the only way to go as a step up is either a well-designed iPad app or something like the Meridian Sooloos interface. An iPad app might be more superficially impressive as a music-library interface, but I doubt it will be as quick to fire up and use as T+A's FD100—and in any case, you'll then be controlling your library with one app, and your volume, input choices, etc., with another app or device. Some devices let you control volume with an iPad—but unless I leave my iPad screen on all the time, I've found iPad apps cumbersome to use when I want to quickly mute something or just skip a track.

As I wrote this, T+A told me that they're working on an iPad app for the MPB, but I'd probably still prefer something like their FD100 to control my system. Having a set of hard buttons on a svelte remote that responds as soon as you touch it is a luxury that an iPad, no matter how cool the app, still can't provide. And the FD100's buttons look like little Skittles fruit candies; round and shiny is always appealing.

Bound for Sound: I no longer have the original Music Player, and three years is too long to retain aural memories with any accuracy. So I compared the MPB with my reference Benchmark DAC1 USB, and with a dCS Debussy DAC that had just arrived.

Sonically, the MPB hewed closer to the $11,000 dCS than to the lower-priced Benchmark ($1295), which I think most folks would consider a plus. The T+A had a top end with more finesse than the Benchmark's, while creating a solid soundstage and a properly balanced bottom end. And in comparing the MPB's digital inputs (LAN, S/PDIF, iPod), I found, as I had in my review of the MP, that playing the same digital file yielded consistent results, regardless of the source.

T+A had also sent along their companion integrated amplifier, the Power Plant Balanced ($3100), to which I coupled the MPB via balanced interconnects. Though on paper, at 140Wpc into 8 ohms, the PPB is underpowered for my MartinLogan Prodigy speakers, the sound was dynamic and robust, and would likely be perfect for a large apartment or modest-size listening room. Operating both the MPB and PPB with the FD100 remote was easy and intuitive—a complete and relatively compact audiophile-grade system for around $8000 for which you just need to add speakers.

In this age of iPad and iPhone apps and endless choices of digital music, it's interesting that an old-school, hard-button remote control and an updated digital hub could still be considered the better way to go. But thanks to the immediacy that a physical remote provides in running a system, combined with the FD100's well-thought-out screen and interface, the T+A elektroakustik Music Player Balanced is exactly that. —**Jon Iverson**

Musical Fidelity V-DAC II D/A processor

This budget-priced processor[2] has two digital inputs, S/PDIF and USB, selected with a small toggle switch. The S/PDIF input is offered on both TosLink and coaxial jacks, but only one can be used at a time. There is one set of analog outputs, single-ended on RCA jacks. The original V-DAC was reviewed by Sam Tellig in November 2009 and cost $299 (see http://tinyurl.com/czjjcbj). Sam then wrote about the V-DAC II in January 2012. This costs $379 but incorporates the asynchronous USB data receiver of Musical Fidelity's V-Link ($169; see http://tinyurl.com/cbn49zy), which allows the V-DAC II to handle data with a 24-bit word length and sample rates of up to 96kHz rather than be limited by the original's 16 bits and 48kHz. It still uses Burr-Brown's DSD1792 D/A chip and SRC4392 upsampler chip, however.

"I heard more resolution, especially space," wrote Sam about the V-DAC II, adding that it had a sweeter, less fatiguing treble than its predecessor. I used the V-DAC II as one of my references for my review of the Halide DAC HD in the August 2012 issue of *Stereophile*. I was sufficiently impressed by what I heard that I felt a full session on the test bench was warranted.

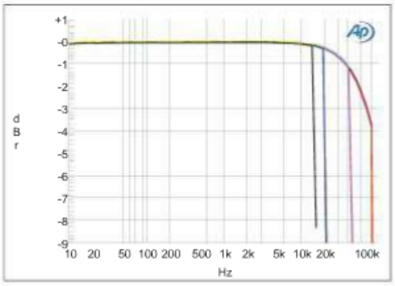

Fig.1 Musical Fidelity V-DAC II, frequency response at –12dBFS into 100k ohms with data at 32kHz (left channel yellow, right gray), 44.1kHz (left green, right blue), 96kHz (left cyan, right magenta), and 192kHz (left blue, right red) (1dB/vertical div.).

To measure the V-DAC II (serial no. SDY0367), I used *Stereophile*'s loan sample of the top-of-the-line Audio Precision SYS2722 system (see www.ap.com and the January 2008 "As We See It," http://tinyurl.com/4ffpve4); for some tests, I also used my vintage Audio Precision System One Dual Domain analyzer.

Unlike the original V-DAC's S/PDIF input, which was limited to 96kHz, the V-DAC II's input operates at sample rates from 32kHz up to a maximum of 192kHz. The Macintosh USB Prober utility identified the product as the "Musical Fidelity V-DAC 24/96," but no serial number. USB Prober confirmed that the V-DAC II did operate in isochronous asynchronous mode, as claimed, and that the USB input would handle 16- and 24-bit data with sample rates of 32, 44.1, 48, 88.2, and 96kHz.

The maximum output level from both of the V-DAC II's single-ended outputs was 2.24V, 1dB higher than the CD standard's 2V and the original V-DAC's 2.08V. If not compensated for, this difference will work in favor of the new products in side-by-side comparisons with the Mk.1 V-DAC. The Musical Fidelity preserved absolute polarity (*ie*, was non-inverting). Its output impedance was higher than the original version's, but was still low at 99 ohms at high and mid frequencies, and at 124 ohms in the low bass.

Fig.1 shows the V-DAC II's frequency response with sample rates ranging from 32kHz (yellow and gray traces) to 192kHz (blue and red). The response at each sample rate follows the same basic pattern: a gentle rolloff followed by a sharp drop-off just below the Nyquist frequency (*ie*, half the sample rate). Unlike the original version of Musical Fidelity's more expensive M1DAC (see http://tinyurl.com/78wkcur), the response with 192kHz sampling does extend an octave higher in frequency than at 96kHz. Channel separation (not shown) was superb, at >110dB in the treble and midrange, but did decrease in the bass, reaching 100dB at 20Hz. This is presumably due to the increasing source impedance in this region of

2 Musical Fidelity Limited, 24-26 Fulton Road, Wembley, Middlesex, England HA9 0TF, UK. Tel: (44) (0)20-8900-2866. Fax: (44) (0)20-8900-2983. Web: www.musicalfidelity.com. US distributor: Tempo Distribution LLC, PO Box 541443, Waltham, MA 02454-1443. Tel: (617) 314-9227. Fax: (617) 336-3486. Web: http://tempohighfidelity.com.

the MF's tiny wall-wart power supply .

Whether measured using a swept ⅓-octave bandpass filter (not shown) or with a modern FFT technique (fig.2), the increase in bit depth from 16 to 24 resulted in a 20dB reduction in the level of the V-DAC II's noise floor, suggesting that this inexpensive device has a resolution of around 19 bits. However, the lowering of the noise with 24-bit data (blue and red traces) does unmask some static tones just under 8kHz. Admittedly, these are at a very low level, but their presence does suggest some mathematical limitations in the Musical Fidelity's digital signal processing. Fig.2 was taken with S/PDIF data; repeating the test with USB data gave an identical result, confirming that the V-DAC II correctly handled 24-bit data via its USB input.

Unlike some processors that use a sample-rate–converter chip as a jitter filter, the V-DAC II suffered very little from noise modulation. Fig.3 shows the spectra of its output while it reproduced a 1kHz tone at 0, –60, and –90dBFS. While there is a slight rise in the noise floor as the signal level increases, this is mild, though AC-supply components at or below a still-very-low –130dBFS can be seen in the left channel. With its low noise and very low linearity error (not shown), the V-DAC II's reproduction of an undithered 16-bit tone at exactly –90dBFS was essentially perfect (fig.4). Not only are the three DC voltages representing this signal clearly resolved, so is the Gibbs Phenomenon "ringing" on the tops and bottoms of the waveform. This waveform also indicates that the V-DAC uses a conventional time-symmetrical FIR reconstruction filter rather than, for example, a minimum-phase or apodizing filter that, all things being equal, tend to give a sound that listeners prefer. Extending the bit depth to 24 gave a well-defined sinewave (not shown), despite the very low signal level.

Although the V-DAC II did produce some high-order harmonics with a full-scale signal, these were all very low in level, even with the extreme 600 ohm load (fig.5). The subjectively innocuous second harmonic was the highest in level—more so in the left channel (blue) than the right (red)—but was still inconsequential in absolute terms. The picture was similarly excellent on the demanding high-frequency intermodulation test (fig.6), with the second-order difference component lying at –96dBFS (0.0015%).

The V-DAC II effectively rejected word-clock jitter on all its inputs. With 16-bit data (not shown) there was no accentuation of the odd-order harmonics of the J-Test's low-frequency squarewave. No jitter-related sidebands can be seen with 24-bit data via the S/PDIF or USB input (fig.7), though the idle tones just below 8kHz in fig.2 that I mentioned above are present.

The Musical Fidelity V-DAC II may be affordably priced, but its measured performance is almost beyond reproach. Extraordinary! **–John Atkinson**

Bricasti Design M1 D/A processor

I don't know whether the makers of Bricasti Design's M1 D/A converter ($7795)[3] consciously subscribe to W. Edwards Deming's famous 14 principles of management, but they sure do seem intent on continuous improvement. The ink was hardly dry on my March 2012 Follow-Up on the M1's new filter set (which provided a greater number of intermediate steps in the range of rolloff options) when Bricasti Design cofounder Brian

3 Bricasti Design Ltd., 123 Fells Avenue, Medford, MA 01255. Tel: (781) 306-0420. Web: www.bricasti.com.

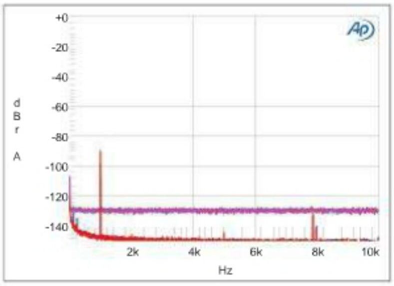

Fig.2 Fig.2 Musical Fidelity V-DAC II, FFT-derived spectrum with noise and spuriae of dithered 1kHz tone at –90dBFS, with 16-bit data (left channel cyan, right magenta) and 24-bit data (left channel blue, right red).

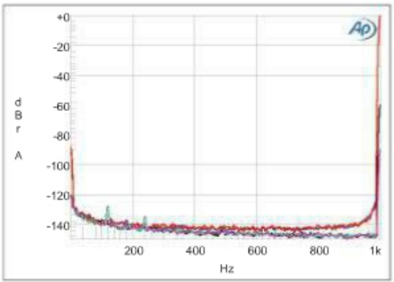

Fig.3 Musical Fidelity V-DAC II, FFT-derived spectrum with noise and spuriae of dithered 1kHz tone at 0dBFS (left channel blue, right red), –60dBFS (left green, right gray), and –90dBFS (left cyan, right magenta).

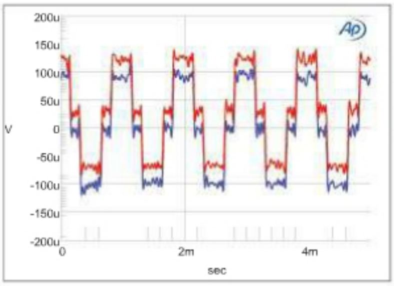

Fig.4 Musical Fidelity V-DAC II, waveform of undithered 1kHz sinewave at –90.31dBFS, 16-bit data (left channel blue, right red).

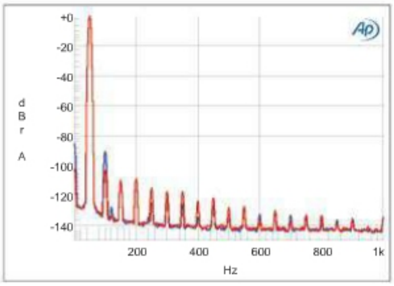

Fig.5 Musical Fidelity V-DAC II, spectrum of 50Hz sinewave, DC–1kHz, at 0dBFS into 600 ohms (left channel blue, right red; linear frequency scale).

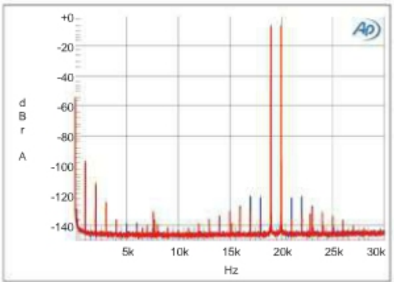

Fig.6 Musical Fidelity V-DAC II, HF intermodulation spectrum, DC–24kHz, 19+20kHz at 0dBFS into 100k ohms (left channel blue, right red; linear frequency scale).

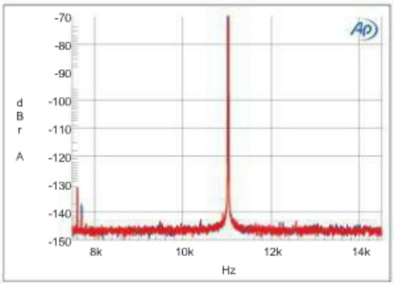

Fig.7 Musical Fidelity V-DAC II, high-resolution jitter spectrum of analog output signal, 11.025kHz at –6dBFS, sampled at 44.1kHz with LSB toggled at 229Hz: 24-bit USB data (left channel blue, right red). Center frequency of trace, 11.025kHz; frequency range, 43.5kHz.