CH Precision C1.2 DAC/Controller

by Roy Gregory

Review a product – any product – and you are faced with two questions: what does it sound like and why? Neither is as straightforward as it seems. How it sounds is a function not just of the product itself but the system context in which it finds itself. Why it sounds the way it does? That largely comes down to speculation. There may be novel technology or circuitry, silver bullet componentry (often old or NOS) or even magic fairy dust for all we really know. Even given a product as topologically simple as a tube power amp, it is dangerously deterministic to start ascribing particular performance attributes to specific aspects or elements in its design. With a product as complex as a DAC, especially one with built in control and switching options, it's generally a fools errand. Yet, despite that, the CH Precision C1.2 DAC/Controller offers us an unusual chance to 'look under the hood'. In doing so it offers an interesting perspective on digital electronics and the way in which they are so often perceived.

The thing that creates this opportunity is the nature of the C1.2 itself. Like all CH Precision products, its construction is based on a modular card cage design. It's an approach that allows the company to utilise the maximum number of common parts across its product line, especially the cost critical casework. That commonality extends past the chassis to the front-panels, which leads to a range of components that look almost identical to the uninitiated eye. So, outwardly at least, the C1.2 DAC/Controller, D1.5 Player/Transport, L1 Line-stage and I1 Integrated Amplifier look all but identical.

But there's more to the modular/card-cage model than consistent outer appearance. The internal arrangements mean that products can be physically upgraded with new parts or key circuitry whilst still retaining the vast majority of their mechanical construction. Nowhere are the benefits of that approach more apparent than with the C1.2. So to

really appreciate the opportunity the new DAC presents, both in performance and perspective terms, it's necessary to step back a generation to the preceding model, the original C1…

A brief history of time (and space)…

The C1 DAC/Controller was the second product that CH Precision launched, over 10-years ago. It followed the D1 CD/SACD player/transport and established both the company's 'common look' and its configurable approach to product design. The D1 had offered a range of optional capabilities or connections (stereo or dual mono internal DACs for anything up to discrete 5.1 replay, as well as an external clock connection) but these were all based around it's single, disc replay functionality. The C1 took that versatility and user configurability to a whole new level. Owners were able to specify the number and nature of digital inputs (including USB and Ethernet options), the clock connectivity and even choose whether to include analogue inputs. In addition, the unit could be configured as either a fixed output DAC or as a Controller with a variable output, making it a genuine digital/analogue control unit (rather than simply a DAC with a digital volume control). What's more, any or all of those options could be added or changed in the field, at any juncture, allowing the C1 to adapt to the changing requirements of its owner and his (or her) system.

The C1 could also be upgraded/updated as time passed and opportunities presented themselves. Thus, the product has seen the arrival of a new, proprietary 'native high-res' digital transfer standard (the CH-Link HD) an improved Ethernet connection (Ethernet-In HD) and a higher resolution display screen – all retro-fittable to existing units. Along the way, there have also been innumerable updates to the operational Firmware that actually runs the unit. So, even a C1 bought when the unit was originally launched could be kept totally current, in terms of both hardware and performance. Which, in a digital world that purports to move at the speed of light and in which product shelf-life can be measured in months, is pretty impressive for a 10-year old DAC!

But what's more impressive still, is the fact that any C1 can be upgraded (transformed might be a better term) into a fully-fledged C1.2, complete with C1.2 performance and a new serial number. The cost of that process: $4,000 – or the difference between the price of the C1.2 and the last published price of the C1. Exact price depends on the actual status of the C1 you are converting. If it skipped a few past upgrades, those might need to be added in, but even so, that really is taking future-proofing and protecting your owners' investments to a whole new level.

The Number Of The Beast

So what has actually changed? Assuming that we're talking about the final C1 version, then the physical changes involve the replacement of three internal boards, including the rear panel interface board to which all the input options connect. As well as that, the C1.2 gets a new digital processing (DSP) board and a new power supply board. Crucially – and in some quarters, controversially – the DAC chips (all eight of them) remain the same, Burr-Brown PCM1704s dating from 1998! So what is this? Some NOS un-filtered DAC masquerading as a high-tech unit? Hardly. The PCM1704 was ground-breaking when it was introduced, an R2R 'ladder DAC', the resistors built into the silicon substrate offering a repeatable accuracy way beyond what's possible with discrete components. It's just one example of how the silicon itself is not (necessarily) the most important part of a DAC. What IS important is the process as a whole – and a lot of that goes on around the DAC chips. In the case of the C1.2, the real heavy lifting is done in the DSP, before the signal even reaches the DACs. So as long as the chips have the processing capacity to manage the signal generated by the DSP, then there's no reason to change them. That's the case here. The chips might have remained the same, leading some observers to question whether this is a 'new' DAC at all, but the processing, power supply and clock arrangements have all changed – significantly. But the upgradability of the C1.2 also demonstrates the benefit of separating the DSP and DAC functions, especially when it comes to building a genuinely future-proof platform.

Let's look at that processing. The C1.2 offers an eight-fold increase in total processing power over the C1. Split between two channels, that's four times the processing power – each! That has allowed CH to substantially improve the performance and accuracy of their proprietary PEtER spline algorithm that up-

samples the incoming data stream. It now operates to 32-bits with fixed point (as opposed to floating) processing. Interestingly, and unusually, the algorithm retains the original data points. Rather than overwriting the entire stream, it fills in the gaps between the existing samples. Helping it do that is an all-new, shunt regulated and temperature compensated MEMS-based clock, which increases clock accuracy and further reduces jitter.

To reduce noise levels within the decoding circuitry, the power supply has been upgraded, including the introduction of discrete local regulators for the DSP and FGPA chips. The control software now switches off all unused processing and signal paths to help eliminate residual and induced noise from those sources. Oh – and the C1.2 is now fully MQA compatible. So the DAC chips might have remained the same, but the algorithm and processing power governing their operation has changed out of all proportion, in terms of both the operation itself and the overall capability. Meanwhile, the operating environment has also been significantly improved in terms of clock performance and power-supply/noise levels.

Getting' Jiggy Wiv It…

In broad terms, there are two ways in which you can extract better performance from a DAC – and they are both to do with eliminating error. Given that any DAC process will induce error, you have a choice between correcting that error (using something like the Wadax feed-forward error correction approach) or you can try and make the DAC work better to start with, improving the process and reducing error mechanisms, like noise, so that the process as a whole generates less error. The CH approach sits firmly in this latter school, with considerable attention paid to the processing and the operation of the DAC chips. The results of their latest advances are, unsurprisingly, easy to hear and appreciate.

But before we get to the question of sonic performance, there are a couple of other, practical considerations to take into account. The first of these is to do with the input options and the order in which they are mounted. The revised internal boards have mandated a change in the installation order of the options/inputs. This doesn't matter unless you owned a C1, get it upgraded and then wonder why the sockets now appear in a different order. And talking of upgrades, it's an operation that requires returning the unit to your local dealer/distributor. Of more moment, at least when it comes to the cost of upgrading, are questions surrounding the display, digital and Ethernet inpu cards. The C1.2 is only compatible with the Digital-In HD and Ethernet-HD In cards and the latest 800 x 480 AMOLED display. This is where the status of any current C1 being upgraded comes in. Really early units that haven't had the original digital input board, Ethernet input or display upgraded already, will need to have that done too.

The other things you get in the upgrade kit (besides a new C1.2 display window and rear panel section with the new serial number) are a set of the new CH composite levelling/grounding spikes – which are a big step up in performance over the previous, steel versions – and a new handy IR remote. The latter is identical to the original, except for the C1.2 designation on its fascia. The end result is a completely updated DAC that is indistinguishable from a brand new C1.2, in physical, parts or performance terms. For owners

of existing C1s, that alone makes the upgrade worth undertaking, just in terms of protecting their investment. However, the real benefit comes in terms of the sonic and musical dividend. CH didn't re-designate the C1.2 because it used (or didn't use) a different DAC chip. They re-designated it to mark a step change in performance.

Physical graffiti…

Many DACs are (relatively speaking) compact and low on features. That isn't the C1.2. In fact, the CH hallmark is the unique ability to combine massive versatility with an uncompromising commitment to sound quality. The C1.2 is perhaps the ultimate expression of that philosophy. Despite the clean lines and uncluttered front-panel, there's so much going on here that the best (if arguably least elegant) way to understand and appreciate it all is as a simple laundry list, starting with the construction and finishing with the various options.

The C1.2 is large and heavy for a DAC. A full 440mm wide, the substantial chassis occupies a square footprint and stands 132mm tall on its shallow feet. That's a lot of internal space and it's heavily populated. The chassis itself is an elegant and beautifully engineered, aluminium plate-to-plate construction, entirely free of visible fixings. The four screw-on caps, flush-mounted in each corner of the top-plate give access to threaded shafts. Composite, spiked posts (hardened aluminium tips combined with Delrin poles) dropped into those shafts allow the unit to be precisely levelled and also mechanically couple the massive base-plate to the supporting surface.

The front-panel is dominated by the large, full-colour display, the familiar CH dual-concentric control on the right, visually balanced by the curved feature-line on the left. Apart from the stand-by LED in the logo positioned top left, that's all you see. The business end is round the back, a rear panel that is literally crammed with inputs, outputs and connections. Let's start by looking at the base model C1.2 ($36,000). Running left to right across the rear panel, the layout reads like this:

A pair of dual-mono analogue output cards (each offering balanced XLR, RCA and 50Ω BNC connections).

Two blank slots for optional input cards.

One Digital-In HD card (CH-Link HD, AES/EBU, S/PDIF and TosLink inputs)

One Ethernet-In HD card (with USB A socket for firmware upgrades only)

Another blank slot, dedicated to the optional Clock Sync card

The AC input and unit grounding panel. As well as the IEC input, this panel carries a multi-pin connector for attaching the optional X1 external power supply. As with all compatible CH components, the X1 delivers a further, substantial upgrade in performance, although I'm not going to dwell on that here. The vertical row of three 4mm sockets (and jumper) allows users to separate or tie together the chassis and signal grounds, optimising grounding arrangements. Like the mechanical grounding feature, this arrangement is common to all the CH 1 Series components, but given that the C1.2 is both a digital unit and a potential system controller, it's a particularly crucial facility here.

Ch, ch, ch, changes…

The next stage is to consider the optional inputs. The Clock Sync card allows the C1.2 to be integrated into a central clocking arrangement, either with an external clock (such as the CH T1 Time Reference) or simply with a designated Master clock within the existing units. It offers one input and two outputs on BNC connectors.

The input options are more complex. The two option slots can accommodate one or more of the following input cards, in any combination:

The Digital-In HD card

The Analog-In card (one pair of balanced XLR, one pair of single-ended RCA)

The USB-In card (one USB-B input)

These optional slots allow the user to add additional inputs to suit their system requirements, be those analogue or digital. The inclusion of an analogue input option is extremely unusual, but it allows the use of the

C1.2 as a controller or pre-amp in a multi-format system scenario, with both analogue and digital sources.

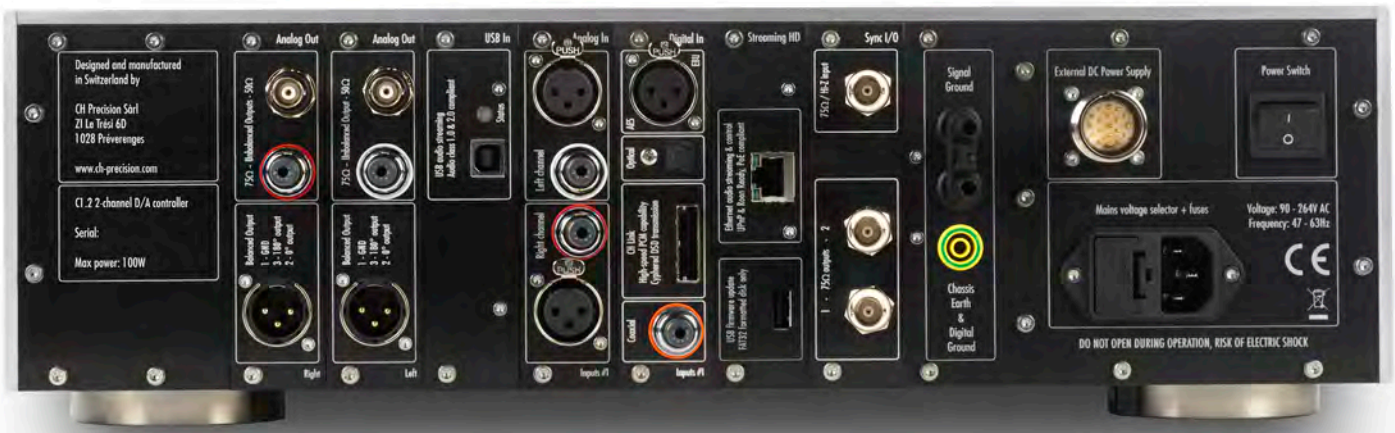
Opportunity knocks…

The second set of options involves the expansion (as opposed to the configuration) of the C1.2. I've already mentioned the possibility of adding the X1 external power supply. As with other CH components, the C1.2 can be upgraded from dual-monaural (two separate channels in a single box) to true monaural, where each channel gets its own box. In practice, the C1.2 Mono is actually a three-box product (!) a single head unit being used to accept and distribute digital signals to separate left and right channel DACs. That in turn creates the opportunity to add extra X1s – as many as three in all. In addition, there's also the aforementioned T1 Time Reference Master Clock and the option to add a D1.5 CD/SACD transport, connected via the CH-Link HD input – and naturally with the option to add yet another X1. Tot that lot up and you end up with a nine-box digital front-end!

But we're still not finished, with a third set of options governing the C1.2's actual operation. These cover everything from the colour of the display (if the seven standard colours don't match your décor, you can input your own RGB cocktail) to its content and whether or not the standby LED is lit when the unit is playing. You have control over absolute phase, balance and stereo/mono output. You can set the gain, input impedance, clock source and name for each installed input – or defeat it entirely. Thus, if you have an Analog-In card fitted, but you are only using the XLR input, you can remove the RCA input from the source selection cycle. You can do the same with unused digital connections. The Ethernet input can operate as both a standard Ethernet connection or a Roon end-point, as required. If the volume control is active, you can set start level, maximum level, overall gain and decide whether you want a volume or status readout on the display. Multiply those options by the number of inputs and that's a lot of settings!

It is entirely possible to navigate the extensive menus and settings, as well as any operational short-cuts you might have opted for, from the dual-concentric control on the front pane, while the diminutive IR remote control covers most of the basic functions (power/mute, volume up/down, source select, phase invert and mono/stereo). However, the assumption is that you will use the CH Control App to both configure and operate the C1.2. This Android-only App has caused more than a few Apple-owners to raise a quizzical eye-brow – but (as always) there's method behind what might at first be considered madness.

Android tablets are considerably cheaper than the Apple alternatives. Cheap enough that it is entirely practical to have one dedicated to your audio system, controlling not only all of your CH components but your streaming services and locally stored files too. Because the Android operating system is more stable (in terms of the number and frequency of updates) CH has been able to create an attractive, comprehensive and intuitive interface – that doesn't require updating every time there's a new iOS! All told, the Android-only path



makes considerable sense – even if its advantages aren't immediately apparent.

In use, the App, the large diameter control knob, the IR remote hand-set and above all, the plethora of information available on the screen makes the C1.2 easy to operate, while that dual-concentric knob in particular, has a luxuriously smooth and precise feel. There's also something undeniably classy about the uncluttered and beautifully proportioned front-panel. Having enjoyed access to both the C1 and the C1.2 for considerable periods of time, I can attest to just how stable and operationally invisible the CH DAC becomes, how easy it is to add or reconfigure its inputs and how quickly you simply forget that it's there, taking its consistent, musical excellence for granted.

Listening to the C1.2 (and not forgetting the C1 too…)

Normally, I listen to products in a broad, system context. However, the C1.2 presents one of those unusual situations in which a direct comparison with (in this case) its predecessor is not only possible, it actually makes sense and answers an important question; is the upgrade significant and musically worthwhile. With that in mind, my initial listening revolved around the C1, C1.2 and the D1.5 (operating in both player and transport mode). In fact, in some ways, this sonic story starts with the D1.5…

I'm not going to start way back at the beginning, but it's worth noting two things: I never particularly cottoned to the D1 as a player, especially a CD player. It was an excellent SACD transport (used with the C1 via the CH-Link HD), but its on-board DACs never really did it for me, especially in Red Book mode. Secondly, when the D1.5 arrived, all that changed. It wasn't just a better transport. It didn't only do a way better job with CD. The thing that really hit home was just how well the on-board DACs performed, narrowing the gap to the C1 significantly. Yes, the C1 still represented a worthwhile step up in terms of subtlety, information retrieval and overall separation, but it was no longer the slam-dunk that step up had once represented. That's the context in which the C1.2 takes the field. It needs to trump both the performance of the D1.5 operating as a player, and the C1, either as a standalone unit or in combination the D1.5.

Listening to the C1 and the C1.2 using the D1.5 player/transport as a source allowed me to compare not just the gap between the C1 and the C1.2, but the performance gap between the D1.5 player and the D1.5/C1.2 pairing, in a single system, without chopping and changing equipment. Starting with the comparison between the two DACs, the first thing you are going to notice when switching from the C1 to the C1.2 is a significant change to the soundstage. First impression is that it has got bigger, simply because it is so much more present. But listen a bit more carefully and you'll quickly realise that it's not bigger but more defined, with more clearly located boundaries, greater depth and more definition of the space between the instruments. Those instruments are more dimensional and more solid. But this is much more than a cosmetic change. It is a pseudo visual metaphor for what has happened to the signal and the musical presentation as a whole. Play a disc from the Jordi Savall/Concert Des Nations, Beethoven Symphonies cycle (*Revolution, Symphonies 1-5*, AliaVox AVSA9937) on the C1.2 and the compact layout of the orchestra, with its narrow, deep and steeply banked arrangement is clearly apparent, both in the shape, depth and height of the soundstage, the proportions of the instrumental layout and (perhaps most of all) in the concentrated energy in the music.

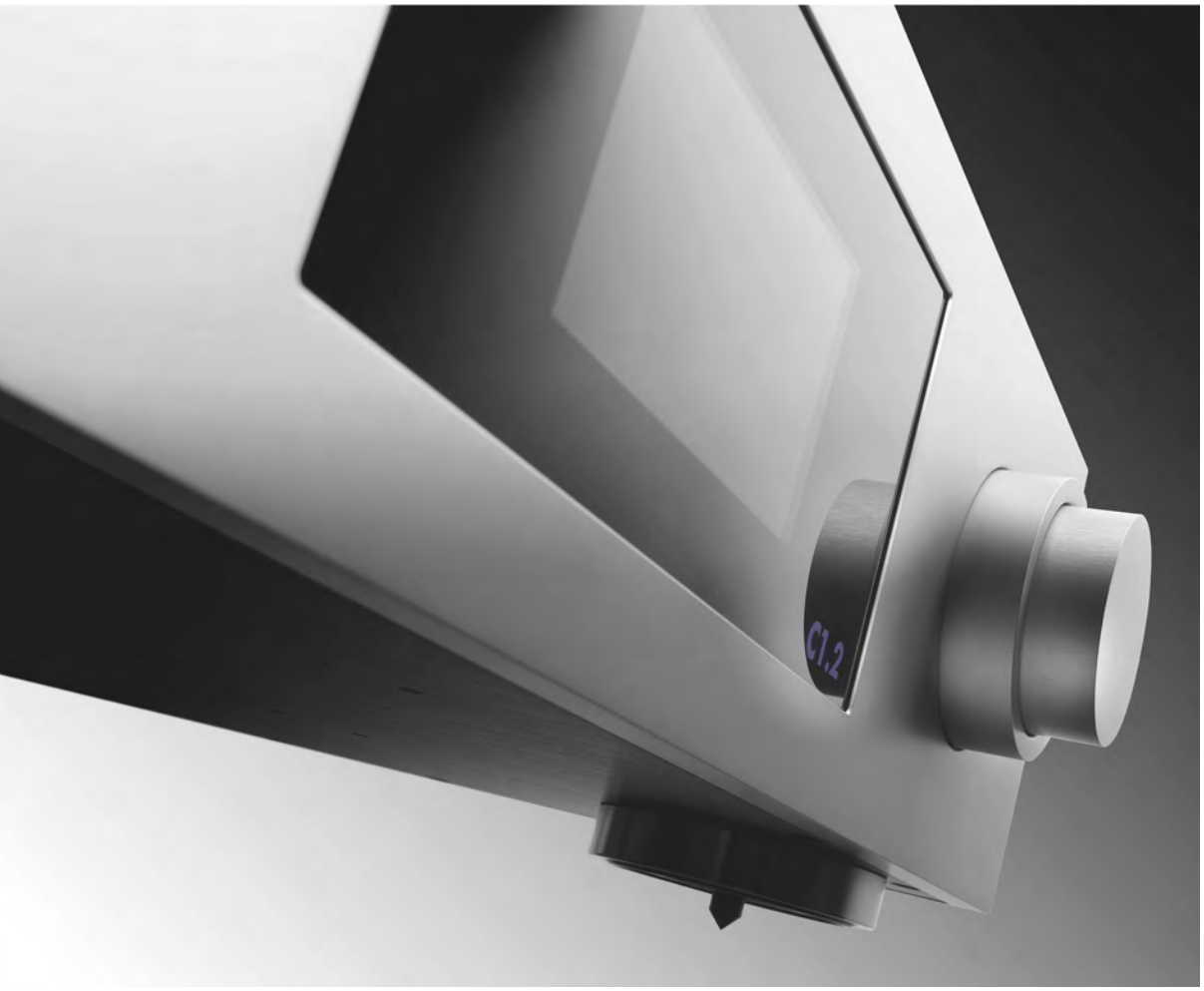
Listen to the quietly pensive opening movement of the *4th Symphony* and it's not only the precise location but also the carefully measured (and clearly defined) level of each instrument that adds to the orchestral presence and the carefully nurtured sense of anticipation and tension. It's this dual aspect to the increased performance that is the key to understanding what is happening here. The musical significance is obvious and undeniable. The mechanics behind it less so – which if you think about it, is no bad thing! But the clue lies in the spatial domain, even if the real import is contained in the time domain. In the same way that the C1.2 isolates spatial location, concentrating the sound generated by an instrument and preventing it bleeding into the space around it, the DAC isolates in the time domain. So just as an instrument has a more defined and more natural sense of location and scale, it's not only the placement, but the start, amplitude and duration of each note that is far more precisely reproduced.

If you want to examine note weight, placement and length, there's no better place to start than piano and a recent favourite has been Mitsuko Uchida's concert recording of the Beethoven *4th Piano Concerto* (Rattle and the Berliner Philharmoniker on the orchestra's own label, BPHR 180243). Uchida's achingly intense reading of the *2nd Movement*, the shortest that Beethoven wrote in any of his *piano concerti*, runs nearly a minute and a half (around 33%!) longer than other versions – and with the same notes to play, that extra time is all in the spaces in between them. The result captures the utter, hopeless desolation of the piece, Beethoven's response to his impending deafness. It is played with such quiet precision and delicacy, such calculated weight and attack to each and every note that it is brutally revealing of a system's micro-dynamic and temporal integrity. Play it on the C1.2 and it achieves its full artistic intensity and impact.

Relative to the C1, the piano is more three-dimensional, substantial and planted, sitting in a more expansive soundstage with a welcome increase in separation between it and the (rather intrusively bombastic) orchestra. The added low-frequency authority reflects a more defined and muscular bottom end. The C1 was no slouch in this regard, but the C1.2 makes it sound bloated and indistinct in comparison – with a commensurate increase in clarity and overall musical purpose. This isn't about adding weight. In fact, quite the opposite. In some ways, the C1.2 does more with less. It's more defined and linear bass reaches deeper, getting more of the energy in the right place more of the time. The result is felt and heard in the increased openness of the mid-band and the easy, unforced extension at the top. (It's also felt in a greater sense of weight and impact when required, but back to Mitsuko's more delicate demands.) The spaces between Uchida's notes are more clearly defined, the artistic choices more apparent. But what is really impressive is that this increased temporal separation actually results in increased musical articulation. In the same way that the extra information that populates the soundstage helps define and clarify it, creating a more coherent and understandable whole, the C1.2's temporal alacrity brings both clarity and shape to the notes and phrases that Uchida has so clearly agonised over. That overall sense of flow and unity elevates the communicative qualities of the replay, moving the listener substantially closer to the original event, its delicate power and emotional impact. The result is so musically profound that you almost wonder how Uchida will lift herself for the 3rd Movement. Few audio sources of any type can achieve this level of connection between the original and the reproduced event, but the D1.5/C1.2 combination is one of them.

What both the Uchida and the Jordi Savall discs demonstrate is that this lift in performance is due to not just the ability to retrieve additional information from a given recording, but to better integrate that information to create a more meaningful whole. The challenge facing any high-resolution audio source is not the amount of detail it can display, but whether the resulting 'picture' makes sense. All too often, timing and spatial integrity have been sacrificed on the alter of resolution. The problem is that far from being a benefit, if all that extra information doesn't arrive exactly where and when it should, then it becomes an embarrassment.

All too often we hear the results in disjointed or sterile replay – a hyper 'digital' sound that trades obvious detail for any sense of musical coherence or communication, individual notes at the expense of the relationship between them. But the clue is in that 'digital' descriptor. The timing and displacement errors that afflicted early digital systems are what characterise that 'digital' thumbprint. Modern, higher-resolution systems (whether disc or file replay) might make things sonically more impressive but actually, in terms of musical communication they all too often make things worse. If that sounds like an unlikely proposition, just consider the enduring musical appeal of filter-less DACs. What the C1.2 demonstrates – and demonstrates so emphatically – is that it is possible to have high-resolution sound and musical integrity, a combination that places it in a very select group indeed.



There are plenty of instances where musical coherence comes at the price of resolution and transparency. It's one of the traditional conflicts or trade-offs between solid-state and tube electronics – the idea that somehow, you have to decide between the space between instruments and their dimensionality, speed or attack as opposed to harmonic development. Those contrasts are simply different error mechanisms. You can (and should) have it all. The Víkingur Ólafsson disc, *Debussy-Rameau* (DGG 483 7701) is a perfect case in point. Not only is the instrument perfectly proportioned, dimensional and complex, but the playing is both wonderfully fluid and articulate. Slower passages have all the pathos of the Uchida recording, while the pauses, the decay of chords and their damping is beautifully natural and evocative. Left hand chords have weight and sonority, while the right hand possesses a quicksilver lightness and precision that bubbles and sparkles like a stream in spate. But what's really impressive is the way that the relationship between left and right hands is maintained, the way that the contrasting pace, tempo and dynamics coexist and integrate. Ólafsson's control of these temporal and dynamic factors is exacting. The clarity with which the C1.2 reproduces them gives a depth of insight into not just what is being played but the how and the why of that playing; a human agency that all but escapes the C1. It's the difference between a nice performance and one that's truly great, a performance that you can concentrate on and one where concentration simply isn't necessary. Listen live and this pianist holds you spellbound. Listen on the C1.2 and it approaches that same, captivating quality. Ólafsson is a pianist who can really make the instrument dance: my kind of pianist. The C1.2's musical fluency captures that character perfectly – and it does

so both through its temporal security and it's spatial and harmonic resolution. It's this combination of factors that brings the music and the performance so vividly to life. Who says you can't have it all?

This inner chemistry, whether between a pianist's left and right hands or the different instruments within a band is what so often escapes proper reproduction. How often have you sat in front of a beautifully reproduced, reach out and touch vocal, only to wonder where the backing band has gone? They may be there, but just how they connect to each other or to the singer is an open question. Listen to Ella singing the *Cole Porter Songbook* (Verve 537 257-2) on the C1 and it's all about Ella. Play 'I Get A Kick Out Of You' and Barney Kessel's guitar accompaniment to the song's intro seems detached and floaty, disconnected and frankly, irrelevant. Switch to the C1.2 and it's all change. His playing takes on a poise and shape that echoes and accents Ella's phrasing, cementing the musical bonds between the two. It's not just that the guitar is located now, in terms of space and the musical structure. You actually know why it's there – and why it leads so naturally into the full band backing for the song as a whole, making the whole thing swing. Within the confines of audio reproduction, we are so used to one musical strand dominating, that the peaceful, productive coexistence that is so apparent in live performance comes as something of a shock when we hear it so starkly revealed at home.

Does the D1.5 accomplish the same inner balancing act when it's used as a player? Well – yes and no. Rhythmically and in terms of phrasing, the DACs in the D1.5 mirror the C1.2 to an uncanny degree. They deliver an engaging song with plenty of swing and a nice, uninhibited sense of shape, flow and momentum. But switch to the C1.2 and the benefits are as big as they are obvious. The voice takes on more body, shape, presence and immediacy: but so too do the backing instruments. They're more substantial and much better separated, the 'stacking in depth' effect that typifies great mono recordings now fully apparent. That increase in musical substance is what underpins a musical contribution that puts them back on a par with Ella's voice. And talking about that voice, the improvements in subtlety and diction are not small, fully revealing the vocal control and dexterity that separated Ella from her contemporaries (and Lord help us, any modern wannabes). Don't get me wrong, Ella is still (quite literally) front and centre, but played through the C1.2, the backing band is now actually providing the backing it's there to provide. So the D1.5's DACs capture some, but not all of the benefits that come with the standalone C1.2. They fasten to the holistic temporal coherence but don't get close to the overall resolution and effortless sense of balanced musical authority.

One of the most obvious musical advances that the D1.5 player offered over the D1 was exactly this new sense of rhythmic and dynamic integrity and expression. In Linn-speak, it does the PRAT thing (Pace, Rhythm and Timing) – something that the C1.2 also exhibits, in Spades! Whilst some of the D1.5's performance gains are undoubtedly down to the move away from the stilted, mechanical sound of the ubiquitous TEAC VRDS mech used in the D1 (and which blighted so many other high-end transports), it definitely also reflects the introduction of second generation PEtER spline filtering to the player's dual-mono DACS. In terms of its musical strengths and character, the D1.5 is far closer to the C1.2 than the D1 ever was to the C1. But in terms of performance, the C1.2 hasn't just restored the gap to the player, it's actually extended it. Given just how impressive the D1.5 is, that represents a huge improvement over the C1 and a generational step-change for CH Precision's digital front end.

While direct comparison to both the C1 and the D1.5 are instructive, the process is also slightly misleading, in that it tends to promote the obviously apparent differences in performance over the more fundamental and often more subtle changes that underpin them. Swap from the C1 to the C1.2 and it's easy to get carried away with the increased dimensionality and presence, but those things are symptoms rather than cause. The thing that's really making the difference here is the increased accuracy and sophistication of the timing. In turn, that brings not only greater clarity to rhythmic patterns and phrasing, but brings order and intelligibility to proceedings as a whole, the temporal integrity increasing the spatial organisation. The C1.2's increased ability to define the space between instruments is a natural extension of the clarity with which it defines their musical relationship. Add to that the lowering of the noise floor and it's

really no surprise that as well as hearing more, what we hear makes more sense. In fact, in very real terms, what you are hearing is an overall reduction in 'noise': at least, if we define noise as any signal that isn't what, where and when it should be. You are hearing more, more easily, which is pretty much the mission statement for high-fidelity. It's also what separates the C1.2 from the likes of MSB, TotalDAC, dCS and Esoteric, all DACs that generate detail for fun but are less adept at translating that detail into a meaningful, musically anchored yet mobile whole. Listening to any of those DACs trying to reproduce a samba beat is as painful as watching some overweight celebrity trying to wiggle to one on *Strictly*…

Getting up close and personal…

What should you expect from the C1.2 in musical terms? What are the qualities that set it apart and elevate it above the crowd? A good place to start is dance music. Listen through the CH Precision DAC and whether you are talking Gregorio Panagua's *La Folia* (Harmonia Mundi HMC 901050), Boskovsky playing Strauss *Waltzes* or near-solid slabs of DeadMau5, you'll hear just how rhythmically definite and emphatic the performance is. Not metronomically rigid, but explicit in the pace and the changes of pace within the music. It's indicative of not just the note-to-note articulation of which the C1.2 is capable, but the temporal foundation on which it all rests. Combine that with the dimensionality, focussed energy and harmonic density it brings to musical reproduction, along with its ability to track a recording's dynamic range and intensity and the result is an unusually direct connection between original performance and listener.

Is there's a singer whose voice you are really familiar with; more familiar than just listening to recordings; ideally somebody that you have spoken with and know? Listen to that voice and you'll quickly appreciate just how naturally it is reproduced. Not just the tonality of the sung words, but the characteristic diction, accent and rhythms that make that individual so familiar and recognisable. That level of sonic integration and subtlety extends across the C1.2's entire range of reproduction. In turn, that makes instruments, what is being played on them and how it is being played, far easier to appreciate – and far easier for your brain to interpolate. For me, one such example would be the Eleanor McEvoy album *Yola* (Mosco MSMSACD113). Playing the haunting 'Last Seen October 9th…' on the C1.2, the quality of the recording, the sparse instrumentation and the intimacy of the vocal makes the identity of the singer unmistakable – as well as the song itself all the more emotionally powerful. The result is a performance that communicates with a directness and purpose that transcends both the medium and the system reproducing it. It's the Uchida experience all over again. Okay, so this might be a particular, even some might say an extreme example. But that clarity of musical communication informs everything you play through this DAC, making it as easy to listen too as it is engaging and entertaining.

So far, every example that I've cited has involved using the D1.5 as a source and playing its data stream through the CH-Link HD proprietary I2S connection. What happens when you use the C1.2's other digital inputs? I ran both S/PDIF and AES/EBU into the C1.2 from the Wadax Atlantis Transport and the CEC TL-2N. The fundamental qualities of the DAC are still clearly apparent, but there's no escaping the diminution of that planted, easy sense of rhythmic and musical authority that comes from the CH pairing, with its configurable clocking and high-res link. This isn't a question of detail or resolution, the Wadax in particular delivering plenty of information. It is entirely to do with how communicative and engaging the resulting music is. Piano notes aren't quite as precise in terms of weight and spacing, Ella doesn't swing quite so easily. Combining products from a single company doesn't always deliver a performance dividend, but in this case, not only do the D1.5 and C1.2 amount to a sum that's greater than the parts, using them together offers up the opportunity to expand and further integrate the digital front-end, with the company's X1 external power supply and T1 10MHz Time Reference clock, as outlined above.

File replay is a whole different question. The simple answer is that the C1.2 will happily replay streamed or locally stored files. It prefers to do so via its Ethernet input (rather than USB) but such are the vagaries of file quality and network topology that I hesitate to state definitive results until I've had more time to work on optimising the set-up and associated ancillaries

(something that I'm working on and will report on later). Currently, I'm getting very good results from locally stored material, but as expected, it doesn't compare to the disc replay – a reflection of the general status quo and in this case another indicator of just how musically capable the D1.5/C1.2 combination is. I prefer to dwell on the performance of the DAC with the source that stretches it, given that its inherent qualities will also emerge with other sources in other systems. Either way, whether that source is disc or streamed, the C1.2 is going to represent a significant musical step over and above both the C1 and a lot of other, competing hardware.

One other practical/operational aspect of the C1.2 is also worthy of comment. Personally (and I do mean personally), I'm deeply suspicious of any system that connects the variable output of its DAC directly to its power amp(s). For me, a really good line-stage will ALWAYS improve things. But having said that, really good line-stages are both rare and invariably expensive. Gritting my teeth, I forced myself to switch the C1.2 to Controller mode and connected its outputs directly to both CH Precision and VTL power amps – and was pleasantly surprised. Even slightly shocked, especially given previous experience with the C1. There have been changes to the volume control arrangements in the C1.2 and whether or not those are responsible, this is now, very definitely, a viable System Controller. The last DAC that performed anywhere near as well as this in the Controller role was the JRDG Aeris. Yes, the C1.2 lost some of the scale, bass definition and dynamic authority that come from the L1 or TL-7.5, but it wasn't the limp-wristed disaster that normally occurs. Even large-scale pieces maintained a sense of purpose, direction and momentum. I'll still take a really good line-stage EVERY time – and it's probably no coincidence that both Jeff Rowland and CH have units on the (very) short list of those line-stages that I find acceptable! But if you are one of those who favour the Digital System Controller approach, I'm not sure you will find a better example than this, musically, sonically or operationally. Given the C1.2's upgradability and its ability to accept analogue inputs, it certainly makes a strong case for serious consideration.

It is interesting to speculate just how much of a part the C1.2's synchronous decoding plays in its temporal security and resulting musical virtues. On a technical level, I have absolutely no way of knowing the answer

to that question – and it's not like the C1.2 suddenly switched to synchronous processing. All CH digital products have always operated synchronous processing, so that includes the D1 and C1, which the D1.5 and C1.2 so handily outperform. However, listening to the results, it is a proposition that, in combination with the massive increase in processing power, makes a certain, intuitive sense. It's not just the precision of the spacing and placing of notes, but the overall temporal authority that the C1.2 brings to musical proceedings that sets it apart from the high-bit/big number norm. As I pointed out earlier, where a-synchronous systems (the majority of up-sampling DACS) take the first sample and then completely rewrite the bit-stream thereafter, synchronous systems retain the original samples and fill in the spaces in-between. Which is exactly what the C1.2 sounds like… It doesn't so much give you 'more' per se: it harnesses the extra information to fleshing out and bringing greater clarity and organisation to what's already there.

More importantly, the sense of musical flow and dynamic coherence grows organically into and informs the presence, dimensionality and extent of the soundstage. There is a natural and indivisible link between the two, just as in life, the sound of an instrument or voice is indivisible from the space within which you hear it. The acoustic space, the instrumental layout and the music itself should all be intimately related. Yet in hi-fi terms, particularly when it comes to high-end digital systems, 'separation' too often extends way beyond the purely locational. Rather than informing and adding to the relationship between the instruments, it pulls them and the music apart. The holistic nature of the C1.2's presentation, its ability to keep everything lock-stepped in time and (as a result) space, is perhaps its most important capability. The more sense it makes of the performance, the less you have to – and that translates directly into a more relaxed, communicative and enjoyable listening experience, a characteristic that has been remarked on by visitors and commentators alike.

So, has my listening experience answered the questions I posed at the beginning of the review? I've spent plenty of time describing the sonic differences between the C1.2, the C1 and, in broad-brush terms, other products too. But is the upgrade worthwhile? And if the C1.2 sounds better, why is that? Well, the answer to the first of those questions is simple: the upgrade is substantial and, in high-end terms, almost unbelievably affordable. If you are running a C1 and you don't upgrade it, you will be selling both yourself and your system short. If you are running a D1, the same applies. You might think that an increased reliance on streamed music would make upgrading your system's disc transport superfluous: you'd be wrong! The D1.5/C1.2 combination will breathe a whole new lease of life into an existing disc collection, as well as opening up some enticing possibilities when it comes to the latest disc formats and formulations.

As to the why, the conclusions are unsurprising. It's not exactly news that improving clock accuracy and power supply quality, both resulting in a significant drop in noise floor, is going to be "a good thing". Meanwhile, when it comes to decoding, the C1.2 demonstrates that it's processing where the action is. What is perhaps surprising is the emphatic nature of that demonstration. Place this experience alongside others, such as living

with the Kondo filter-less DAC (amongst others) and it suggests that it's not just a question of whether to process or not, but that no processing may well be musically preferable to poor-processing – which rather undermines the numbers-based marketing efforts of so many digital manufacturers. It also suggests why so many of those products are so musically inarticulate and unrewarding.

Rare as white truffles...

The number of digital components with which I can co-exist and which can co-exist with my record collection and musical demands is woefully small – the list of manufacturers barely even filling the fingers of one hand – but CH Precision numbers amongst them. At one extreme you have the Wadax Reference components. At the other, two French companies, Neodio and EERA. But straddling that broad middle ground is the CH family, starting where EERA finish and ultimately stretching almost as far as the all but unaffordable Wadax. The nature of the CH products means that they can be configured or expanded in a whole range of different ways – but at the very heart of the CH digital eco-system sits the C1.2 DAC and its partnering player, the D1.5. Above all, I demand a system that makes sense of the recorded performance: one that identifies, puts together and articulates all the moving parts to create a single, coherent, musical whole. Clarity and organisation might not sound sonically sexy, but they are key to both great music making and what makes the C1.2 so special – as well as being precisely what so many high-end digital systems struggle with. The CH Precision digital components might look almost identical to their predecessors, but underneath (and in action) it's a whole new ball game.

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Prices:	
C1.2 DAC/Controller (including Digital-In HD and Ethernet-In HD inputs)	$36,000 USD
Optional Input Cards	
Digital-IN HD	$2,500 USD
USB-IN	$3,000 USD
Analog-IN	$2,500 USD
Sync I/O	$1,500 USD
Upgrades	
C1 to C1.2 upgrade	$4,000 USD
Additional upgrade costs:	
800×480 AMOLED Display	$1,200 USD
Ethernet-In HD Card ($3,000 if C1 has the original, non-HD, Ethernet-IN card)	$6,000 USD