Chord Electronics Hugo TT 2 DAC/M Scaler upscaler

by Chris Martens

As many music lovers know, the legend of Chord Electronics' Hugo family of products started several years back with the first generation Hugo, which was a wildly overachieving portable headphone amp/DAC that took the marketplace by storm. Though that first Hugo was ostensibly a personal audio product, it didn't take audiophiles long to discover that it could handily compete with (or in many cases surpass) the performance of like-priced standalone DAC's for use in full-size audio systems. Granted, it did make for a strange sight, as the system would be comprised of racks full of big, full-width components plus the compact little paperback book-sized Hugo, which at least sounded big.

Audio history took its course, so that the first-generation Hugo begat the critically acclaimed first-generation desktop-sized Hugo TT ('TT' stands for table top), which was essentially the DAC section of the Hugo bolted on to an even more capable and powerful Chord headphone amplifier/preamp. As time moved on, those first-generation Hugo models gave rise to what was and is one of Chord Electronics' greatest achievements: namely, the cost-no-object DAVE (Digital Audio Veritas in Extremis) preamp/headphone amp/DAC.

From the beginning, two things set the Hugo/DAVE family of products apart. First, they possessed extremely quiet, powerful, and low-distortion amplifier sections. Second, they incorporated extremely sophisticated Rob Watts-designed DAC sections that used distinctive FPGA-based digital filters that supported extremely long tap-length filtering schemes and could therefore use Watts' proprietary WTA (Watts Transient Aligned) filter algorithms. (To avoid confusion, let me mention that Rob Watts acts as an independent Digital Design Consultant to Chord Electronics, although he is regarded as an honorary member of the Chord team.)

What's the significance of the ultra long tap-length digital filter and of the WTA algorithms? In seminars given around the world, Watts has suggested that few designers recognize the full implications of digital audio sampling theory, which according to Watts point to an astonishing conclusion. ►

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Specifically, Watts contends that garden variety 44.1kHz digital audio files could, if processed through a digital filter of near infinite tap-length, yield analogue waveforms every bit as accurate and complete as those produced from higher-res audio files, albeit with slightly higher noise floors. Stop a moment and let that claim sink in. Watts is saying, in essence, that a DAC with a properly designed filter system can deliver ultra high-res sonic results from conventional CD-quality files.

To give some perspective, most normal DACs use filters offering a couple of hundred taps, whereas Chord's DACs use filters offering tens of thousands of taps, or more (the DAVE, for example, offers a filter with ~164,000 taps). Each time new Chord Electronics products up the number of available filter taps, says Watts, the WTA algorithm has had to be revised to take advantage of the additional processing power, while sound quality has audibly improved. This "more filter taps = superior sound" philosophy forms the underpinnings of the DAC designs found in the Hugo, Hugo TT, DAVE, Hugo 2, and now the new Hugo TT 2, which offers 98,304 filter taps (second only to the DAVE DAC within the Chord Electronics range). The Hugo TT 2 is one of our two review subjects here, the other being the Hugo M Scaler, which we will get to in a moment.

To state things simply, the Hugo TT 2 is different to and better than the original Hugo TT in every way. It is quieter, yields un-measurable levels of noise floor modulation, offers greater dynamic range, provides a different and better power supply, produces much more output power, and incorporates a markedly improved DAC section. In short, everything the Hugo TT could do, the Hugo TT 2 can do better.

The Hugo TT 2 sports a host of useful digital inputs: two optical, two coaxial BNC inputs, one driverless USB input (for use with tablets and smartphones), one USB Type-B input, and an aptX Bluetooth interface. Analogue outputs include: stereo XLR, stereo RCA, 2 × 6.35mm headphone jacks, and 1 × 3.5mm headphone jack. One set of dual DX BNC digital (expansion) output are also provided. By design, the Hugo TT offers three distinct operating modes: DAC mode with fixed line-level outputs, Amp mode with variable-level rear panel outputs, and Headphone mode with variable-level outputs from front panel-mounted headphone jacks.

The amplifier section of Hugo TT 2 is very powerful, delivering up to 7.3 W @ 8 Ohms in single-ended mode or a stonking 18 W @ 8 Ohms in balanced mode. For this reason, and with headphone/hearing protection in mind, Chord Electronics advises owners to start out with extremely low volume level settings and to proceed with appropriate caution. The DAC section of Hugo TT 2 is as flexible as the amplifier section is powerful, offering support for PCM digital audio files ranging from 44.1kHz on up to 768kHz sampling rates and with DSD support via DoP (DSD over PCM) for DSD 64 through DSD512 digital music files. As mentioned above, Hugo TT 2 uses a 10-element digital filter that provides 98,304 taps and that runs a 16FS WTA 1 filter algorithm. Moreover, the DAC section provides four user selectable sub-filter settings: Filter 1 'Incisive Neutral' (the recommended reference setting), Filter 2 "Incisive Neutral with HF roll-off", Filter 3 "Warm", and Filter 4 "Warm with HF roll-off'. An IR remote control is included.

Now we come the Hugo M Scaler, which in many ways is a ground-breaking product. Basically, the M Scaler is a very powerful digital upscaling device—claimed by Chord Electronics to be "the most advanced in the world". The M Scaler can accept virtually any digital audio file input regardless of resolution or sampling rate and will upscale the input data

to either 705.6kHz or 768kHz levels (depending on whether the data was based on a multiple of 44.1kHz or 48kHz). But upscaling, per se, is only part of the story; the other part is an FPGA-based digital filter that offers a staggering 1,015,808 taps and that runs under a specialised version of the WTA algorithm—one adapted to take advantage of the enormous processing power on tap. In the end, the M Scaler can send upscaled and pre-filtered audio data to any of the Chord Electronics DACs that support 705.6kHz and 768kHz inputs, including the Qutest, Hugo TT 2, and DAVE.

Much of the technology of the M Scaler is drawn from Chord Electronics' previously released Blu II upscaling CD transport, with the primary difference that the M Scaler features digital inputs only (no CD transport) and is sized and styled to conform to the Hugo TT family design idiom. From a sonic perspective, though, the real significance of the M Scaler is that it can take garden variety CD-quality material and upscale it to the highest practical sampling rates possible, while applying a digital filter so powerful that, says Watts, the result is sound quality equal to or better than that of ultra high resolution digital files. But here's another point to ponder; the M Scaler lets its owners access the most sophisticated digital filter Chord Electronics presently knows how to make—a filter better than the ones used either in the Hugo TT 2 or in the DAVE.

The M Scaler provides 2 × BNC digital inputs, 2 × optical digital inputs, and one galvanically isolated USB Type-B input. Digital outputs include 1 × optical output, 1 × coaxial S/PDIF output via a single BNC connector, and one dual BNC output, which is the output of choice for best performance. While the Hugo M Scaler can conceivably be used with any DAC, the manufacturer makes it clear it is really optimised for use with Chord Electronics DACs that provide high-bandwidth dual BNC inputs able to take full advantages of the Scaler's full capabilities. Once I heard the M Scaler in action I thought that its sonic benefits were both transformative and profound.

Using a group of very high performance reference headphones from Final, HiFiMAN, Meze, and MrSpeakers, I listened to the Hugo TT 2 both with and without M Scaler and here is what I learned. Heard in isolation, the Hugo TT 2 sounds like exactly what it is: one of the finest headphone amp/DACs available today. While it is not quite on a par with the more than twice as expensive DAVE, the Hugo TT 2 takes worthwhile steps forward relative to its predecessor in terms of resolution, clarity, focus, and coherency, while also offering quieter backgrounds and more dynamic muscle. In short, the Hugo TT 2 can more than hold its own in comparison to like-priced competition. However, fold the M Scaler into the equation and the picture changes dramatically for the better.

Quite candidly, the M Scaler makes substantial, across-the-board improvements to almost every qualitative aspect of the sound—so much so that you might feel like you are either A) listening through an altogether different and better headphone amp/DAC, or B) listening to delightfully re-mastered and/or much higher resolution versions of your favourite recordings. Once you hear the M Scaler in action, there's no going back.

I played a Virgil Fox pipe organ performance of Bach's Prelude and Fugue in D Minor from the Reference Recording *30th Anniversary Sampler* [Reference Recordings, HDCD] through the Hugo TT 2 and, as expected, it sounded superb. But, with the M Scaler in play, the unexpected sonic improvements I heard left me slack-jawed with astonishment. First, the pipe organ's low frequency pedal notes sounded more deeply extended (right down to the very low frequency shudder of air columns in the large pipes), much more tightly focused, and possessed of considerably more textural nuance. Second, the pipe organ's middle register sounded rounder, more expressive, and more full-throated, with a more spacious and three-dimensional presentation overall. Third, the organ's upper register passages, which had sounded just a bit congested when played through the Hugo TT 2 alone, suddenly sounded clearer, more delicate, and far more articulate, with virtually no congestion at all. Finally, the acoustic interaction between the pipe organ and the recording space was rendered more vividly and naturally, while apparent soundstage size increased. Impressively, these improvements were wrought upon a recording widely acknowledged to be a superb one to begin with.

I enjoyed similar benefits when I played the 'Triptych (Excerpt)' from *A Company of Voices – Conspirare in Concert* [Harmonia Mundi, 16/44.1]. This exuberant and syncopated piece for percussion ensemble and concert choir is not one that is easy for most DAC's to handle, in part because of the large-scale dynamic swings involved and the perhaps slightly over-modulated choral swells that at times threaten to become ragged and strained. However, with the M Scaler assisting the Hugo TT 2, the timing and timbres of the percussion ensemble instruments improved dramatically, with more incisive transient sounds, rounder tonalities all around, and the all-important qualities of 'swing' and dynamic 'jump' in evidence. Individual choral lines also became clearer and more intelligible, while the potentially problematic vocal swells sounded better controlled and more expressive, with elements of congestion mostly (though not entirely) cleared up. In addition, the sounds of the concert venue were captured more realistically (I can say this with some conviction because I was present in the hall on one of the ▶

evenings when the recording was made) and with appropriate stage width and depth. Once again, the M Scaler/Hugo TT 2 pair made an already good recording sound a whole lot better.

The Hugo TT 2 and Hugo M Scaler fit together like a sonic hand in a glove; once you hear them together, you won't ever want for them to be apart. While Chord Electronics' DAVE may be in a class of its own as a standalone headphone amp/DAC, the combination of the Hugo TT 2 and the Hugo M Scaler actually costs less than the DAVE and may actually offer better all around performance, which is saying a mouthful. +

TECHNICAL SPECIFICATIONS

Chord Electronics Hugo TT 2 headphone amplifier/ preamp/DAC

Type: Solid-state headphone amplifier/preamp/DAC
Inputs: Two TOSLink optical, two coaxial BNC, one driverless USB input, USB Type-B, aptX Bluetooth
Outputs: Analogue: Stereo XLR, stereo RCA, 2 × 6.35mm headphone jacks, 1 × 3.5mm headphone jack
Digital: 2 × DX BNC (expansion outputs)
Formats supported: PCM from 44.1kHz to 768kHz sampling rates. DSD (via DoP) from DSD64 to DSD512
Digital Filters: 98,304-tap 16FS WTA 1 (Watts Transient Alignment) digital filter. Four user-selectable sub-filters:
Crossfeed: Four user selectable settings
Operating Modes: Three options are supported:
Headphone mode: Hugo TT 2 operates as headphone amp/DAC with variable output levels.
Amplification mode: Hugo TT 2 operates as a digital preamplifier with variable output levels. DAC mode: Hugo TT2 operates as a DAC with fixed line-level outputs
Dynamic Range: 127dB (A weighted)
Noise: 4µV (A weighted, high gain), 1.7µV (A weighted, low gain) with no measurable noise floor modulation
Distortion: 0.00008% @ 2.5V, 300 Ohms; 0.00016% @ 6W. 8 Ohms
Power Output (@1% THD): Unbalanced 300 Ohms: 288mW RMS, 8 Ohms: 7.3W RMS
Balanced: 300 Ohms: 1.15W RMS
8 Ohms: 18W RMS
Dimensions (H×W×D): 40.5 × 235 × 223mm
Weight: 2.53kg
Price: £3,995 (UK), $5,795 (US)

Chord Hugo M-Scaler digital upscaling device

Type: Digital upscaling device with a greater than 1M-tap digital filter
Digital Inputs: 2 × BNC, 2 × optical, 1 × galvanically isolated USB Type B
Digital outputs: 1 × optical, 1 × S/PDIF, 1 × galvanically isolated dual BNC (which supports upscaling to 768kHz from 48kHz data)
Upscaling: 44.1kHz digital audio files (or multiples of 44.1kHz) upscaled to 705.6kHz via dual BNC outputs
48kHz digital audio files (or multiples of 48kHz) upscaled to 768kHz via dual BMC outputs
FPGA device: Xilinx XC7A200T
Digital Filters: 1, 015,808-tap WTA (Watts Transient Alignment)
Dimensions (H×W×D): 46 × 235 × 236mm
Weight: 2.55kg
Price: £3,495 (UK), $4,995 (US)

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URL: bluebirdmusic.com