

C1 Digital to Analog Controller



We describe the C1 as a Controller because it is more, much more than just a digital to analog converter. While creating a world-class DAC could be considered a sufficient challenge on its own, the use of modular component architecture and the power of sophisticated software control opens up opportunities as well as offering solutions: opportunities that transform the role, capabilities and versatility of the C1.

Of course, it is digital conversion that lies at the heart of the C1. The perfect preservation of time and amplitude information is critical to reproducing musical signals stored in digital format. Noise and jitter performance is central to the design of any high-performance DAC, but at CH Precision we believe that the solutions we have adopted for the C1 take digital performance to a whole new level. We have paid extraordinary attention to the master clock arrangements (as well as providing highly developed clock-sync and external reference clock options) to minimize timing error to unprecedented levels, while our proprietary Polynomial Equations to Enhance Resolution (CH-PEtER) processing delivers incredible sample-to-sample resolution. Input compatibility includes all high-resolution digital formats, whether from optical or file replay sources. Our proprietary CH-Link HD interconnection allows the transfer of DSD data in the digital domain, from the D1 transport to the C1, or can carry PCM data at up to 768kHz/32 bit resolution. The AES/EBU and S/PDIF inputs accept PCM at up to 192kHz/24bit resolution. The DAC itself employs no fewer than four converter chips per channel, in a fully differential, dual-mono topology. The vital analog output stage is discrete, fully differential, Class-A and DC coupled. The modular input architecture and upgradable software capability ensures that the C1 remains future proof, able to adapt to changing digital standards or system demands.

Having created the C1's digital decoding core, the next step was to construct the system architecture around it. As well as the established digital input standards (AES/EBU, S/PDIF and TosLink) it was necessary to create dedicated input cards for both Ethernet network and USB music replay, each optimized to deal with the special challenges presented by these computer-based formats. Alongside the multiple digital input and clock-sync options, we also added a by-passable hybrid volume control, operating across both the analog and digital domains and an A-to-D facility, allowing the C1 to accept balanced or single-ended analog inputs, creating a genuine analog/digital domain control option, allowing the C1 to stand at the center of any system, irrespective of the source components in use.

With the vast array of user definable parameters on offer, from input identity to input offsets for the analog connections, overall gain and balance to output level and absolute phase, a comprehensive, non-intrusive display was essential. This requirement led directly to the implementation of our 480 x 272 pixel AMOLED screen, with its user-configurable content, brightness and power-down options. Users can even select a specific RGB color for the content! Although each and every setting in the C1 can be accessed and adjusted from the dual-concentric control on the front-panel, the CH-Control App allows direct, remote access to every parameter from an Android tablet or smartphone, making this one of the most adjustable, configurable and adaptable DAC Controllers on the market – and also one of the easiest to use.

Digital Architecture And Input Compatibility

Standard Inputs

- Factory fitted with CH-Link HD, AES/EBU, S/PDIF and TosLink digital inputs
- The CH-Link HD interface allows for synchronized transfer of high definition audio content (up to 32bit/768kHz) and DSD, offering the ideal interconnection to the D1 CD/SACD Transport or other CH-Link HD equipped units
- Standard digital inputs accept PCM to 24bit/192kHz, DSD 1bit/2.822MHz (DSD64)

Optional Digital Inputs

- The C1 can accept up to three digital input boards to allow multiple digital sources to be connected
- Ethernet audio streaming input board, UPnP/DLNA compatible, allows connection to audio servers (NAS drives), streaming services and internet radio
- PCM to 24bit/192kHz (384kHz for uncompressed formats)
- DSD 1bit/2.8224MHz (DSD64), 5.6448MHz (DSD128) or 11.2896 MHz (DSD256)
- Native DSD and DoP
- WAV, AIFF, FLAC, ALAC, AAC and MP3 formats supported in PCM
- DSF and DFF formats supported in DSD
- Asynchronous USB audio input board – PCM to 24bit/384kHz, DSD 1bit/5.6448MHz (DSD128, DoP encoded)

Digital to Analog Conversion

- Four PCM1704 R-2R converters per channel
- Fully complementary, dual mono symmetrical circuit topology
- Discrete dedicated regulated linear power supplies for low noise and maximum channel separation

Processing

- Independent 2.4GFLOPS DSP engines for each channel
- Proprietary CH-PETeR synchronous data over-sampling processing
- DSD to 705.6kHz PCM conversion
- Resolution enhancement of audio material recorded at less than 24bits
- Digital to Analog converters data scrambling
- Linearization of the R-2R converters through on-board calibration process

Timing & Clocking

- Ultra low jitter digitally controlled VCXO oscillators with dedicated power supplies
- Optional master/slave Clock-Sync board allows synchronization with external clocks when used with the D1 CD/SACD transport, I1 Universal Integrated amplifier or computer-based audio source
- Clock-Sync board also allows use of the T1 10MHz Time Reference clock



Analog Input Options And Functionality

Volume Control

- By-passable 0.5dB step hybrid volume control, coarse steps using relays and a resistor ladder and fine steps in the digital domain, to maximise system resolution

Analog Input Board

- Discrete, fully differential analog input circuit
- Balanced XLR and single-ended RCA inputs
- 6V RMS maximum input level
- Input offset and balance user selectable

Analog-to-Digital conversion

- DSD 1bit/5.6448MHz (DSD128) direct conversion

Analog Output Stage

- Pure class A, fully symmetrical circuit
- Fully discrete, ultra low noise, high slew rate design
- Zero global feedback
- One pair each – balanced XLR, single-ended RCA and BNC outputs
- DC coupled
- 5.4V RMS maximum output (balanced XLR), 2.7V RMS maximum output (single-ended RCA/BNC)
- Switchable absolute phase
- Channel balance in 0.5dB steps

Display

- 480 x 272 pixel, 24bit RGB AMOLED
- 15 standard, user-selectable text colors
- User definable RGB option for text color

Remote Control Options

- Infrared Remote Control handset for basic functions
- Ethernet-based Android control APP

Optional Hardware

- Digital Input Board – CH-Link HD, AES/EBU, S/PDIF and TosLink
- Network Player Input Board
- Asynchronous USB Input Board
- Clock-Sync Board
- Analog Input Board – one pair balanced XLR, one pair single-ended RCA
- Fully compatible with X1 External Power Supply
- Compatible with T1 10MHz Time Reference external clock (with Clock-Sync board)

“Neutral, exciting, fast, tons of detail, yet musical in a way that is honest to the source, not gussied up with bloom and decay trails, it is not like the audio we grew up with. This kind of sound did not exist until now. As far as I’m concerned, CH Precision is at the forefront of digital technology. They are the leader of the pack.”

MARSHALL NACK, POSITIVE-FEEDBACK

"As it is, the CH Precision D1 and C1 pairing makes it onto my extremely select digital replay top table... It is by some distance the most musically emphatic member of the party and also the de facto recommendation for SACD replay."

ROY GREGORY, THEAUDIOBEAT

