

Bricasti M21

A decade on from the brand-defining M1 DAC and Bricasti has poured all its latter day experience into a new flagship featuring bespoke DAC and clocking technologies

Review: **Mark Craven** Lab: **Paul Miller**

Bricasti Design is not an adherent to the 'keep your range rolling' philosophy. Likely informed by its professional audio heritage, it keeps new arrivals to a minimum. So the launch of the M21 DAC, a flagship D/A converter to replace the £9600 M1 of 2011 [*HFN* Jun '11], is of interest particularly when you clock the updates the Massachusetts-based company has implemented, and its £17,249 price tag.

There are things that haven't changed much in the intervening years, including the M21's choice of third-party DAC, which remains Analog Devices' AD1955, two used in a dual mono configuration. And once again, the fully balanced circuit path includes separate, isolated power supplies for each channel [see pic, below].

GOING NATIVE

Yet several additions mark this model out as a serious update on the M1, and help explain the leap in price point. First, there's its native DSD decoding and separate 1-bit DAC, as seen recently on the company's more affordable (£6999) M3 network DAC/headphone amp [*HFN* Jun '20]. This is described by Bricasti as a 'true one-bit modulator of our own design and unique to the industry.' There is still the option of using the AD DAC for DSD conversion, but it'll be converted to LPCM along the way.

For PCM sources, the M21 also introduces an alternative, bespoke ladder DAC option which, like the Analog Devices path, can be used with linear and minimum phase filters, both offered in '0' and '1' flavours [see PM's Lab Report, p53]. There's then something not mentioned in the otherwise comprehensive user guide, as it arrived via a firmware update: 'Wide' and 'Fine' options for the M21's Direct Digital Synthesis [DDS] clock recovery [see PM's boxout, p51]. So this new Bricasti model

now combines three DAC topologies and four digital filters to tempt the audiophile, though they cannot all be 'mixed'.

The brand, which was founded in 2004 by ex-Lexicon engineer Brian Zolner, has two product categories under its consumer umbrella: Classic and Platinum. The latter features iterations of its costlier models, including the M20 preamp [*HFN* Nov '20], M32 monoblock and M21 we have here, though the £3000 price premium for a platinum-finished chassis and gold-plated buttons hardly makes it an impulse buy.

Even in the standard 'Classic' guise this DAC is lovingly built, with its black case, and silver top, all machined from solid aluminium. Four circular stainless feet, from specialist Stillpoints, provide a vibration-nulling platform for the 6.8kg chassis.

Supplied with the M21 is a palm-sized, heavyweight remote control [see p53] that offers six buttons: status, balance, input, level (Bricasti has added an analogue

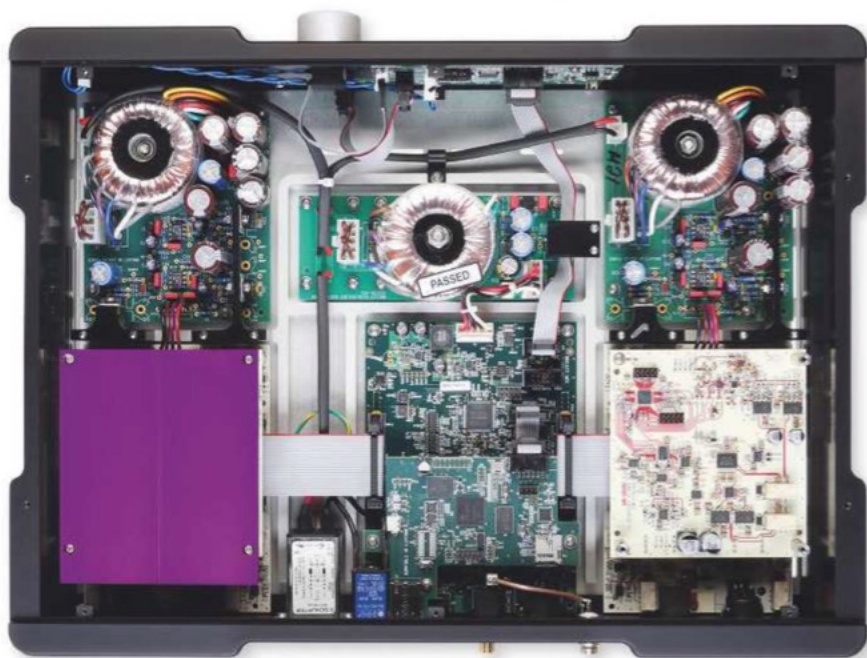
preamp stage) and up/down keys. This allows sofa-based browsing and control over the DAC's menu systems, and – as further evidence of Bricasti's build quality ethos – replaces a slip-off battery cover with a screw-backed panel.

MAKING A CONNECTION

If the M21's DAC and filter options seem generous the same can be said of its connectivity. The most prosaic is Toslink optical, supporting 96kHz, which is flanked by two 192kHz-capable S/PDIF coaxial connections, and an AES/EBU input supporting 192kHz and DSD64 over

DoP. For computer/network setups, the M21 also has USB-B and Ethernet LAN sockets supporting 384kHz LPCM and DSD (DSD64 natively and DSD128 as DoP). There are also balanced XLR and unbalanced RCA outputs, plus a 12V trigger to sync with, for example, Bricasti's partnering power amplifiers.

'Its vivid sound had me settling in for the long-haul'



RIGHT: Three linear power supplies are fitted [top], one for the network, USB and other digital processing [bottom] and one for the bespoke ladder and DSD DACs [top PCBs, left/right, under purple cover] and AD1955 DACs [lower PCBs]



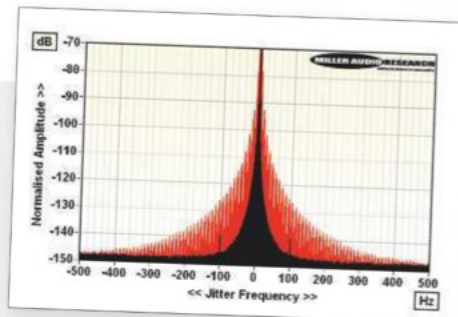
Considering Bricasti's pro audio origins, it's not surprising to find the M21 falls a little way short of the user-friendly nature of some rivals. It's not overly complicated, thanks to a front-panel display with easy-to-read text, and once you've familiarised yourself with the way this can be navigated by the remote, operation is largely plain sailing. Yet there are some discrepancies between its front panel control and the handset – the Reference mode, which enables menu settings to be saved for instant recall, is only accessible via the M21's fascia, for example. Some might also wish for a custom app to complement the DAC's DLNA playback support.

Another unusual element concerns Bricasti's update path. Despite that Ethernet connection, software updates aren't handled over the air. Instead, during the review period, Bricasti supplied editor PM with a physical memory card to be

installed to flash the M21 to its latest iteration. Presumably such an upgrade would be performed by your dealer, as it's not a simple process.

SCINTILLATING SOUNDS

Even though I gradually grew accustomed to using the M21, rather than getting to grips with it from the get-go, it still only took me seconds to realise it's a DAC with a scintillating performance, one particularly suited to those who favour clarity and transparency and a laser-focus on soundstage separation. Does that mean it has a 'pro' sound? I wouldn't know, having spent little time in mastering suites, but I can say I found it hugely entertaining in its ability to unearth seemingly every tiny detail of a multi-track mix while making it sound organic and musical.



DIGITAL SYNTHESIS

Direct Digital Synthesis (DDS) is a method of creating a signal of known and stable frequency. The technique is commonly used to synthesise the desired sine, square, etc, waveforms by the function generators on an engineer's test bench. Within the M21, DDS is used to create a stable master clock, in turn used to recover and synchronise the 'buried' clock within incoming digital audio datastreams.

This is a favoured method of clock recovery by one of Bricasti's technology partners – Analog Devices. One of AD's highly evolved solutions, the AD9951, is included as part of Bricasti's MDX platform, cutting its teeth in the inaugural M1 DAC [HFN Jun '11]. The M1 featured excellent jitter suppression down to ~10psec but when Bricasti fine-tuned the refresh/tracking rate of its DDS to about $\pm 0.1\text{Hz}$ in the M3 [HFN Jun '20], to achieve some other technical/subjective advantage, correlated jitter increased to ~1900psec. What you gain on the swings...

So, for its new M21 DAC, Bricasti has updated its firmware to not only offer two alternative digital filters [see Lab Report, p53] but to also include a 'Wide' once-a-second clock sync/refresh rate. The effect is dramatic, as evidenced by the 'clean' black peak [inset Graph] against the $\pm 15\text{Hz}$, $\pm 25\text{Hz}$, $\pm 35\text{Hz}$ and $\pm 45\text{Hz}$, etc, sidebands [red spectrum] of 'Fine' mode. Additionally, the broadening of every peak on this graph – main and sidebands – is not a measurement artefact but is likely to be a residual phase noise in the DDS clock, taking the form of low-rate, noise-like jitter. 'Wide' or 'Fine'? Which will you prefer? PM

ABOVE: Bricasti's elegant but 'bomb proof' CNC-machined casework is decked out with a bold display, rotary encoder (also the volume control) and a row of six function buttons

Take, for instance, Aerosmith's 'Last Child', in vanilla CD-quality FLAC. This choice cut from the Boston band's 1976 *Rocks* album [Columbia 474965 2] begins with a dreamy, almost psychedelic melange of ringing guitar and layered vocals. There's a lot more going on than meets the eye (or ear) and it sounded spine-tingling here, the cascade of information cleanly presented. Soon the track segues into a funky, rolling blues-rock jam, and what surprised me was the M21 delineating this without sacrificing any of its composure. A similar experience was had from The Rolling Stones' 'Rocks Off' [Exile On Main Street (Deluxe Edition), Polydor 273 429-5], another loose-limbed guitar piece that became, with the M21 in charge, a riot of detail, texture and separation.

THE SHOOT OUT

In short, this DAC enabled me to appreciate the skill of these rock-n-roll dinosaurs perhaps better than ever before. It really was that vivid, clear and precise, and had me settling in for the long-haul with a playlist of blues and country favourites. I wanted to take off my metaphorical reviewer's hat and just kick back, but repeatedly felt compelled to stop and make notes. Bob Dylan's 'Main Title Theme' from the *Pat Garrett And Billy The Kid* soundtrack [Columbia Records], with its lilting, lullaby-style acoustic guitar and jingling bells, offered a captivating fluidity. By contrast, the oddity that is the Ry Cooder/Rolling Stones/Nicky Hopkins collab 'Edward's Thrump Up' [Jamming With Edward!, Virgin 7243 8 40403 21] laid on reverberant piano chords and a foot-tapping drum shuffle, proving the Bricasti M21's rhythmic, unclouded talents.

Of course, audiophile owners of the M21 will likely be playing high-resolution files, if only because that price tag practically begs you get the best out of it. ➤

NETWORK-ATTACHED DAC



ABOVE: Supported digital inputs include wired Ethernet (as a DLNA compatible network player the M21 handles up to 384kHz PCM, native DSD64 and DSD128 over DoP), USB-B (also 384kHz PCM and DSD128), optical/coax S/PDIF and AES/EBU (XLR)

And, yes, even though its delivery of CD-quality is remarkable, it sings that little bit sweeter when the sample rates go up. Kim Andre Arnesen's 'Magnificat IV', played with jaw-dropping fluency by the TrondheimSolistene and mastered in DXD [2L Recordings 2L-106-SABD], had a gorgeous scale and openness that easily described the environment of the concert hall. The vocal here grows to include a mass of female voices, which soared high yet avoided sharpness. Moreover, the string accompaniment of this gentle, *andante* piece rose and fell with total grace.

MAKING MY MIND UP

Something with more attack was Antonia Forcione's 'Brasilico' [Meet Me In London, Naim Label; 192kHz/24-bit], which is all about the pauses between notes, and a complex image that sandwiches singer Sabina Sciubba between tabla drums and plucked acoustic guitar. All this was revealed by the M21, together with a bite to its presentation and leading edges in particular, that made the instruments sound utterly lifelike.

Of the M21's filter options, I had quickly decided 'Linear' was my choice as it subjectively brought a little more focus to the DAC's delivery of midrange elements.

Differences between the '0' and '1' options were indistinguishable to my ears, however, and

LEFT: Compact all-alloy 'M21' remote offers control over input, balance, display and volume



nor could I develop a preference between the Analogue Devices or bespoke ladder DAC options after much toing and froing.

AUDIO AUTHORITY

This DAC doesn't only impress with its clear, airy highs and midrange texture. Always a constant throughout my listening was an authoritative but never overtly rich bass. It rendered the propulsive rhythm section of Led Zeppelin's 'When The Levee Breaks' [Led Zeppelin IV, Atlantic no cat. no; 96kHz/24-bit] with tight focus while ensuring John Bonham's tub-thumping sounded as heavy as ever, and brought low-end snarl to album opener 'Black Dog'.

At the other end of the spectrum, Doug MacLeod's 'Serious Doin' Woman' [Exactly Like This, Reference Recordings RR-135; 176.4kHz/24-bit] became a listen that was nuanced and delicate to the extreme. There was a taut kick drum, gently struck snares and acoustic bass sat back from MacLeod's storytelling vocal. It was a masterful presentation of the smallest details as part of an enjoyable whole. ☺

HI-FI NEWS VERDICT

Everything about Bricasti's M21 flagship screams 'premium', from its exceptional build quality and triple DAC implementation to – yes – the price tag. Put that five-digit figure to the back of your mind, however, and you can enjoy a sterling performance that brings fluidity, clarity and sheer excitement to your digital music collection. And you can pick it up in that Platinum finish if you really want to show off...

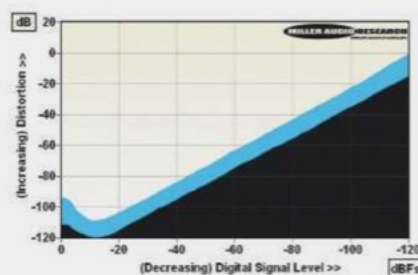
Sound Quality: 87%



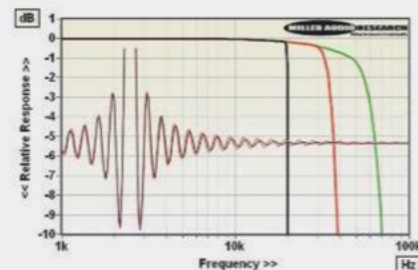
BRICASTI M21

In the ten years since we tested the original M1 [HFN Jun '11], the 'Gold Edition' [HFN Oct '16] and the more affordable M3 version [HFN Jun '20], Bricasti has refined both its hardware and firmware [see boxout, p51, for a discussion of DDS and jitter performance]. For LPCM inputs there's a new bespoke ladder converter and also the same Analog Devices AD1955A DACs that define the very low 0.0004% distortion through the midrange at its (fixed) 4V peak output, falling to 0.0001% at –10dBfs and 0.00018% at –30dBfs [see Graph 1, below]. As before, there's a slight increase in 3rd harmonic distortion to 0.0027% at 20kHz falling to 0.0003% between –10dBfs and –30dBfs (a function of the balanced analogue filter circuit) while the A-wtd S/N ratio is broadly unchanged at 113.9dB.

Bricasti has retained both linear and minimum phase digital filters but, as part of the latest update, has introduced additional versions of each. The new 'Linear 1' [black impulse, Graph 2] and 'Minimum 1' have slightly reduced coefficients over the original 'Linear 0' [red impulse] and 'Minimum 0' versions. The fractionally reduced ringing seen in the '1' filters is traded for an equally small decrease in stopband rejection (92dB vs. 105dB) and a very slightly earlier cut-off (–0.3dB/19.6kHz to –1.4dB/20kHz vs. –0.18dB/19.6kHz to –0.19dB/20kHz). These latter comparisons are for filters '1' versus filters '0'. At higher sample rates Bricasti's native file processing delivers a slightly earlier roll-off than we see with off-the-shelf implementations. Featuring –3dB points at 35kHz and 60kHz with 96kHz and 192kHz inputs, respectively, the cut-off is steep at –15dB/40kHz and –25dB/80kHz [red and green traces, Graph 2]. PM



ABOVE: Distortion versus 24-bit digital signal level over a 120dB range at 1kHz (black) and 20kHz (blue)



ABOVE: Time (linear phase filters 0 & 1, red with extended ripples & black) and frequency responses at 48kFs (black), 96kFs (red) and 192kFs (green)

HI-FI NEWS SPECIFICATIONS

Maximum output level / Impedance	3.96Vrms / 28-29ohm
A-wtd S/N ratio	113.9dB
Distortion (1kHz, 0dBfs/–30dBfs)	0.00040% / 0.00018%
Distortion & Noise (20kHz, 0dBfs/–30dBfs)	0.0027% / 0.00060%
Freq. resp. (20Hz–20kHz/40kHz/80kHz)	+0.0 to –0.17dB/–15dB/–25dB
Digital jitter (Fine / Wide re. 48kHz)	1700psec / 11psec
Resolution (re. –100dBfs / –110dBfs)	±0.1dB / ±0.4dB
Power consumption	45W (9W standby)
Dimensions (WHD) / Weight	432x114x305mm / 6.8kg