HERB REICHERT

TEAC UD-701N

STREAMING PREAMP, D/A CONVERTER

In Gramophone Dreams #88, I described the sound of TEAC's VRDS-701T CD transport as "dense and precise in a way I had never previously heard from digital." I went on to explain, "by 'dense,' I mean there was a tangible *corporeality* effected by seemingly infinite quantities of small, tightly packed molecules of musical information."

What I noticed most during the review period was the extraordinary volume of data the 701T was vacuuming off those pits and lands and turning into music. As I have gotten to know it better, what I've noticed most is how the 701T sorts and delivers all that data in a manner that makes every DAC I pair it with sound more corporal and dynamic.

As I wrote that review, I wondered how the 701T would perform partnered with its matching UD-701N converter/streamer/preamplifier and how the TEAC flagship DAC's sound character would compare to flagship DACs from HoloAudio, Denafrips, and dCS.

Now I know. These are my impressions.

Description

The TEAC UD-701N ($4299.99) is the heart of a trio of matching 700-series components that includes the VRDS-701T CD transport and the smart-looking AP-701 power amplifier. The UD-701N isn't

SPECIFICATIONS

Description Two-channel D/A converter, streamer, line-level preamp, and headphone amplifier. Digital inputs: two coaxial (one S/PDIF, one BNC), two optical (TosLink), one USB, one Ethernet (RJ45). Analog inputs: stereo pair balanced (XLR), stereo pair single-ended (RCA). Audio outputs, line-level: stereo pair balanced (XLR), stereo pair single-ended (RCA); headphone: single-ended (1/4" stereo), 4-pin balanced (XLR). Other: clock sync input. 12V trigger in/out, RS-232 serial port (control). Frequency response: 5Hz–80kHz, +1/–5dB. THD: 0.002%. S/N ratio: 108dB (1kHz, A-weighted). Headphone amplifier maximum output power: 700mW into 32 ohms balanced, 500mW into 32 ohms single-ended. Supported headphone impedance: 16–600 ohms. Supported formats: PCM to 384kHz, FLAC, Apple Lossless (ALAC), WAV, AIFF, MQA. DSD to 22.5MHz. Supported Bluetooth codecs: LDAC, LHDC, AAC, SBC, Qualcomm aptX, aptX HD. Supported streaming services: Spotify Connect, Tidal Connect, Qobuz, TuneIn.

Dimensions 17.5" (444mm) W × 4.5" (111mm) H × 13.25" (334mm) D, including protrusions. Weight: 26.2lb (11.8kg).

Serial number of unit reviewed 2250081. Designed in Japan, manufactured in TEAC's own factory in Dongguan, China. Warranty repairs carried out at a service center in Buena Park, California.

Price $4299.99. Number of US dealers: 50 bricks and mortar, 5 online. Warranty: Three years parts and labor with registration.

Manufacturer

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Tokyo 206-8530, Japan
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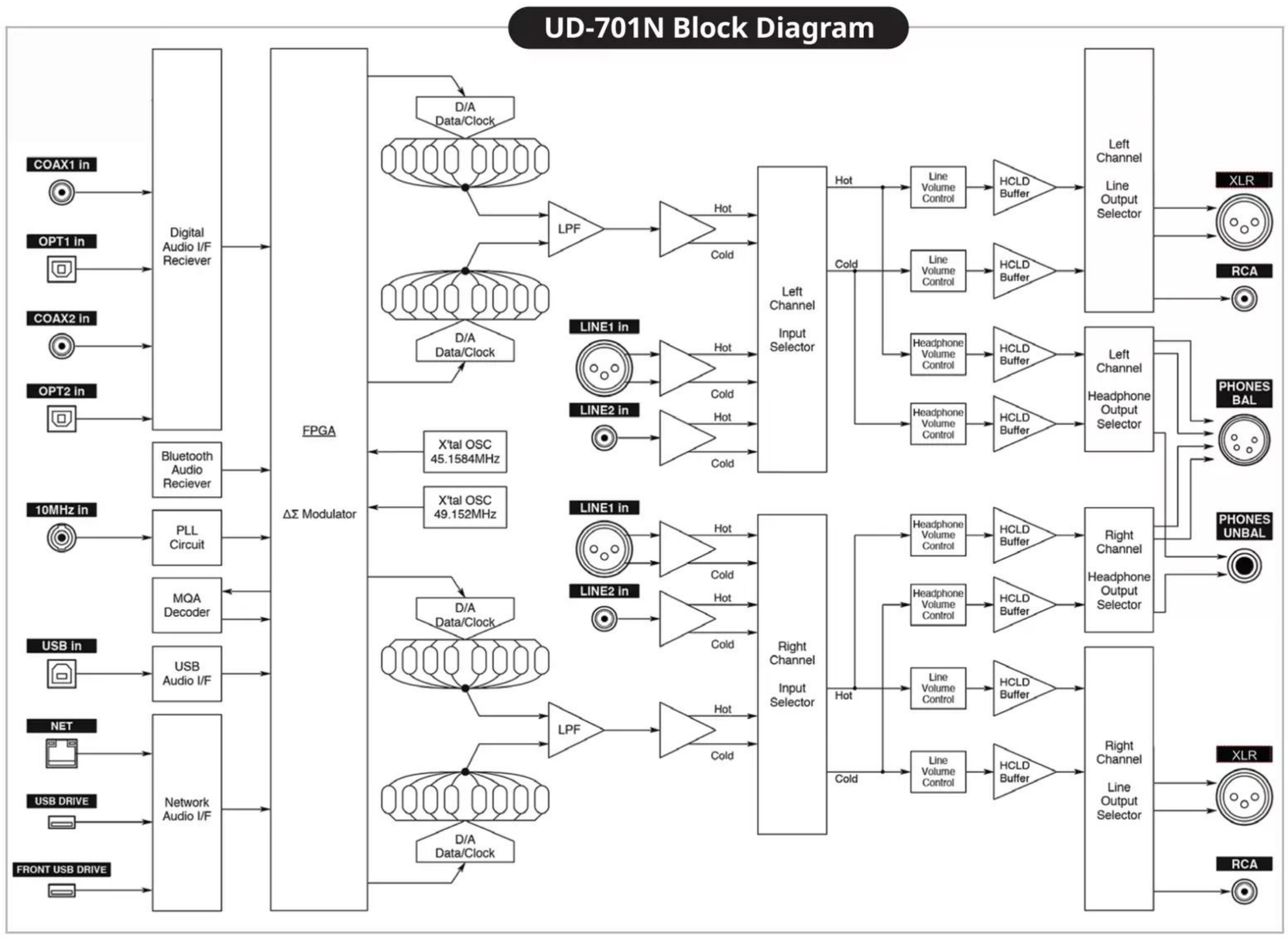
US distributor:
Playback Distribution
3257 Wildlife Tr.
Zionsville, IN 46077
Web: playbackdistribution.com

just a DAC; it's also a fully balanced, two-input (RCA + XLR) line-level preamplifier and a two-output headphone amplifier (4-pin XLR and 1/4" jack).

The DAC part of the UD-701N isn't just another chip DAC. TEAC explains: "Instead of using a generic DAC [integrated circuit], we incorporated a custom-developed TEAC ΔΣ (Delta Sigma) discrete DAC comprised of discrete circuitry that uses FPGA"—field-programmable gate array—"incorporating our original algorithms." See the block diagram below.

"DSD signals are transmitted as is, while PCM signals are transmitted after passing through a ΔΣ modulator and conversion to either 1-bit or multibit signals, according to the end user's choosing." Multibit is the default. "With the TEAC ΔΣ discrete DAC, playback of 22.5MHz DSD and



MEASUREMENTS

I performed a full set of measurements on the TEAC UD-701N using my Audio Precision SYS2722 system.[1] I started the testing by examining the performance of the UD-701N's DAC. I used the coaxial and optical S/PDIF inputs, both of which accepted data sampled at rates up to 192kHz, and USB data sourced from my MacBook Pro running on battery power. I also connected the UD-701N to my network and installed the TEAC HR Streamer app on my iPad mini. The app doesn't appear to allow access to the processor's settings, however; it's just for playback including the usual streaming services as well as Roon. I adjusted the settings with the front-panel Menu button and the remote.

The USB Prober utility identified the D/A processor as "MODEL_NAME TEAC USB AUDIO DEVICE" from "TEAC Corporation," with the serial number string "\001," and indicated that the USB port operated in the optimal isochronous asynchronous mode. Apple's AudioMIDI utility showed that the UD-701N accepted 16-bit, 24-bit, and 32-bit integer data via USB with 16-bit data accepted with sample rates up to 1356kHz! (I assume the last applies to DSD-encoded input data.) The maximum sample rate with 24-bit and 32-bit PCM data was a still-impressive 768kHz.

The DAC operated in several modes via four settings. First, users can set "upconversion" to native, 2×, 4×, or 8×Fs. Next, multibit or single-bit (DSD) delta-sigma modulator output can be chosen. Finally, the delta-sigma modulator sampling frequency can be set to 128×, 256×, or 512×Fs. Here, Fs refers to the original sampling frequency; upconverting the input does not affect the delta-sigma modulator output sampling frequency.

1 See stereophile.com/content/measurements-maps-precision.

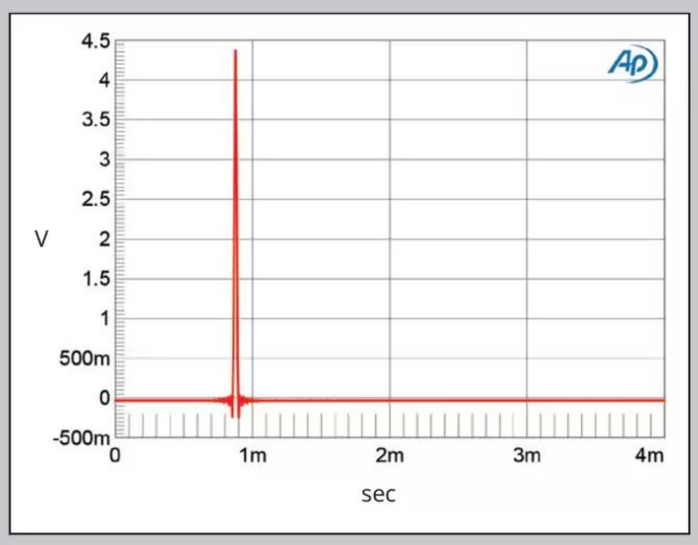


Fig.1 TEAC UD-701N, digital inputs, PCM, no upsampling, impulse response (one sample at 0dBFS, 44.1kHz data, 4ms time window).

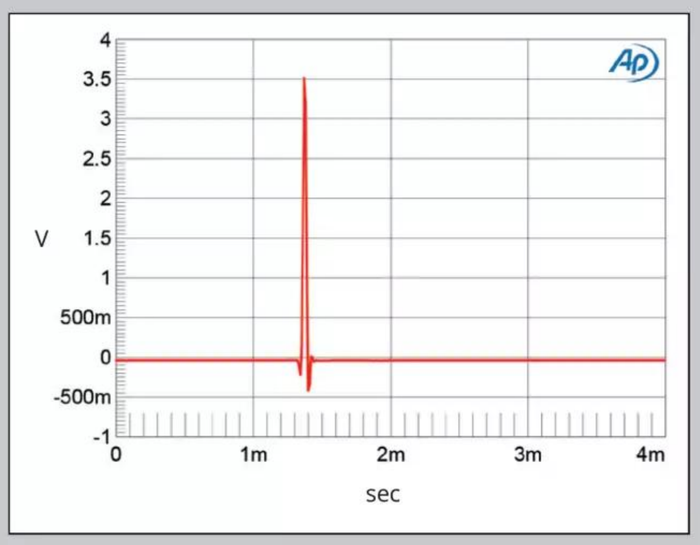


Fig.2 TEAC UD-701N, digital inputs, DSD upsampling, impulse response (one sample at 0dBFS, 44.1kHz data, 4ms time window).

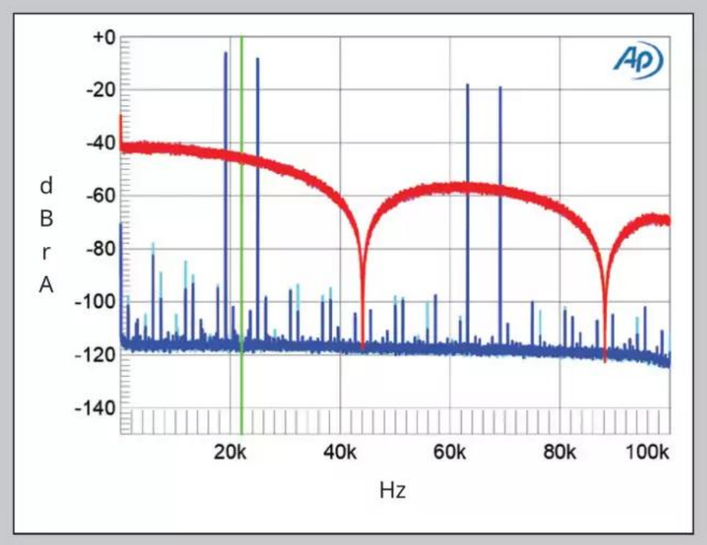


Fig.3 TEAC UD-701N, digital inputs, upsampling off, wideband spectrum of white noise at –4dBFS (left channel red, right magenta) and 19.1kHz tone at –3dBFS (left blue, right cyan) into 100k ohms with data sampled at 44.1kHz (20dB/vertical div.).

384kHz/32-bit PCM is possible."

Up-conversion can be used with all digital inputs and comes in three powers: 2×, 4×, or 8×Fs. Users can also set the ΔΣ sampling frequency: 128×, 256×, or 512×Fs.

TEAC's signature antivibration strategy is evidenced by its four minimally attached "floating" toroidal power transformers, one for each channel's fully balanced high-current analog section—the 701N is truly dual-mono—one for the network module, and one for the digital-control sections.

The 701N's feet contribute further to that low-vibration strategy. "TEAC's three pinpoint feet utilize a new mechanism that provides protection on the bottom panel to suppress vibrations that ultimately affect audio quality. Even the length of the side fins of the device that are for heat dispersion have also been adjusted to prevent sympathetic vibrations."

Most digital components either ignore vibration-induced nonlinearities or throw mass and rigidity at the problem. TEAC's UD-701N and VRDS-701T opt for a strategy I regard as more elegant. It may also be more effective.

The 701N's brushed-aluminum front panel matches that of the VRDS-701T transport and the AP-701 amplifier. It's a timeless-looking facia that will work aesthetically in a serious audiophile rack, on a bureau top in a luxury home, or in a professional recording studio. Its semifaux "rack handles" keep the component from looking generic and contribute to the 701N's ability to look at home in diverse environments.

I enjoyed the assurity of the front panel's mechanical power/standby switch. The feel of the centrally located selector knob and far right volume knob scream luxury and tight-tolerance manufacturing. In my room, where I often listen near enough to reach forward and turn these knobs, the OLED display seemed just the right size and color: discrete and professional, like an experienced waiter in a fine restaurant.

In use, the 701N exhibits a strong sense of drive, which TEAC attributes to its output-buffer circuits. "We used TEAC-HCLD2 circuits, which are improved versions of our TEAC-HCLD (TEAC High Current Line Driver) enhanced-current output buffer circuits. These raise the current transmission capabilities that are important in analog output circuits. Each channel has a positive and negative two-circuit structure with diamond buffer amplifiers, which have high current transmission capabilities, used as line drivers. Drive is differential for balanced output and parallel for unbalanced output. By increasing the current supply ability, transmitting the dynamism of audio signals without loss becomes possible."

My suspicious nature urged me to email the never-sleeps public relations ball-of-fire Jaclyn Inglis of Jaclyn Inglis PR & Communications. She facilitated my TEAC DAC investigations by asking TEAC's engineers to verify that the analog input signals remained analog all the way through, including to the headphone outputs.

"Yes, all analog inputs are all analog all the way through. The signal path does not have any analog to digital conversion."

The volume control is all-analog; TEAC describes it this way: "Our TEAC-QVCS (Quad Volume Control System) is a variable gain amp volume control (see block diagram) with four independent circuits for left, right, positive, and negative (L+, L–, R+, and

measurements, continued

There's a choice of two low-pass filters for DSD, which smooths the data resulting in analog output; it can also be switched off. I performed complete sets of digital-input tests in all the upsampling modes, repeating some of the tests with upsampling turned off.

The TEAC's digital inputs preserved absolute polarity from the balanced and unbalanced line outputs, and from the balanced and unbalanced headphone outputs. With the line output mode set to "variable," the volume control operated in 2dB steps at the top of its range, these reducing first to 1.5dB steps, then to 1dB steps at settings of "85" and below. With a 1kHz tone at –12dBFS, the headphone outputs clipped unless I reduced the volume from "100" to "96," when the output voltage was 8.9V, balanced, and 5.6V, unbalanced. With the volume control set to the maximum, the UD-701N's line output levels with the 1kHz signal at –12dBFS were 7.6V, balanced, and 7.2V, unbalanced. As is often the case, the TEAC's digital inputs offer excessive gain, though this does mean that the analog noisefloor will be lower in level at lower volume settings (see later).

The output impedances were all usefully low: 247 ohms at 20Hz, 228 ohms at 1kHz and 20kHz, for the balanced line out; 65 ohms at 20Hz, 62.3 ohms at 1kHz and 20kHz, for the single-ended line output; 25 ohms from 20Hz to 20kHz for the balanced headphone output; and 11.7 ohms across the audioband for the unbalanced headphone output.

Fig.1 shows the UD-701N's impulse response with USB data sampled at 44.1kHz and upsampling turned off. There is no reconstruction filter; the impulse response

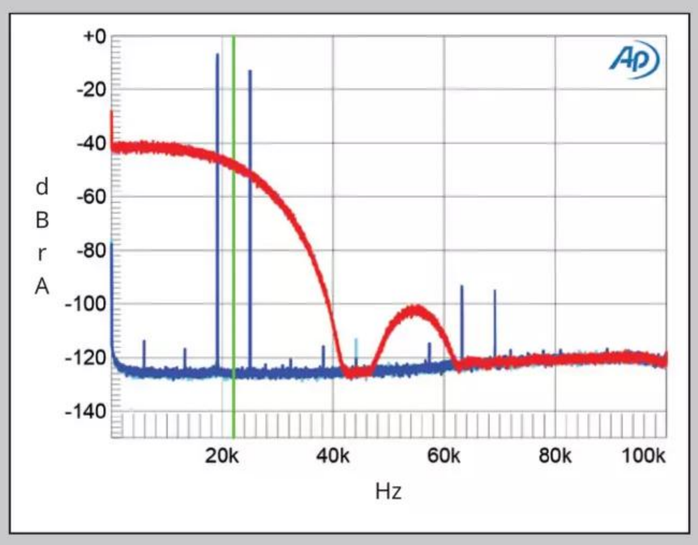


Fig.4 TEAC UD-701N, digital inputs, DSD upsampling, Filter 1, wideband spectrum of white noise at –4dBFS (left channel red, right magenta) and 19.1kHz tone at –3dBFS (left blue, right cyan) into 100k ohms with data sampled at 44.1kHz (20dB/vertical div.).

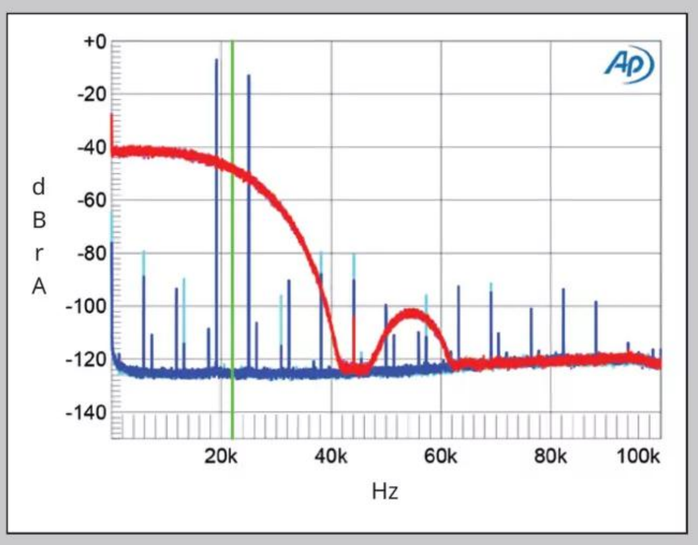


Fig.5 TEAC UD-701N, digital inputs, DSD upsampling, Filter 2, wideband spectrum of white noise at –4dBFS (left channel red, right magenta) and 19.1kHz tone at 0dBFS (left blue, right cyan) into 100k ohms with data sampled at 44.1kHz (20dB/vertical div.).

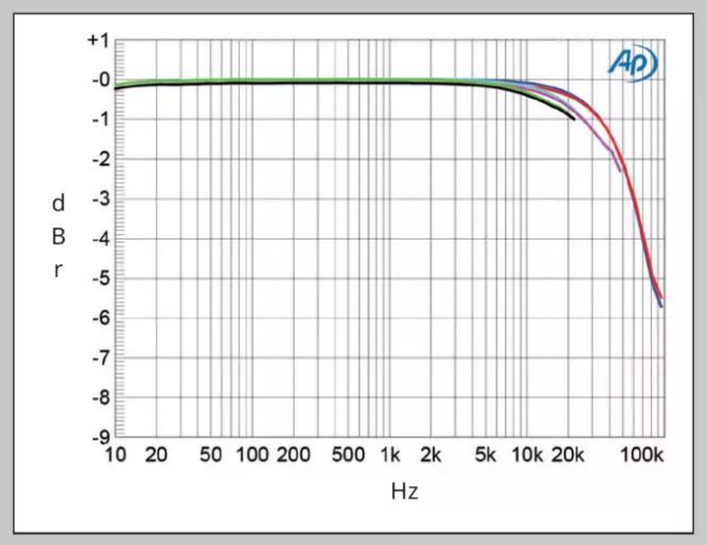


Fig.6 TEAC UD-701N, digital inputs, upsampling off, frequency response at –12dBFS into 100k ohms with data sampled at: 44.1kHz (left channel green, right gray), 96kHz (left cyan, right magenta), and 192kHz (left blue, right red) (1dB/vertical div.).

R-)." During these auditions, the 701N provided sufficient gain to drive all three of my amplifiers directly. If you're using it with a preamplifier, the volume control can be bypassed and the fixed output set to either 2V or 4V.

The 701N offers Bluetooth including the LDAC, LHDC, AAC, SBC, aptX, and aptXHD audio codecs; I didn't use Bluetooth. It is also Roon Ready.

The 701N's aluminum and plastic remote is simple to use and solidly built. There's a custom application for Windows and Mac computers—TEAC HR Audio Player—and an app for smartphones and tablets: TEAC HR Streamer, available for iOS and Android. The Streamer app is bare bones but very good: easy to install and intuitive to use. It's available for iOS and Android.

Listening via the analog input

The first test recording I played with the UD-701N DAC/Network player was the LP *Felt* by Nils Frahm (Erased Tapes Records ERATPO33LP). I used this reverb-drenched contemporary recording to assess how the 701N's line-level input handles transients and reverb tails and how invisible the preamp section was. It was clear by the end of the first album side that notes from Frahm's piano were not blurred or foreshortened. This completeness allowed the carefully constructed

measurements, continued

is a time-perfect delta function, with none of the usual ringing before and after the single sample at 0dBFS. (The tiny amount of ringing in this graph is due to the Audio Precision's antialiasing filter.) With all the upsampling modes, the impulse response had the one cycle of ringing before the single sample at 0dBFS due to the Audio Precision's ADC, with the postsample ringing slightly greater in amplitude (fig.2).

The magenta and red traces in fig.3 show the TEAC's wideband spectrum with 44.1kHz white noise data at –4dBFS and no upsampling. As is usually the case with a NOS DAC, the ultrasonic behavior comprises mirror-imaged versions of the audioband spectrum each side of the integer multiples of the baseband sample rate. The primary aliased images of a 19.1kHz tone at –3dBFS (cyan, blue) are barely suppressed, and there are higher-order aliased images present at low levels. Repeating this analysis with the 44.1kHz data upsampled to multibit delta sigma or DSD gave a better-behaved result. The result was very similar in both these modes. With the DSD low-pass Filter 1 engaged (fig.4), there is now a gentle rolloff above the audioband, and while the image at 25kHz of the 19.1kHz tone is only suppressed by 6dB, the other aliased images have almost completely disappeared. However, they reappear with DSD Filter 2 (fig.5).

The frequency response with 44.1kHz, 96kHz, and 192kHz data without upsampling is flat in the audioband with a slow rolloff beginning below half of each sample rate (fig.6). With upsampling, the rolloff starts earlier. With 44.1kHz data upsampled to DSD or multibit delta sigma at 512kHz, for example (fig.7, green and gray traces), the response is down by 3dB at 19.5kHz. Channel separation was superb, at >115dB in both directions below 3kHz and still 107dB at the top of the audio-

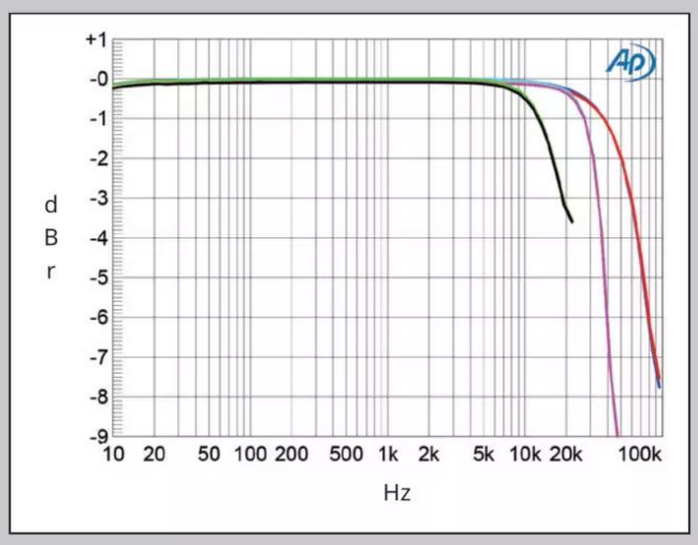


Fig.7 TEAC UD-701N, digital inputs, DSD upsampling, frequency response at –12dBFS into 100k ohms with data sampled at: 44.1kHz (left channel green, right gray), 96kHz (left cyan, right magenta), and 192kHz (left blue, right red) (1dB/vertical div.).

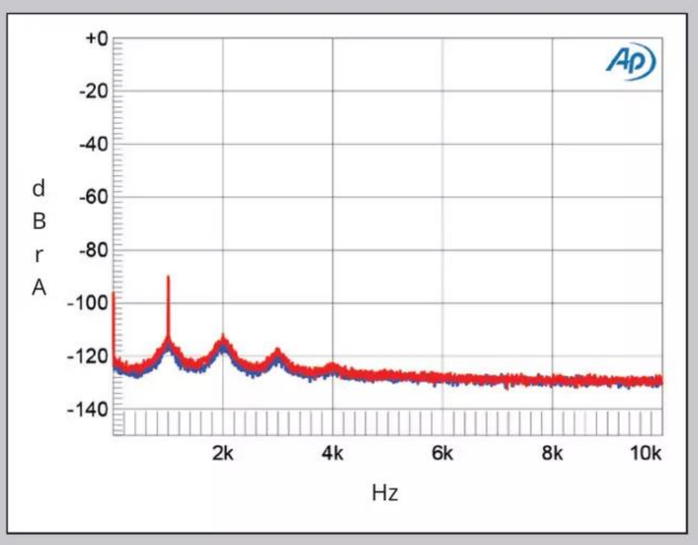


Fig.8 TEAC UD-701N, digital inputs, upsampling modes, spectrum with noise and spuriae of dithered 1kHz tone at –90dBFS with 24-bit data (left blue, right red) (20dB/vertical div.).

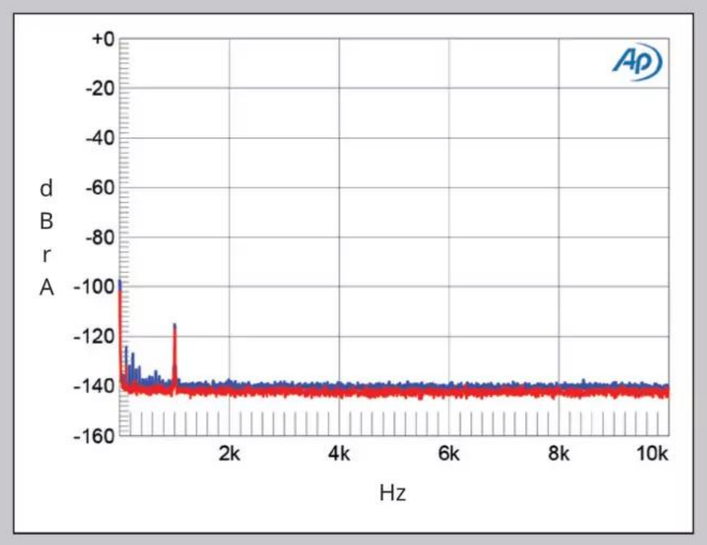


Fig.9 TEAC UD-701N, digital inputs, upsampling modes, spectrum with noise and spuriae of dithered 1kHz tone at –120dBFS with 24-bit data (left blue, right red) (20dB/vertical div.).

space of Frahm's recording to occupy my space with the same level of immediacy and transparency it did while playing this recording through the TEAC DAC into the HoloAudio Serene preamp. The only discernable difference between the TEAC alone and with the Serene between it and the First Watt SIT-4 amplifier was the quality of "finish" on the sound energy. Driving the SIT-4 directly, the 701N put a nice semigloss on the sound. Signals coming out of the Serene exhibited an equally clear but more satiny finish.

When tube-fired analog signals—like those from PrimaLuna's 10-tube EVO 100 phono stage—pass through HoloAudio's solid state Serene preamp, they do not come out sounding hard or transistorized. Instead, they come out sounding *almost* the same as they do coming out of PrimaLuna's eight-tube EVO 400 line-level preamp. The 400 pre adds a teaspoon of reverberant "juice" that wets the transparency, but in a casual blind test, I doubt I could guess which preamp was playing. I'm pretty sure I *could* distinguish between those preamps and the 701N's output. The UD-701N plays substantially more firmly and forcefully than the Serene or the EVO 400. That forcefulness would be a strong tell.

In my system, the 701N's analog stage played LPs with unusually deep, perfectly tuned bass; a task that was likely assisted by First Watt's new SIT-4 power amplifier, which applies a just-right, never-too-tight grip on my Falcon's woofers. No matter how we divvy up the credit, with the 701N direct-driving the SIT-4, my Gold Badge LS3/5a went lower in the bass (possibly below 50Hz) and pushed it out harder and tighter than I ever imagined possible. Bass was suddenly something I could follow and pay attention to. The listening impact of this deeper, tighter, more forceful bass was quite pronounced, and *totally* enjoyable.

Listening via S/PDIF

With every DAC I tried, the 701T was so neutral tonewise, so thoroughly excavated data-wise, and so well-formed space- and contrast-wise that I decided it would be the perfect source for evaluating DACs. After trying all my reference DACs, I began my TEAC 701T + 701N auditions by spinning the best-sounding CD I own: M•A Recordings' *Sara una Noche: Otra Noche* (MA092A). I figured if that source-combo sounds dry, or less than ultra-vivid and super-3-D, this story wouldn't end well. I was expecting Everest-level digital sound and, fortunately, that is what I heard.

The first thing I noticed was how those first dramatic notes at the start of track one, "Viejo Ciego," exposed the complete volume of the recording venue. The detail and hyperclarity of *Otra Noche*'s echo and reverb dominated the drama—as did the flawless vocal and instrumental tones. Santiago Segret's bandoneon, Marcelo Mogilevsky's clarinet, and Lidia Borda's voice projected large, clear, and extraordinarily present in my room. This was exactly the kind of big, well-drawn, lock-me-on sound I am always hoping to find.

Then again, *Otra Noche* is the finest digital recording I know. It would sound moving and three-dimensional coming out of a boom box. As one of my old pals used to say, "Your hi-fi is only as good as how it plays your worst record." I can't think of a "worst" record, but I do have some CDs containing good music but with sound that is off in a way that prevents my full engagement. One of those is a

measurements, continued

band. With the volume control set to the maximum, the random noisefloor lay at the 16-bit level but dropped as the volume was lowered. With the control set to "75," the noisefloor dropped by 23dB, for example. The only supply-related spurious tone was at 120Hz; it lay at an insignificant –124dBFS even with the volume control set to "100."

When I examined the spectra with 16- and 24-bit dithered data representing a 1kHz tone at –90dBFS, the increase in bit depth didn't lower the noisefloor in any of the modes (fig.8), which suggests a measured resolution of 16 bits. There was also some noise modulation to each side of the tone and its low-order harmonics. However, when I repeated this test with dithered 24-bit data representing a 1kHz tone at –120dBFS, the harmonics and noise modulation disappeared, though the tone was reproduced 5dB too high in level (fig.9). When I played undithered data representing a tone at exactly –90.31dBFS, which consists of data at –1LSB, digital zero, and +1LSB, the waveform in all the modes was slightly asymmetrical (fig.10) and was overlaid with a higher level of random noise in DSD mode.

With DSD upsampling, the TEAC's digital inputs produced primarily second-harmonic distortion (fig.11), this lying at –84dB (0.006%). When I repeated this analysis in multibit mode, the noisefloor was lower and the second harmonic was only slightly higher in level, but it was now accompanied by many higher-order harmonics, albeit at low levels (fig.12). These tests were performed with the balanced line output; repeating the spectral analyses at the same voltage from the balanced headphone and unbalanced headphone and line outputs and with a 1kHz signal, as well as 50Hz at –10dBFS gave similar results (not shown). On the positive side, the levels of the harmonics didn't increase into the punishing 600 ohm load, so perhaps they arise from the multibit upsampling

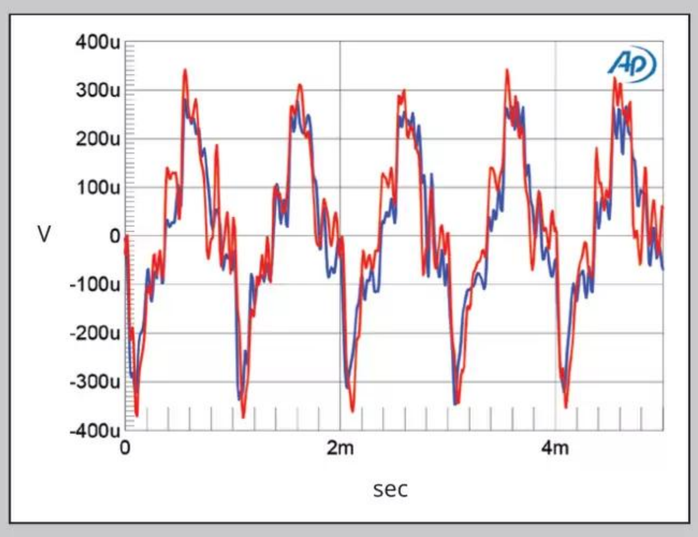


Fig.10 TEAC UD-701N, digital inputs, multibit delta-sigma upsampling, waveform of undithered 1kHz sinewave at –90.31dBFS, 16-bit data (left channel blue, right red).

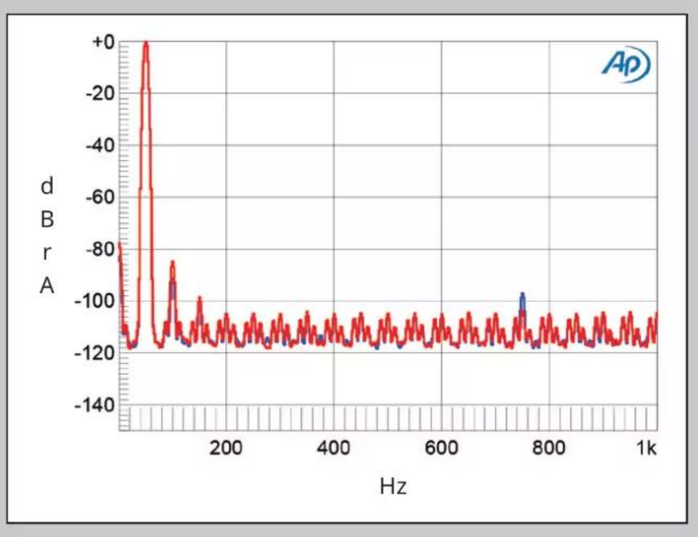


Fig.11 TEAC UD-701N, digital inputs, DSD upsampling, spectrum of 24-bit 50Hz sinewave, DC–1kHz, at 3V into 100k ohms (left channel blue, right red, linear frequency scale).

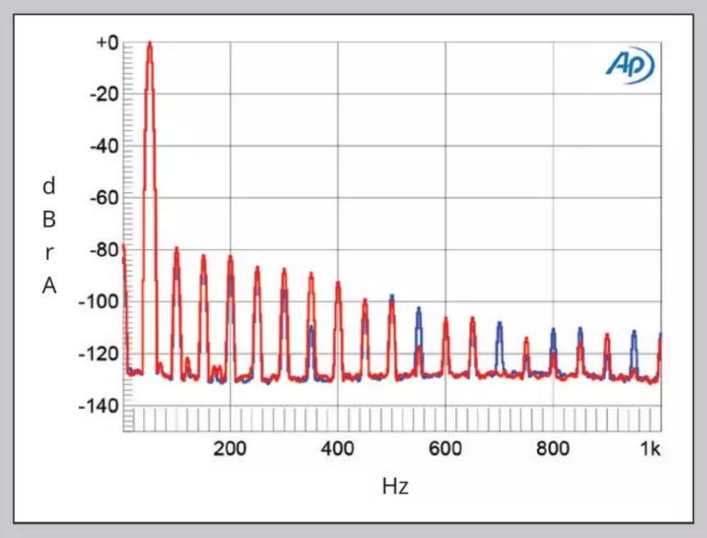


Fig.12 TEAC UD-701N, digital inputs, multibit delta-sigma upsampling, spectrum of 24-bit 50Hz sinewave, DC–1kHz, at 3V into 100k ohms (left channel blue, right red, linear frequency scale).

1997 collection of American folk music called *American Primitive Vol. 1: Pre-war Gospel (1926 – 1936)* (Revenaṅt RVN 206).

Despite their vintage, the mostly electric recordings in this nicely mastered collection sound crisp and clean and not muffled. Obviously, producer John Fahey saw to it that their raw expression was not smothered by soul-crushing noise reduction. Unfortunately, my Onkyo C-7030 CD player blurred, dulled, and failed to resolve most of the low-level background sounds that describe the recording site. This canceled any hope for audio *verité* and made getting into the songs difficult. Fortunately, TEAC's 701T transport + UD-701N DAC located all the data the Onkyo lost and put it in precisely ordered focus. The beats and rhythms and inner details of these recordings came through in a manner that was easy to notice and appreciate.

The greatest virtue of this TEAC combo was how *different* it allowed each singer's voice to sound. It did this by laying out clearly their unique harmonic palettes and fully exposing the nuanced particles of pace and inflection. I regard this as evidential proof of these components' accuracy.

TEAC's VRDS-701T transport feeding TEAC's UD-701N DAC-preamp through Kimber Kable's D60 coaxial cable played all my favorite CDs with what I currently regard as leading-edge resolve.

MQA via JPS Labs in binaural

I only own one MQA recording, but it's a doozy. It's on a CD, and surely one of the most real-sounding live recordings I've encountered.

Inside the Moment is a luxuriously packaged Chesky Records production (Chesky Records CD JD397) of Camille Thurman singing and playing saxophone, recorded live at New York's Rockwood Music Hall with a B&K binaural head feeding an MSB A/D converter, engineered and mastered via the sharp, wise ears of Nicholas Prout.

Before I acquired this spectacular CD, I'd only experienced MQA via streaming on Tidal[1] through either a Mytek or a dCS DAC. But this crazy-cool binaural recording sounded crisper, better sorted, and more colorful than Tidal's regular 16/44.1 MQA fare. Besides extreme transparency and sharp focus, this recording is an orgy of reverberant three-dimensionality.

I listened using JPS Labs Abyss Diana TC headphones, and the sound was 100% transparent and 3D and disarmingly *real* in a manner that made the headphones disappear as the source of the sound.

You know how audiophiles are always trying to make their speakers disappear? Well, this binaural Chesky disk does that trick, too. No speakers. No headphones. Just my favorite drummer, Billy Drummond, masterfully playing his drums—over *there*, on the stage in front of me. Likewise, Camille Thurman's sax and vocals were maybe 8' in front of me. The couple at the little table next to me were whispering, and the waitperson was delivering cocktails. Applause was as fleshy and lifelike as I've

1 Tidal stopped streaming in MQA during the first half of 2024. A new MQA-based streaming service is planned, a collaboration of Chesky and Lenbrook, parent company of Bluesound, NAD, and PSB.

measurements, continued

algorithm.

Intermodulation distortion with optical data representing an equal mix of 19 and 20kHz tones, each at –6dBFS, was relatively low in level, though a large number of aliasing products were present with multibit delta-sigma–upsampled data (fig.13). DSD upsampling behaved better in this respect (fig.14).

Fig.15 shows the spectrum of the UD-701N's output when it was fed 16-bit J-Test data via USB, upsampled to DSD. The odd-order harmonics of the undithered low-frequency, LSB-level squarewave lie at the correct levels, though there are some supply-related spuriae either side of the central spike that represents the high-level tone at one-quarter the sample rate (Fs/4). Peculiarly, the noisefloor was higher in level with 16-bit TosLink data, both with and without upsampling.

Turning to the UD-701N's analog line inputs, these preserved absolute polarity for all four output types. The single-ended line input impedance was a fairly high 23.4k ohms at 20Hz and 1kHz, 19.6k ohms at 20kHz. The balanced input impedance was much lower, at 1920 ohms at all audio frequencies. With the volume control set to the maximum, "100," the voltage gain with a 1kHz balanced input was 18dB from the balanced line output and 25.3dB from the balanced headphone output. The gain with an unbalanced input was 5.8dB higher from all the outputs. Setting the line outputs to "Fixed 0dB" gave the same output voltages as with the volume control set to "100."

The balanced line frequency response was flat up to 100kHz into 100k ohms and 600 ohms; the very close channel balance and the overall response were preserved

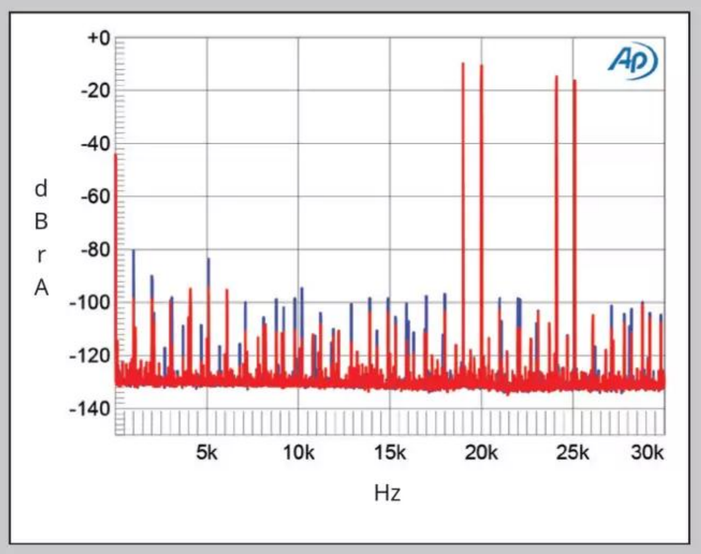


Fig.13 TEAC UD-701N, digital inputs, multibit delta-sigma upsampling, HF intermodulation spectrum, DC–30kHz, 19+20kHz at 0dBFS into 100k ohms, 24-bit, 44.1kHz data (left channel blue, right red; linear frequency scale).

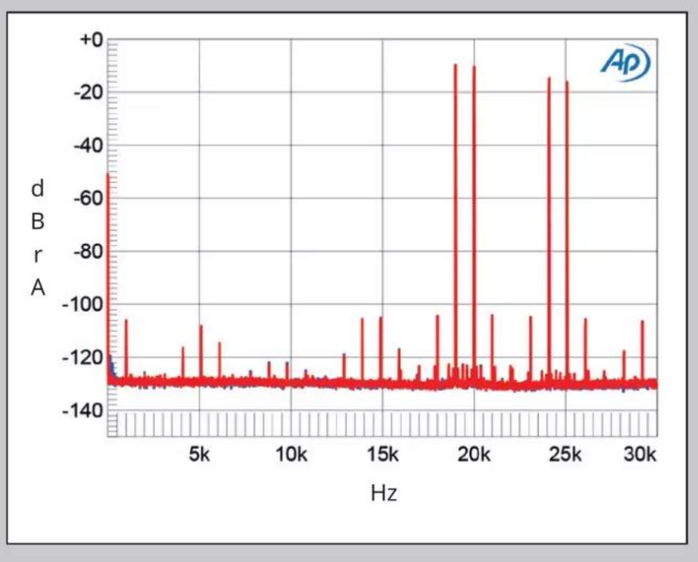


Fig.14 TEAC UD-701N, digital inputs, DSD upsampling, HF intermodulation spectrum, DC–30kHz, 19+20kHz at 0dBFS into 100k ohms, 24-bit, 44.1kHz data (left channel blue, right red; linear frequency scale).

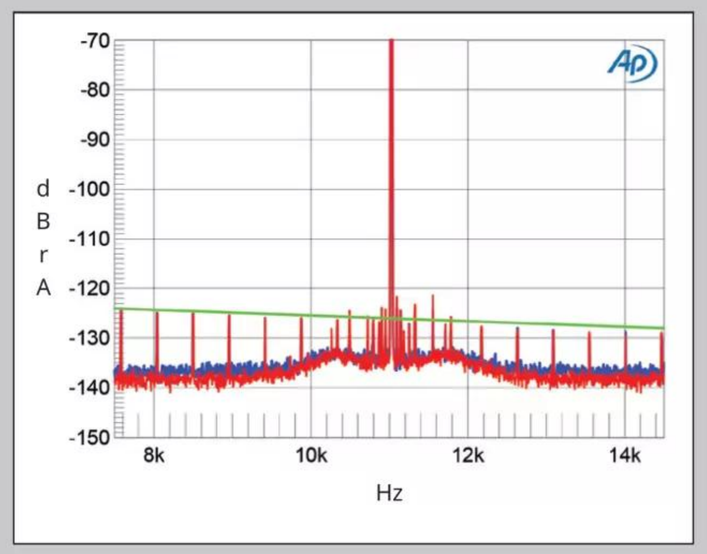


Fig.15 TEAC UD-701N, DSD upsampled 16-bit USB data, high-resolution jitter spectrum of analog output signal, 11.025kHz at –6dBFS, sampled at 44.1kHz with LSB toggled at 229Hz (left channel blue, right red). Center frequency of trace, 11.025kHz; frequency range, ±3.5kHz.

ever heard it from any recording. By any measure, this was a "wow" audio moment, featuring conspicuously high-fidelity reproduction.

The 701T transport read the disc. The 701N identified it as MQA, unwrapped it at 176.4kHz, and made sound that was stunningly real.

Listening via Ethernet

I've been American dreamin', oh-whoa-oh
I'm American dreamin', oh-whoa-oh
I'm American dreamin', oh-whoa
But I never seem to get no rest

The first voice I heard through the Ethernet-connected UD-701N was that of my latest singer-songwriter crush, Sierra Ferrell, singing "American Dreaming," composed by Ferrell and Melody Walker, off of Ferrell's good-sounding 2024 album *Trail of Flowers* (24/96 FLAC, Rounder/Qobuz). The sound was clear—not compressed or opaque—plus wide, deep, and pacy. Within seconds, the sincerity of Ferrell's voice was choking me up. By the second chorus, I was streaming tears—exactly what it didn't do when I played this Qobuz album via USB from my Mac mini. Played back from the computer, it had blah and meh issues. The sound was not nearly as clear and engaging as it was via the network directly into the UD-701N, served up by TEAC's HR Streamer app.

No matter what DAC I am using in my floor system, sourcing Qobuz from my not-dedicated computer, driving 5m of USB wire, the feel of the sound reminds me of driving a dirty car on a sunny Sunday. My religion forbids such acts.

I use dCS's Mosaic control app with my reference Lina DAC, and its transparency is several steps beyond squeaky clean. Which is how I would describe the sound quality via TEAC's app-controlled "HD Network" connection.

To me, streamed music is boring without material force and high-energy dynamics. Fortunately, the 701N delivers both. I encountered a lot of visual and sonic excitement while playing King Crimson's "Moonchild" from *In the Court of the Crimson King* (24/96 FLAC, Atlantic/Qobuz). Who knows the provenance of this King Crimson file, but it came through with deeper, blacker black spaces and notes that burst open and sparkled more than they did coming from my LP, served through the UD-701N's analog input. The sound was trippy, as intended.

The 701N's HR Audio Player was a joy to use. It played bold and clean and super pacy, not far from the elite resolve of dCS's Lina DAC with Mosaic.

1-bit or multibit?

Normally I'm antifeature, but the 701N's choice of 1-bit or multibit processing drew me in because it managed to present both algorithms with their best traits front and center. The 701N let me switch quickly to 1-bit when a piano recording needed firming up, then back to multibit when I needed more color and atmosphere on a vocal recital or movie soundtrack. What a luxury!

measurements, continued

at lower settings of the volume control and from the headphone output. Channel separation was astonishingly high, at >130dB in both directions below 2kHz and still 115dB at the top of the audioband. The wideband, unweighted signal/noise ratio, taken with the unbalanced input shorted to ground and the volume control set to its maximum, was a very good 80dB ref. 2V in both channels. This ratio improved to 95dB when the measurement bandwidth was restricted to the audioband and to 97.9dB when A-weighted.

Fig.16 plots how the THD+noise percentage in the UD-701N's balanced mode varied with output voltage into 100k ohms. At *Stereophile*'s usual definition of clipping, which is when the THD+N reaches 1%, the UD-701N's balanced outputs clipped at 12.75V into 100k ohms. The single-ended outputs clipped at half this voltage. The downward slope of the trace indicates that the distortion lies below the noise up to 6V. Fig.17 is a spectral analysis of the TEAC's output with its balanced line output driving 50Hz just below clipping into 100k ohms. Even at this very high output level, the third harmonic, which was the highest in level, lay at just –80dB (0.01%). Intermodulation distortion was also superbly low in level despite the very high output voltage (fig.18).

The measured performance of the TEAC UD-701N's digital inputs suggests that the least distortion will be obtained with data upsampled to DSD, though this gives lower measured resolution. I was puzzled by the higher distortion in multibit mode, though it is fair to note that perhaps this looks worse than it sounds, as HR enjoyed the UD-701N and told me he did most of his listening in that mode.

There are no puzzles about the UD-701N's behavior as an analog preamplifier; it offers a wide frequency response coupled with superbly low crosstalk, noise, and distortion, even into 600 ohms.

—John Atkinson

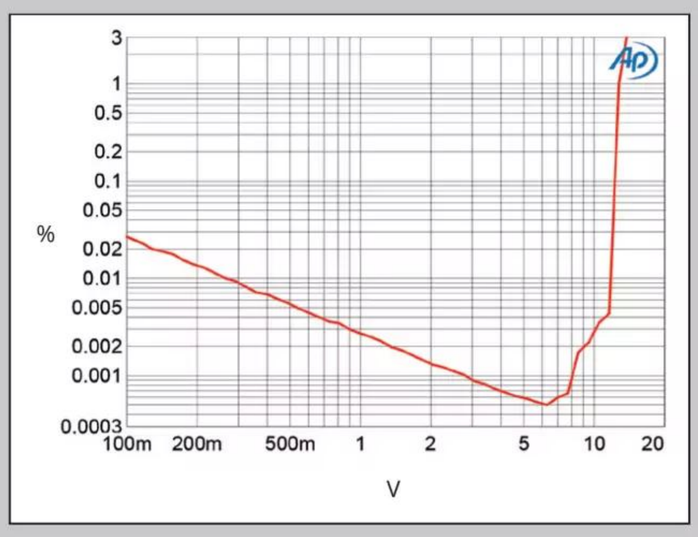


Fig.16 TEAC UD-701N, line input, balanced output, THD+N (%) vs 1kHz output voltage into 100k ohms.

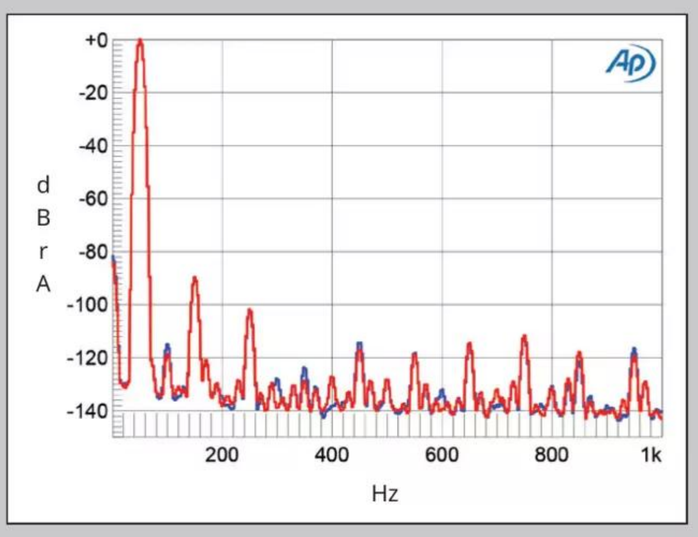


Fig.17 TEAC UD-701N, line input, balanced output spectrum of 50Hz sinewave, DC–1kHz, at 10V into 100k ohms (left channel blue, right red, linear frequency scale).

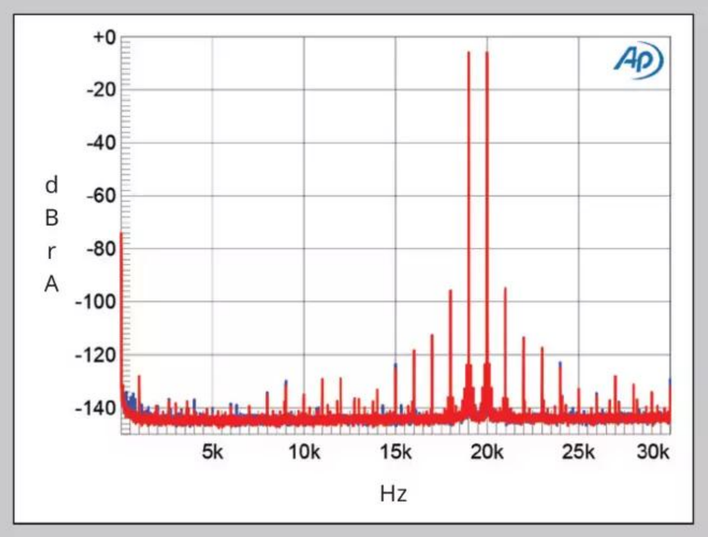


Fig.18 TEAC UD-701N, line input, balanced output, HF intermodulation spectrum, DC–30kHz, 19+20kHz at 10V peak into 100k ohms (left channel blue, right red, linear frequency scale).

Listening to DSD

I possess only a handful of pure—untouched by PCM—DSD recordings, and they are all produced and recorded (in DSD) by Todd Garfinkle on his M•A Recordings label.

I smiled when the 701N played the "Nostalgias" track off Garfinkle's *Otra Noche* (M•A Recordings M092) from a 5.645MHz DSD file on a USB flash drive. What I heard sounded pure, crystalline, and appealing—like DSD usually does. But the transparency was less liquid than I am used to. It did not have that mesmerizing celestial light that native DSD has when converted by my HoloAudio May DAC (KTE Level 3), nor the laser-mapped detail I get playing it through the dCS Lina DAC (with Master Clock). The UD-701N presented DSD recordings in a bold, straightforward manner that emphasized the description of forms over tone, lighting, or mood. The TEAC is less vibrant and atmospheric than the May and less microfocused than the Lina. But it still let DSD sound better than PCM.

DSD low-pass filter

Playing DSD files, the UD-701N offers three choices of finite impulse response filter (FIR): OFF, FIR 1, and FIR 2. These analog filters are intended to remove the high-frequency noise produced by the delta-sigma modulator.[2]

When I compared these three filtering modes, I initially preferred OFF, but I easily recognized and enjoyed the ringing-reduction accomplishments of FIR 1. FIR 1 winked at me alluringly and I hung with it—for a while. Initially, FIR 2 seemed sharper than FIR 1, but very quickly it started sounding suppressed. After a day, FIR 2 started to bug me, so I switched it off.

NOS vs upconversion

What I like most about TEAC's UD-701N DAC is how recordings came out feeling not quite like RAW camera captures (as they do with my NOS R-2R DACs), but less Photoshopped than generic delta-sigma conversion. Tones and contrasts did not feel programmatically enhanced. I found this surprising because as I experimented with TEAC's Upconvert feature, my brain kept mumbling: if this DAC is delta-sigma, as the website says it is, then some type of upsampling must have already happened at the initial stages of its conversion—right?

I say this because even with TEAC's Upconvert off, the UD-701N does not present recordings with the same still-water transparency as my NOS R-2R DACs from HoloAudio and Denafrips. Noticing this difference made me doubly curious to try TEAC's three levels of upconversion.

Before I switched on Upconvert, I hadn't noticed any problems that needed fixing. So I wondered what the effect of upsampling might be. To search for that, I used HiFiMan's easy-to-drive, ultra-high-resolution HE-R10P closed-back headphones as monitors.

I suppose some folks could tell me what I *should* have heard, but playing 44.1 Red Book CDs at 2× or 4× did not change the sound enough for me to notice. When I listened to King Crimson's "Moonchild" (24/96 FLAC, Atlantic/Qobuz) via Network LAN with the 701N set at maximum power (8×Fs), which ups the sampling to 384kHz, the difference was subtle again. Maybe it got denser. Or less reverberant. But I wouldn't swear to it.

When I played a 24/96 "Moonchild" on Qobuz via USB, it sounded vigorous and clearly formed without Upconvert, and possibly more solidly formed at 384kHz. But maybe not.

For me, TEAC's Upconvert was more of a placebo than a panacea.

The headphone amp

HiFiMan's not-free ($5499) HE-R10P is a closed-back, wood-cupped planar magnetic headphone that lets your ears see back to the "view" from the microphone grilles. The R10P has laser-level resolve and moves tunes forward with a spunky, plucky verisimilitude that I find irresistible. Its 30 ohm impedance and 100dB/mW sensitivity make it easy to drive, but be warned: Its low distortion, clarity, and unbound dynamics will make your floor speakers sound fuzzy, confused, and repressed.

Powered by the UD-701N's headphone amp, the R10Ps soared, dived, and sang with no confusion, with relaxed, unbridled dynamics. Speed *and* beauty. The tones and tempos of Itzhak Perlman playing Paganini's 24 *Caprices* (EMI CD 7243 5 67257 2) were so quick, so tactile, and so present that delirium was achieved.

I listened to *Otra Noche* in DSD through HiFiMan's 60 ohm 83dB/mW sensitive Susvara planar magnetic open-backs, plugged into the 701N's balanced headphone output. The sound was as rich and alluring as digital can be but also dark, slow, and unsparkly—a sure sign the TEAC's amp was struggling to make enough spark to punch up the Susvara's gold-leaf, nano-thin diaphragms.

Playing Beyerdynamic's $209, 250 ohm, DT-880 Pro dynamic headphones was kind of a comedy, because, driven by the 701N's amplifier, they outplayed the $6k Susvara in every possible way: More open, more brilliant, more brightly lit, incredibly detailed, and super dynamic. I loved revisiting these classic headphones because the TEAC's DAC/headphone amplifier drove them super superbly.

Conclusion

TEAC's UD-701N rendered my analog and digital content with a powerful, unprocessed, extrasolid *this-is-it* feel that made extended listening easy and something to look forward to. The 701N's engineering thoroughness was always evident, and its sound quality and user-friendliness were up there with the best I know at any price.

Welcome back, TEAC! ■

ASSOCIATED EQUIPMENT

Analog sources Dr. Feickert Analog Blackbird turntable with Sorane SA1.2 tonearm with a Benz Micro Gullwing SLR moving coil, or Nagaoka MP-200 moving magnet. Plus, EMT 912-HI tonearm with EMT's JSD6 moving coil.
Digital sources Denafrips Terminator Plus DAC, HoloAudio May Level 3 and Spring 3 KTE DACs, dCS Lina DAC with Master Clock; TEAC VRDS-701T transport, Onkyo C-7030 CD player.
Preamplifiers HoloAudio Serene line preamp; PrimaLuna EVO 100 and MoFi MasterPhono phono stages.
Power amplifiers First Watt SIT-4, Parasound Halo A 21+, Elekit TU-8900 with Brimar and Western Electric tubes.
Loudspeakers Falcon Acoustics Gold Badge LS3/5a, Devore Fidelity Orangutan O/93.
Cables Digital: Kimber Kable D60 coaxial, AudioQuest Cinnamon USB. Interconnect: Cardas Clear Beyond, AudioQuest Pegasus. Speaker: Cardas Clear Beyond. AC: AudioQuest Tornado, manufacturer's own.
Accessories AudioQuest Niagara 1000 power conditioner; Harmonic Resolution Systems M3X-1719-AMG isolation platform for Parasound A 21+, Sound Anchor Reference speaker stands, Musical Surroundings V2 Fozgometer; Riverstone Audio VTF gauge, Dr. Feickert cartridge alignment protractor, Record Doctor disc cleaning brush, plus MoFi and Audio-Technica stylus cleaners.—**Herb Reichert**

2 Surprisingly, to me at least, the only low-pass filter employed by the UD-701N is this one, intended to filter noise above 75kHz from the delta-sigma modulator, even when multibit is chosen.—**Jim Austin**