Chord Electronics Ultima Pre 3 preamplifier and Ultima 3 mono power amplifiers

Alan Sircom

Over the years, I've amassed the princely sum of two laws of audio. The first is "the thermal operating temperature of a product is directly related to the ambient temperature" In other words, the hotter it is outside, the hotter-running the product, and in mid-winter, it's all ice-cold Class D. The other rule is, the more you want to keep hold of a product, the shorter you get to review it. At least one out of the two almost always applies, and in the case of the Chord Electronics Ultima Pre 3 preamplifier and Ultima 3 mono power amplifiers, it's very much the latter law. There was absolutely no chance of extending the listening session on these excellent amplifiers, despite my best efforts; they had already been in circulation and were in high demand for other listening sessions.

I mention this not in some 'woe is me' melodrama, but because that popularity is almost always a sign of a quality product or products. The things that are good, but a bit 'meh!' tend to stick around. The products that are really, really good barely get a chance to get on the shelf before someone's clamouring to take a listen. The Ultima 3 combo were on a very short leash, and when you get a chance to listen to them, that makes a lot of sense.

New to us

While the Ultima Pre 3 is new to us, it's the Ultima 3 monos that are the latest out of Chord Electronic's idyllic Kentish pumphouse factory. While we are consciously leaving the explanation of Ultima to those who make the thing, the elevator pitch is the Ultima 3 are the most affordable mono power amps in the brand's 'Full Size' range, replacing the

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long-standing SPM 1400 MkII. It uses Chord Electronics' unique Ultima amplifier topology, first seen in the flagship 780W Ultima mono amp.

The Ultima 3 'only' manages to deliver 480W, while retaining the sliding Class AB bias and dual feed-forward error-correction system of the Ultima circuit. Sliding, or adaptive, bias is a potentially 'best of all possible worlds' system where the amplifier works in Class A during normal operation and only switches to the more efficient Class B under extreme or demanding conditions. The 'sliding' part (adapting the bias of the amplifier to suit the load) differentiates the Ultima topology from more traditional Class AB designs. Ultima's topology also means output devices that are (to paraphrase *Futurama*) built like a MOSFET but handle like a Bipolar. At least, when it comes to transconductance.

As discussed, the Ultima Pre 3 has been around a little longer, although is new to us. It's a line-level preamp, with two-balanced and three single-ended inputs, an XLR-only AV loop and one balanced and one single-ended outputs to a power amplifier. Chord Electronics began life making balanced power amplifiers for BBC active monitors, so the Ultima system is best run balanced, but if you are allergic to XLR cables, it's no slouch in single-ended mode. The matching handset is good and is the only way to dim the amp's top-panel and front lighting level. It also has that reassuring hewn-from-solid heft seen in the electronics and includes buttons irrelevant to the Pre 3. The extra buttons are not 'a swing and a miss,' however.

Chord Electronics clearly loves colour-coding, and the glowing blue orb in the middle of the front panel will change colour to denote which input is being used. The flanking controls feel great and have dual functions. The left operates volume and input selection, while the right drives balance and AV bypass. I like the simple lines this creates, but sometimes moving between modes can get a little frustrating. The modalities seem counter-intuitive, too; I keep expecting volume and balance to share one dial, and input selection and by-pass to be on the other. I suspect this is something you get used to very quickly, and as it was going back in the box, I had already adapted. »

Running in

My samples came with a few miles on the clock, so running in wasn't an issue. There are reports of the amps needing several hours of playing before they come on song, but once that is over, they seem to stay in good conditioning. I found they needed a few minutes of warming up from cold, but from there, things sprang to life fast. There's no need to leave them powered up constantly; just fire 'em up and give it a couple of minutes to come back on song, and everything's golden.

Not that you'd notice they had been through a few hands before I got them. The review samples were finished in 'Jett Black' with matching 'Integra' legs, but there's also an 'Argent Silver' option. There's even an acrylic side-block option for those who will never choose to stack the amps. The amps are made from aircraft-grade aluminium; that doesn't have quite the same ring to it today. Perhaps Boeing might want to claim its aircraft are made of Chord Electronics-grade aluminium in future… it would bring back some confidence.

In the late 1970s, the Top Trumps craze hit many countries. These cards had various attributes (such as top speed, 0-60 acceleration, BHP, weight and engine size for supercars) for each category, and you would try to list a winning attribute, so you'd win all the opponent's cards in that round. No single card held all the records (although the Ferrari 512 BB, De Tomaso Pantera and Lamborghini Countach got close) Teenage geeks – myself included – would attempt to memorise as many of these attributes as possible. I mention this not simply to pad out the review, but because these Chord Electronics Ultima devices get close to holding all the winning attributes from a sonic perspective, and most of them from a technical one, too.

Everything else is a trade-off

The Ultima pairing makes most amps sound like they are a bit of a trade-off. In particular, the Chord Electronics Ultima Pre 3 and Ultima 3 mono amps make their rivals sound slow, lacking in transparency, and often quite noisy by comparison. This is no small difference in performance; 'Hours' by FKA Twigs [LP1, Young] is a complex bit of post-dubstep electronica. When done badly, it sounds like a soprano James Blake. Here, the speed and clarity make it sound less disjointed, less of a motley collection of bleeps and bloops, and her voice – though at the time, still finding itself – is confident and direct.

Move on to more traditional demonstration discs, and the same can be heard. Take Rachmaninov's Symphonic Dances {Zinman, Telarc], for example. The sense of musical movement comes across – it's a dance, after all – thanks to the speed and directness of the Chord Electronics performance. It's also extremely detailed. There's also a powerful sense of dynamic range on tap; this is a perfect test of dynamic range, both small scale (the sound of keys on a clarinet) and large (those huge orchestra swells). The Chord Electronics Ultima take it in their stride. The amplifiers always feel like they are never even remotely stressed by the music, even when dynamic music is played at a fair lick. And there seems to be an absence of background noise or hash that gives that music more room to bloom.

Why Rachmaninov is so useful here (both in terms of amplifier speed and dynamics) is the dynamic passages almost become a jump-scare. You know they are coming, but they arrive with such pace and power that you find yourself physically reacting to the sound; that's usually a function of the live event, or when played by the absolute pinnacle products in appropriately well-set-up systems.

We haven't even touched on the other aspects of performance, such as stereo soundstaging, and image solidity, but once again these are pretty much aced by the Chord Electronics Ultima group. Most importantly, there's a fine sense of scaling up and down in these important aspects, switch from the aforementioned Rachmaninov to a small Jazz combo and the scale and size of the stage changes to accommodate. Move to a singer-songwriter and it shifts again, but move to a singer-songwriter where they are so close to the microphone they dominate the soundstage (I'm looking at you, Beyoncé), and you get a big, close mic'd sound. You don't get the 'attack of the 50 foot woman' stage size unless it's really badly recorded.

Vocals are fascinating through the Chord Electronics Ultima, too. Thanks to that transparency, that speed and the dynamics, you hear every nuance, every vocal cue. That can be good and bad – spitchy, sibilant recordings have nowhere to hide – but when you have a fine set of pipes in front of you – Joyce Di Donato [*Stella Di Napoli*, Erato], the effect is mesmerising. It's like listening to the real deal, a sense attenuated only by the loudspeakers. It draws you deeper into the music. All of which makes more angst-driven lyrics hard to bear. 'Not a Pretty Girl' from the album of the same name by Ani DiFranco, on Righteous Babe records, isn't an easy listen, but here the track – and the entire album – is pained and shockingly so. Which is how it should be.

Characteristic sound

Yes, there is a characteristic sound to Chord Electronics, just as there is to every piece of audio electronics ever made – the 'straight wire with gain' maxim is still a long way from being reached. But that sound is far removed from the purely cerebral sound of the older Chord Electronics amplifiers. It's that modern, European high-end sound that delivers excellent detail and staging properties but also manages to be musically communicative and entertaining at the same time. And the Chord Electronics Ultima Pre 3 and Ultima 3 mono power amplifiers cost about 1.2 metric BMWs less than its closest sonic rivals.

That drive to swap boxes melts away, and I wouldn't be surprised if the same three baby blue eyes are staring back at you for the next decade or more.

» If I were to try and break things up, I'd probably single out the Ultima 3 mono power amplifiers as having that special 'something'. The Ultima Pre 3 is very good – excellent, in fact. But in terms of sheer transparency and blistering, entertaining speed, almost everything runs behind the Ultima 3 monos.

That said, there's a sense of balance to the Chord Electronics Ultima Pre 3 and Ultima 3 mono amps. They work together extremely well in a 'why change anything?' sense. Sure, the bigger Ultima Pre 2 and Ultima 2 monos – or the reference-grade Ultima pre and monos – bring more to the table, but there's no 'planned obsolescence' here. You don't get that feeling of 'I wonder…' or 'what if…' here. Unless you look to the Ultima 3 models as a stepping stone to something bigger from the outset and have a perpetual urge to churn products at an alarming rate, you may be surprised at just how content you will be with the Ultima 3 models. That drive to swap boxes melts away, and I wouldn't be surprised if the same three baby blue eyes are staring back at you for the next decade or more.

That's not code for 'stay in your lane' style mediocrity. The Chord Electronics Ultima 3 Pre and Ultima 3 mono amps are extremely resolving, detailed, dynamic and enjoyable. There's nothing 'mediocre' about that performance. It's more that the pairing is so adept and well-built that you need to make some very large financial jumps to make a substantial dent in the Ultima 3 'package' performance. And for many, those jumps will unbalance the performance elsewhere in the system. You need to be really pushing the envelope of performance in source, cable and loudspeaker before you look to the amps.

Labour of Love

There's a labour-of-love phono stage in the Ultima line coming (it was shown at the last Munich High-End). I'd love to see a DAVE-level or even DAVE-beating DAC in the same line, but Chord Electronics is playing its cards close to its chest on this, but if criticism in real terms is "where's the matching DAC?" you know Chord Electronics is onto something with the Ultima line.

The Chord Electronics Ultima 3 Pre and Ultima 3 mono amplifiers are ear-opening stuff. They work brilliantly together and deliver a sound that is hard – and expensive – to better both inside the Chord tent and beyond. Their speed and resolution draws you deeper into the music, and the detail and dynamics when you get there keeps you enthralled. To try them is to buy them… it's that simple. +

Technical specifications

Ultima 3 Pre

Type: Balanced and single-ended line preamplifier

Inputs: 2x XLR balanced pair, 3x RCA single-ended pair

Outputs: 1x XLR balanced pair (AV bypass); 1x XLR balanced pair, 1x RCA single-ended pair (pre-out), Type A USB (charging only), 1x 12V trigger output/input

Frequency response: 10Hz-200kHz ±3 dB

THD: 0.002 % 20Hz-20 kHz

Signal to noise ratio: -105 dB on all inputs

Input impedance: 100 kΩ

Output impedance: 560 Ω

Input maximum voltage: 10 V RMS

Output maximum voltage: 17 V RMS

Gain: x1

Channel separation: 100 dB

Finish: Argent Silver, Jett Black

Dimensions with included Integra legs (WxHxD, as supplied): 48x13x34cm

Weight: 12.7kg

Price: £6,000, €7,999, $8,945

Ultima 3

Type: Solid-state power amplifier

Inputs: 1x phase-inverted balanced XLR, 1x non-inverted balanced XLR, 1x phase-inverted single-ended RCA, 1x non-inverted single-ended RCA, 1x 12v trigger input

Output: 2x Pair of High Quality, High Current, Gold Plated Type Speaker Terminals (Bi-wireable)

Power Output: 480w RMS per channel into 8Ω, 1000W RMS per channel into 4Ω

Frequency Response: -1dB @ 0.2Hz to 46kHz and -3dB 0.1Hz to 200kHz

THD: 0.005%

Signal to Noise Ratio: Better than -84dB

Input Impedance: 100kΩ Unbalanced/Balanced

Output Impedance: 0.04Ω

Gain: 30dB

Finish: Argent Silver, Jett Black

Dimensions (WxHxD, with included Integra Legs): 48x18x36cm

Weight: 22.4kg per channel

Price: £11,500, €14,900, $17,762 per channel

Manufacturer Chord Electronics Ltd

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TECH TALK

John Franks, Chord Electronics

It's easy to think there's not much that changes in the world of amplifiers. Sure, we had Class D at the turn of the century, and the Class A/D hybrid that followed in 2009, but otherwise amplifier development is at the sleepy end of electronics engineering. Or so it seems.

So, when Chord Electronics looked to replacing its evergreen line of Switch-Mode power amplifiers, the company looked to research from the past to find technology of the future. Amplifier designs that were almost impossible to make outside of the lab due to the component tolerances of a bygone age can now be realised as manufacturing concepts and even end-user products today. And it's that blend of 'clever' from the past meeting today's quality control and production engineering that became the genesis of Chord Electronics latest Ultima topology, which sees its way into the brand's amplifiers, from the smallest to the giant Reference class models.

We spoke to John Franks, CEO of Chord Electronics on the pioneering work that went into Ultima, and how it became a real-world product.

John Franks, CEO of Chord Electronics

A new approach to amplifier design

Chord Electronics' Ultima topology is based on theories that Professor Malcolm Hawksford put forward in the 1980s. This work was picked up by a young American engineer, Bob Cordell, who built a low-power audio amplifier and wrote extensively about it in *Wireless World* magazine.

At the time, I was researching better ways to control *high-power* MOSFETs in audio in order to overcome their non-linear behaviour. I was so impressed by Cordell's work that I decided to combine his approach with my knowledge of high-frequency power techniques to see where I could take this technology.

MOSFETs in audio design

There are two major types of MOSFETs: horizontal gate and vertical gate. Vertical gate MOSFETs are »

These transistors have a drain, a source, and a large gate structure shaped like a waffle-iron grid that controls the flow of current.

» not normally used in audio designs because they are notoriously difficult to control in their transition region, which is where we operate in audio amplifiers. They prefer to be either on or off. Until around five years ago, like all audio companies, Chord Electronics used only the easier-to-control lateral gate structure audio MOSFETs.

These transistors have a drain, a source, and a large gate structure shaped like a waffle-iron grid that controls the flow of current. This grid must cover the entire chip, which limits the chip's power and makes it quite expensive. Many years ago, I used some of my aerospace contacts to develop Chord Electronics' own special dual-chip lateral structure MOSFETs, which served us well.

However, for the same die size, a vertical MOSFET can deliver ten times the current, making it much more powerful. While they are usually too difficult to control for use in audio amplifier designs, the Ultima topology, which uses several feed-forward error-correcting circuits, monitors each individual power FET in the amplifier signal path. This enables six-sigma perfect control of the music signal within each part of the waveform.

My approach to design and development

Honestly, I love my job as Chord Electronics' chief designer, which is why I don't intend to retire anytime soon. I enjoy sorting out each individual issue as it arises, and I didn't encounter any serious problems when implementing this technology.

I've always loved the intricacies of well-designed electronics, when done well. As a child, I would hunt for broken valve radios and try to fix them. My bedroom desk was full of semi-working, but fully lethal (!), bits and pieces.

Much later, I got an engineering job at Marconi Avionics, where I first saw some truly beautiful hardware designs. I learned a great deal, and Marconi's advanced training taught me how to design electronics that would never fail. This experience instilled a philosophy in me to strive for electronic perfection as close as possible with the technology available at the time.

Development timescales

Development timescales can vary significantly. A relatively quick change to a current design can take up to a year, especially if there are extensive changes to the metalwork or control circuits. Additionally, meeting the qualification standards of different countries can add many months to the process.

For new concepts and technologies, the timescales can increase to around three years for my analogue ideas. With our digital products, I work with consultants, which can take many opinionated and argumentative years—far too long, but I'm sure that ultimately, it's worth the wait.

For my own analogue domain designs, such as amplifiers, preamplifiers, and phono stages, I first draw up the circuitry and run simulations. Having good software to model parts of the designs is a tremendous help, as it gives me confidence that the complete circuit will eventually work.

However, a software simulation is only a guide, and reality usually sets in once I've assembled some hardware and put some nasty volts through it. But by being diligent and empirically plodding through the process, the final design often exceeds my initial simulated expectations. I believe that the enforced long stay at home during the pandemic was actually very beneficial. I set up a small lab at home and was able to explore ideas and concepts that I would not normally have had time to look at. Some of these are only now coming through into our production.

The future of Ultima

Can aspects of the Ultima topology be applied to all products? Not all, but I have used aspects of Ultima ideas in products where the outputs have power sections driving very precise, low-impedance controlled inputs.

Could this have been developed historically? Yes, I believe it could have been developed in the mid-1980s as a modestly powerful amplifier. However, electronic components are improving all the time, and the massively powerful devices I'm currently working with were not even conceived of back when the theory was developed.

Is it easy to scale up or down? It was relatively easy to scale the technology both up and down. However, the smaller size and consequent power limitations of units like our miniature amplifier, the Anni, mean great care must be taken during extended internal listening sessions to ensure it still sounds like a fine-quality Chord Electronics amplifier.

This, of course, was greatly assisted by the higher current capabilities of well-controlled, small but powerful vertical MOSFETs. +