



THE BRYSTON BDA-1 DIGITAL TO ANALOG CONVERTER

**STRAIGHTFORWARD, EFFECTIVE,
HIGH-PERFORMANCE**

CYR-MARC DEBIEN

In my constant quest for the best Digital to Analog Converter (DAC), I recently learned that the Canadian company Bryston had just brought their first external DAC to market. Since I had done the bench test for the same company's BCD-1 player, I made it abundantly clear to my editor that I was interested in writing the bench test for the BDA-1. Wish granted!

I'm currently in the process of replacing the source component in my audio system. I still have a "good old CD player," but more and more I use a Music Server and the Internet to listen to music. Internet for general listening to background music, with the help of online radio and, for more "active" listening, either my CDs that I have digitalised or uncompressed files that I've downloaded. In some cases these are albums in native 16-bit/44.1 kHz, in other cases they've been downloaded in 24-bit/96 kHz.

THE BODY AND THE MOTOR

Aesthetically, the Bryston BDA-1 is designed along the same lines as the BCD-1 CD player. An anodized aluminum facing and a chassis of high-quality steel. But that's where the similarities end. Since this is a DAC, the features are limited, but there are still quite a number. The faceplate sports several small push buttons which let you choose from: one AES/EBU input, four S/PDIF inputs, two TosLink inputs and one USB input. All of these inputs will accept 16 to 24-bit

word lengths with sampling frequencies varying from 32 to 192 kHz, except the USB input which is limited to 16 bits with a sampling frequency varying from 32 to 48 kHz. The power-on button is located on the right and the over-sampling toggle is on the left. (Remote control optional).

On the rear of the unit you'll see all the inputs that I listed earlier, as well as balanced and unbalanced outputs, an RS-232 input for software updates, a plug for the "Trigger" for powering on the unit using another component and, finally, an IEC320 connector for the power.

So, right from the get-go, it's Plug and Play – just plug it in and start listening. Which is what I did in a hurry. Once again, I was too impatient; I forgot that you need a break-in period to get good quality sound. So I put my active listening off until later.

The BDA-1 Digital-to-Analogue Converter is built around a pair of hybrid multi-bit delta-sigma Crystal CS-4398 converter chips. This allows for a sampling frequency of 192 kHz with a 24-bit word length. This chip has the particularity that it accepts both DSD (Direct Stream Digital) and PCM (Pulse Code Modulation) signals. That way, the BDA-1 DAC can perform "synchronous" over-sampling at 176.4 kHz or 192 kHz. Each chip uses digital and analogue filters which eliminate conversion "echos." The CS-4398 chip has three operating modes. If it detects an input signal below 50 kHz, it applies an over-sampling multiple of 128. A signal below

100kHz will be over-sampled at 64x, whereas if it is above 200 kHz it will only be over-sampled 32 times. Obviously the quality of the over-sampling is directly dependent on the precision of the BDA-1's internal clock.

So Bryston has attacked the problem of jitter head-on. Jitter is inherent in all modules that have to send a synchronous digital signal from point A to point B. Jitter produces timing errors which mess up the electronic words between departure and arrival. Bryston has opted for a radical solution. The digital signal is re-sampled and re-synchronised in such a way that the jitter is reduced to a thousandth of a nanosecond (1 pico-second). Once the conversion and filtering have been done, the signal is then amplified by discrete operational Class A amplifiers. The printed circuit on which these components are soldered contains two encapsulated toroidal transformers. One is used for the digital section and the other for the analogue.

BEHIND THE WHEEL

Once the break-in period was over, I was ready start my active listening and take the BDA-1 for a "road test." In order to get a good idea of its performance, I tried it under several different conditions. I used my EAD CD player, a Mini Mac Apple computer, mono amplifiers, a passive preamp with transformers and my Supravox acoustic speakers. Then I used the same three music samples for the comparative A-B listening tests. Of course, to round out my evaluation and make it more exact I also listened to a lot of other albums, some digital, some not. The three reference albums were: *Altre Latitudini* by Gianmaria Testa; an album from Bob Dylan's Bootleg series (Vol. 8 Tell Tale Signs) and Nine Inch's (NIN) *The Slip* which is downloadable in 24-bit/96 kHz. Here are the various configurations that I tested. Of course this is not an exhaustive sample, but it will give a good overview of the personality of the BDA-1.

- CD player through the BDA-1's S/PDIF input
- Computer via the USB output into the BDA-1's USB input
- Computer via the USB output into a Dr Bott T3 Hub and then to the BDA-1's USB input

- Computer via the USB output in the Trends Audio DAC UD10 converter in order to convert the USB signal and send it to the BDA-1's S/PDIF input
- Computer via the USB output in the Trends Audio DAC UD10 converter in order to convert the USB signal and then it to the BDA-1's AES/EBU input

WHAT A MENU!

The BDA-1 has a couple of noteworthy features. The first is the small green diodes on the unit's left side. Depending on the source and its sampling frequency, one or another of these LEDs (light emitting diodes) lights up to indicate the sampling frequency of the selected source and another shows whether the signal is locked. The BDA-1 can recognise all the frequencies currently in use: 32, 44.1, 48, 82.2, 96, 176.4 and 192 kHz. Enabling the "Up-sample" feature starts the over-sampling. Over-sampling here is synchronous. This means that the user doesn't have the option of selecting the sampling frequency that he or she wants. Depending on the input frequency (32, 48 or 96 kHz) the over-sampling will automatically kick in at 192 kHz. When that happens, the green "Up-sample" light comes on. If the input frequency is 44.1 or 88.2 kHz, the over-sampling shifts to 176.4 kHz and the "Up-sample" light glows orange.

I put on Gianmaria Testa's CD, *Altre Latitudini*. The input frequency locks to 44.1 kHz. First impression: the lows are very low. I didn't think that my speakers had such low frequencies in them. Further, they're firm and not at all muddy. The BDA-1 is incisive, clean and detailed. In the cello passage you can distinctly hear two of the three breaths that the cellist takes (there are three ... keep reading). The spatial representation is fine, but the dynamics seem a bit chopped-off. Next, the Mini Mac and the same CD digitalised through the USB input. WOW! I pick myself up off the floor! The scales fall from my eyes. Details, dynamics and a gorgeous finesse. In the same passage you hear all three breaths from the cellist, complete with a rustling of clothing at the start of the solo. Everything is there: good spatial separation, lots of details, good homogeneous

sound, all the while maintaining interesting dynamics. I start over again, this time with Dylan's albums. One of the fascinating things about these CDs is the way they move us around from one era, studio or recording venue to another. From one song to another the sound varies enormously. In one piece, « Series of Dreams », Dylan's voice seems immense and, at the same time light ("he's been sniffing helium" joked one of my buddies). Compared to my usual set-up, Dylan's voice now seemed much bigger, while still staying light. The instruments no longer seem to be coming out of the speakers, they've moved away. By using the Mini Mac as the source instead of my CD player, I've improved things on several fronts. The instrumental sound no longer seems to be located in the speakers and the voice has started to take on proportions similar to what I've noticed elsewhere.

One more try: Nine Inch Nails' The Slip, downloaded at 24/96, directly from the NIN site. Since the DBA-1's USB input is limited to 48 kHz (like most of the commercial DACs), I couldn't take full advantage of this download. I can however, state that the DBA-1's performances were exceptional. The piece "The Four of Us are Dying," starts off with a synthetic bass which digs down deep. A synthetic percussion breaks away from the ensemble and plays at the back of the stage behind the rest of the group. My current

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DAC just doesn't give me this feeling the way the BDA-1 does. In the piece "Corona Radiata," the bass synthesizers change speed (pitch) almost making me dizzy. You can appreciate the DBA-1's remarkable control over bass frequencies .. no fuzziness. Each instrument remains distinct without creating a feeling that all is analytic and cold.

All of the preceding listening tests were done without activating the BDA-1's over-sampling mode. The sources were locked at 44.1 kHz so the BDA-1 boosted the frequency to 176.4 kHz. Using the same pieces and the same sources, carrying out A-B tests, both with and without the over-sampling feature, the BDA-1 offers different presentations case by case. Let's start with Gianmaria Testa's album: on all three planes, the spatial representation has been increased eloquently. There's more space and more headroom, and the soundstage goes well beyond the speakers. Gianmaria's voice is much more suave and even the cello seems to have added density. On the other hand, the dynamics have been smoothed out significantly. The cymbal crashes are softer and the attacks seem a trifle muted. Dylan's voice seems even more imposing even if it's still just as light (was it had been recorded in a different studio). It is completely separate from the instruments which seem to come from far behind the speakers. Once again we get the wide sound stage, but to the detriment of the percussion attacks, the sound of the bells or the plucking of the guitar strings. With NIN the same things happen, bit to different degrees.

Listening to dozens of albums only confirmed the impressions I got from the first three. Whether the source is a CD player or a Music Server, the S/PDIF and USB sources with the same sampling frequency produced similar results. The over-sampling had an identical effect on the two sources with, in my opinion, a more marked effect on the USB.

It would appear that, even using a USB link, there is still room for more refinement in order to improve the sound that comes from a DAC. Listening to other DACs, my colleague Geoffroy Melançon and I had noticed that adding a USB hub improved the sound. Don't ask me why; I have no idea. But where the BDA-1 is concerned this gain is signi-

ficant, as if a veil had been lifted. Everything became even more precise, clearer and the overall dynamic range was even greater.

Using my Mini Mac and a Trends Audio UD10 DAC as input interface for the BDA-1's AES/EBU and S/PDIF, I note an expansion of the sound stage and also some smoothing where the AES/EBU was concerned. My player's S/PDIF output and that of the Trends Audio are hard to tell apart and the over-sampling effect produces a pretty similar sound in both cases.

Finally, I took the NIN download in its native format (24/96 kHz) and sent it into the BDA-1 so that the BDA-1 would receive it in 24/48 kHz format (to do so, I had to change some options on the Mini Mac). Since the BDA-1's USB input is limited to 16 bits and the input frequency is now 48 kHz, the over-sampling moves to 192 kHz (the "Up-sample" button glows green) and the word length is reduced to 16 bits. When I listened to the two NIN pieces that I described earlier, I noticed a phenomenon that I find hard to explain. It sounds to me as if the two pieces are "darker" and that the three-dimensional effect is grossly exaggerated. On the piece "The Four of Us are Dying," where the synthetic percussion moves away from the ensemble, it now sounds as if someone forgot to re-centre the sound at the mixing console. The very low frequencies have become fuzzy and the highs are a lot softer, less incisive and seem chopped off. When I reconfigured the mini Mac so that it would send 16-bit words, everything fell into place and the dark sound disappeared. As Geoffrey pointed out to me, maybe dropping 8 bits in the word length had something to do with it.

CONCLUSION

In my quest for the ideal DAC, given my budget and my set-up, I've now been able to listen to several. I've been able to plug most of them into my own system or into environments that I know pretty well. Some have prices tags that are, in my opinion, too hefty, whereas others offer a quality to price ratio that I consider honest and acceptable. When I stack up the Bryston BDA-1 DAC using my own criteria, it falls into the second group. For pure

performance and flexibility, (even if it only really does one thing, i.e., digital-to-analogue conversion), this unit meets the needs of people who prefer easy listening as well a wide sound stage. At the same time, it will also satisfy those whose priorities are dynamics and precision, getting a sound close to what studio people aim at. Is one better than the other? Personally, I don't think so. These are just two different sound presentations each with its own strengths and weaknesses.

The arrival of Music Servers and their use at home rings the death knell of the CD medium. I know, you'll tell me that that's what they said about vinyl more than 25 years ago! The digital format is here to stay, but the CD, this little polycarbonate and aluminum disk, will disappear. Music will come to us in other ways and my guess is that the Internet will be the favourite delivery mechanism. I'm pretty sure that DACs will be called on to become the heart of tomorrow's hi-fi audio systems. Getting the most out of the digital files that we will eventually access will depend on the quality of this "gateway."

With their BDA-1, the folks at Bryston have demonstrated their solid mastery of digital processing procedures. This unit has its place at the heart of every system which places a high value on transparency. This exceptional transparency from the BDA-1 let me perform all my tests (even if they're not exhaustive) and also discern both the subtle and the not-so-subtle differences in the sources or digital files. Before you purchase your next DAC, make sure that you think hard about what may possibly become the heart of your audio system. Then go and take a serious look at the Bryston BDA-1.

Bryston BDA-1
Digital to Analog Converter
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