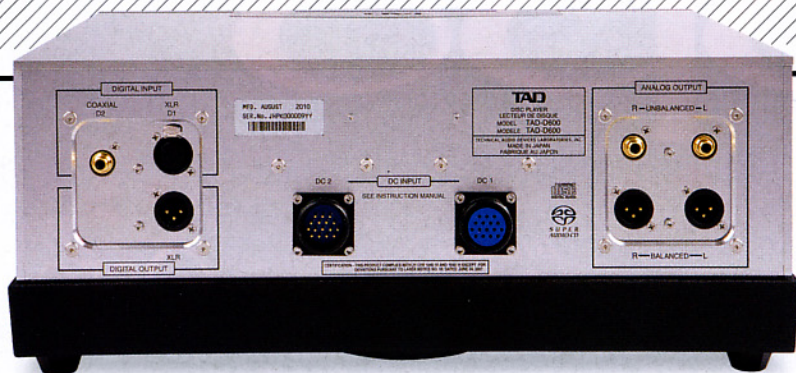
ABOVE: Distortion versus digital signal level over a 120dB dynamic range. 24-bit/48kHz LPCM (1kHz, red) vs. 16-bit CD (1kHz, black; 20kHz, blue)



ABOVE: High resolution jitter plot comparing 24-bit/48kHz LPCM (black) with SACD (red)

### HI-FI NEWS SPECIFICATIONS

|                                      |                             |
|--------------------------------------|-----------------------------|
| Maximum output level (Balanced)      | 4.23Vrms at 300-2890ohm     |
| A-wtd S/N ratio (CD/SACD/LPCM)       | 115.4dB / 115.2dB / 115.2dB |
| Distortion (1kHz, 0dBFS/-30dBFS)     | 0.0013% / 0.00046%          |
| Dist. & Noise (20kHz, 0dBFS/-30dBFS) | 0.011% / 0.0021%            |
| Freq. resp. (20Hz-20kHz/45kHz)       | -0.1dB to -0.5dB / -23.7dB  |
| Digital jitter (CD/SACD/LPCM)        | 120psec / 35psec / 10psec   |
| Resolution @ -100dB                  | ±0.1dB                      |
| Power consumption                    | 24W                         |
| Dimensions (WHD)                     | 450x185x440mm               |



ABOVE: D600 has balanced (XLR) and single-ended (RCA) outputs, plus an AES/EBU (XLR) digital output. Two digital inputs (S/PDIF and AES/EBU) are provided to use the on-board DACs, the two multi-pin connectors being for the external PSU

uncommonly earthy and full-bodied, while the husky texture of Jung's voice was laid bare against the dark backdrop of the soundstage.

Comparing TAD Labs' D600 with a friend's Esoteric P03/D03 two-box player (around £22k in this form, sans external world clock) highlighted the D600's slightly warm, fruity balance and relaxed fluidity. Where the Esoteric combo appeared to major on raw resolution, commanding our attention – and sounding awesome with good recordings – it could just as easily sound 'stark' and unforgiving, laying many recordings rather too bare.

#### ADULT ANALOGUE

By contrast, I'd describe TAD Labs' D600 as a high-end disc player for grown-up analogue music lovers. It retrieves detail in spades, with lovely layering of textures, along with just enough rose-tinting to make even raw rock recordings seem surprisingly palatable.

This character remains when it's used as a DAC, too. During a further listening session I used my creaky old Pioneer DV-868AVi universal DVD player as a CD transport, spinning 'Should've Listened' from *The Long*

*Road* by Nickelback [Roadrunner RR84002]. Connected via S/PDIF (coaxial) to the D600, the sound was simultaneously ballsy and 'clean' where this disc can often be a jarring, seat-of-the-pants experience.

#### SUPREME CIVILITY

Comparing this immediately with the DAC section built into the C2000 preamp highlighted the D600's supreme civility. I would suggest there is a family resemblance, the confident stability and precision

remaining throughout. But through the C2000's DAC the sound was a 'tad' (!) less fruity and arguably more sharply focused, its ever-so-slightly brightly-lit perspective delivering increased presence. No doubt one could compare and contrast the two until the cows come home. Which you would prefer would depend on the recording being observed and, of course, personal taste.

The C2000/M2500 pre/power combo summarily trounced my Levinson integrated amp. Of course, the TAD costs four times as much, nevertheless the No.383 has shown many very expensive amplifiers a clean pair of heels in the past, such is its classic refinement. But not so

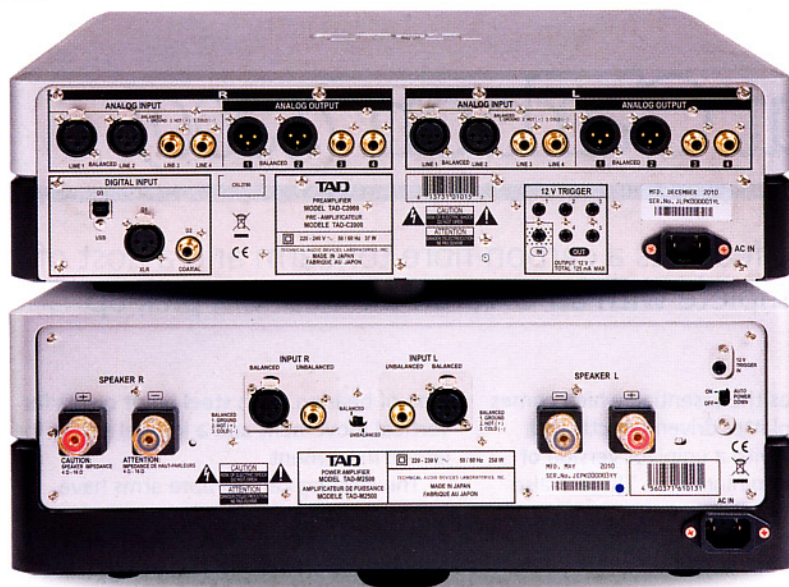
'Through the C2000's DAC the sound was more sharply focused'



ABOVE: A separate PSU, which can be hidden away, provides independent supplies for both the analogue and digital sections of the D600 disc player/DAC



## SACD/DAC & PRE/POWER AMP



**ABOVE:** C2000 preamp has four line inputs – two balanced and two single-ended – plus three digital inputs for its on-board DAC: S/PDIF, AES/EBU and USB. M2500 power amp has a switch at the rear to select its balanced or single-ended inputs

here, the TAD combo sounding fast and explicit, peeling away layers of veiling to bring recordings alive, hi-res and low-res alike.

I downloaded recently a 'demo sample' from the audiophile label Channel Classics Records based in Holland [[www.channelclassics.com](http://www.channelclassics.com)], an excerpt from Stravinsky's *Firebird* Suite, performed by the Budapest Festival Orchestra under Ivan Fischer. The demo is delivered as three files at 44.1kHz, 96kHz and 192kHz sampling frequencies. Listening to them via the C2000's USB input revealed marked differences in clarity and subjective naturalness even when switching from the 96kHz to the 192kHz file, despite the internal processing and ultimate resolution maxing out at 96kHz.

### RAZOR SHARP

Clearly the TAD Labs electronics have been voiced to match symbiotically with its speakers, the complement of D600 and C2000/M2500 with the CR1 transducers delivering taut, razor-sharp bass that goes very deep – impossibly deep given the compact dimensions of the standmounts – combined with sparkling, vivid treble detail that's concomitantly as sweet as a nut. During a trans-Atlantic telephone conversation with Andrew Jones he confessed that the biggest challenge for TAD Labs is treading that fine line between ultra-transparent

studio monitoring which could be fatiguing and easy-on-the-ear 'listenability'. Said Jones: 'We are designing for playback in listener's homes, after all – not acoustically treated studios. We're striving for the closest approach to the original source – the recording itself – but our task is to turn that source into sound. If you're not in control of the playback system from end to end it's impossible to voice it *precisely* how you'd like it.'

I've been blown away by what I've heard here so far. Listening to the sound of these exquisitely crafted statement products was a joy, and it was heartbreaking to crate them up and watch the security van take them away. ☹

### HI-FI NEWS VERDICT

TAD Labs is one of a rare breed in the high-end audio arena, capable of developing an entire system right down to component level. These first 'consumer' TAD units boast considerable engineering finesse and deliver exceptional sound quality, being highly revealing while remaining at all times musically involving. Put them on your list of gear to hear before you die – even if the prices preclude ownership!

Sound Quality: 87%

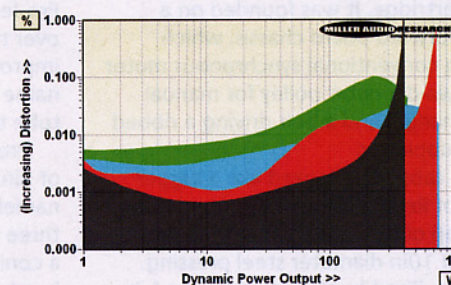


## LAB REPORT

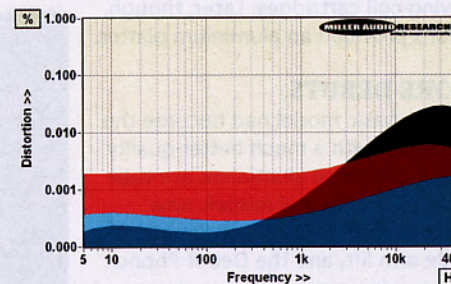
### TAD C2000/M2500 (£20,000/£18,000)

The digital input/DAC section of TAD Lab's C2000 preamp bears great similarity to that of its D600 player/DAC [see p27]. The S/N ratio is slightly inferior at 111dB (re. 0dB volume, 4.1V balanced out) but jitter is squeezed even lower still (7.8psec) while the response shapes (including downsampling of 192kHz inputs to 96kHz) and moderate 0.002–0.01% distortion are almost identical. Distortion via the balanced *analogue* input/outputs is very much lower still, typically 0.0003–0.0016% [see blue trace, Graph 2], the A-wtd S/N ratio is very impressive at 99dB (re. 0dBV) and the response, while rolling gently away beyond –0.15dB/20kHz is still only –2.8dB/100kHz. Maximum output is just under 20V and the source impedance a moderate 325ohm. The C2000 is a very slick and clean-looking preamp.

The matching M2500 power amp represents a mix of innovative and traditional Class D values. Distortion, is very low indeed at 0.0002% through bass and <0.001% through midrange up to about 50W/8ohm, increasing to just 0.0059% at its rated 250W/8ohm. Only at very high frequencies does THD rise quickly [0.07% at 20kHz; black trace, Graph 2]. In common with other bridged Class D amps, response is load-dependent, rising here to +3.3dB/40kHz into 8ohm but falling to –1.7dB/40kHz into 4ohm. There's a substantial loss in treble into lower impedance loads. Power output is very high at 2x355W/640W into 8/4ohm and – very unusually for Class D – increases under dynamic conditions to 400W/760W [see Graph 1, below]. Readers are invited to view comprehensive QC Suite test reports for the TAD C2000 preamp/DAC and M2500 Class D power amplifier by navigating to [www.hifinews.co.uk](http://www.hifinews.co.uk) and clicking on the red 'download' button. PM



**ABOVE:** Dynamic power output versus distortion into 8ohm (black trace), 4ohm (red), 2ohm (blue) and 1ohm (green) speaker loads via 8/4ohm taps



**ABOVE:** THD vs. extended frequency; M2500 (10W/8ohm, black) vs. C2000 (digital, red; analogue, blue)

### HI-FI NEWS SPECIFICATIONS

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Power output (<1% THD, 8/4ohm)       | 355W / 640W                     |
| Dynamic power (<1% THD, 8/4/2/1ohm)  | 400W / 760W / 780W / 435W       |
| Output imp. (20Hz–20kHz, pre/power)  | 323–354ohm / 0.065–1.48ohm      |
| Freq. resp. (20Hz–100kHz, pre/power) | +0.0 to –2.8dB / +3.2 to –9.3dB |
| Input sensitivity (for 0dBV/0dBW)    | 255mV (pre) / 96mV (power)      |
| A-wtd S/N ratio (re. 0dBV/0dBW)      | 98.8dB (pre) / 70.5dB (power)   |
| Distortion (20Hz–20kHz, 1V/10W)      | 0.0003–0.0016% / 0.0002–0.072%  |
| Power consump. (pre/idle/rated o/p)  | 24W/45W/585W                    |
| Dimensions (WHD pre/power)           | 440x140x393/440x170x467mm       |