

Chord Electronics Ultima Integrated amplifier

Chris Frankland

A year ago, when I was visiting my local hi-fi dealer, he told me rather excitedly about a new integrated amplifier he had heard an early pre-production sample of. He was so enthusiastic that I made a mental note to get hold of one for review. That amplifier was the Ultima integrated amplifier from Chord Electronics.

It made its world debut at the Munich High-End Show last May but was only unveiled in the UK at the Bristol Hi-Fi Show in February.

It has an interesting backstory because, in this model, we see the Ultima technology Chord Electronics introduced five years ago in its high-end amplifiers trickling down to an integrated amplifier for the first time.

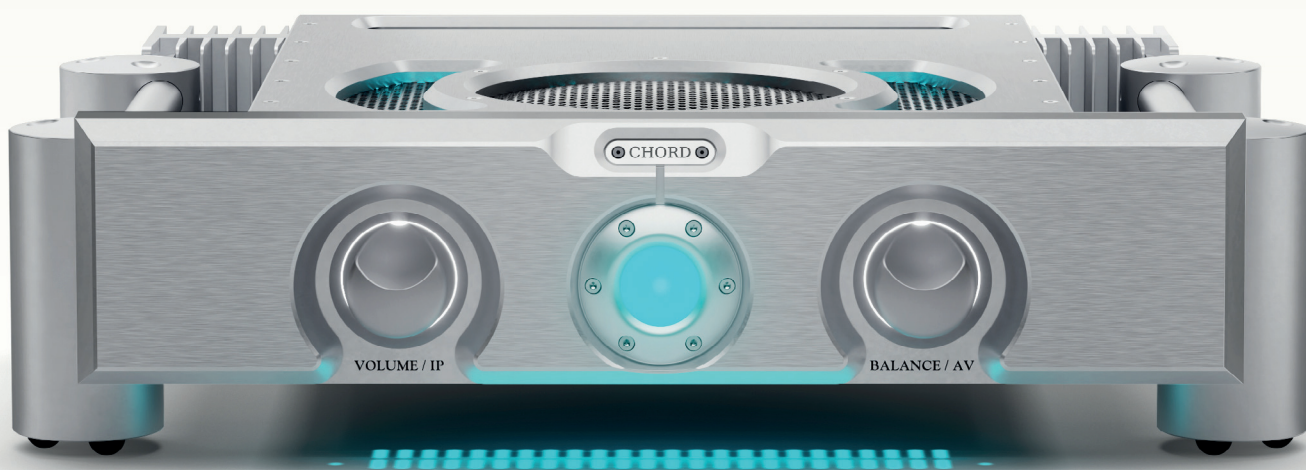
Chord Electronics started producing amplifiers for consumers and professional recording studio environments such as the BBC and Abbey Road. Since then, it has expanded into streamers, DACs, and phono stages.

Avionics background

John Franks, who founded the company in 1989, had a background in the avionics industry with the likes of Raytheon, AT&T, and Marconi Avionics. This experience, he told me, shaped the way he approaches design.

I was interested in learning more about the Ultima and how it came about, so I went to talk to him at the Chord Electronics factory. Asked to summarise his design philosophy, Franks said: "Being prepared to go as far as you need to go to make the very best thing that the technology of the time can do. And technology is always improving. In avionics, you cannot short-change and compromise a design because, if you do, planes can depart from proper flight. You must be prepared to push the envelope, and I think I have brought that philosophy over from avionics. It's no compromise. It's what I always wanted to do, and it's been a helluva ride."

The technologies that have trickled down to the new Ultima integrated are Chord Electronics' dual feed-forward >>



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Dual feed-forward

The dual feed-forward technology is based on a paper by the legendary Malcolm Hawksford at Essex University. It was then taken up and refined by Bob Cordell of Bell Labs before being further developed by Chord Electronics' John Franks. Franks progressed Cordell's dual feed-forward error correction topology and incorporated his own concepts in ultra-high-frequency power supplies that have underpinned Chord's amplifier range since 1989.

As many regard the power supply as the beating heart of an amplifier, let's look at that first. In a nutshell, the Chord Electronics switch mode power supply runs at 80kHz, which Chord says means it doesn't interfere with any audio signals. The incoming power is filtered and rectified and then chopped using high-voltage MOSFETs. It is then passed on to a special ceramic-cored high-frequency transformer, rectified again and is then fed to Chord's Dynamic Coupling system.

This couples the amp's positive and negative rails with a strong magnetic flux to help cope with any high demand. Running the power supply at 80kHz also means the transformer can be much smaller.

Such power supplies were initially developed for use in the aerospace, telecommunications, and data processing industries where they needed high power in a space-efficient format. However, early variants used in the audio industry were often criticised for electrical noise, poor reliability, high engineering costs and generating electromagnetic interference.

Ten years after

In his white paper on his amplifier designs, Franks admits that it took him 10 years of "perseverance and innovative engineering" to overcome those problems, but he is adamant that this was the right approach.

He told me: "It is about controlling a drive unit rapidly and some of these 15in drivers are big and maybe have a compliant mass of 100g. It takes a lot to stop and start them within microseconds and you've got to draw down energy from your power supply very quickly. High-frequency switching power supplies can do that, whereas analogue supplies struggle.

"Smaller capacitors are faster to respond and also the recharge time on a high-frequency power supply is so much faster. People think they always have RF noise, but there isn't if they're designed right. Analogue supplies are passing anything that's on the mains, and that could be anything, and a lot of it could be RF. So it is a total misconception."

For those reasons, Franks has stopped using huge storage capacitors in his power supplies and opted for multiple, smaller ones. He believes smaller capacitors respond faster to charging and discharging demands than larger ones. The Ultima boasts four high-power line input phase-corrected power supplies designed to deliver excellent transient response.

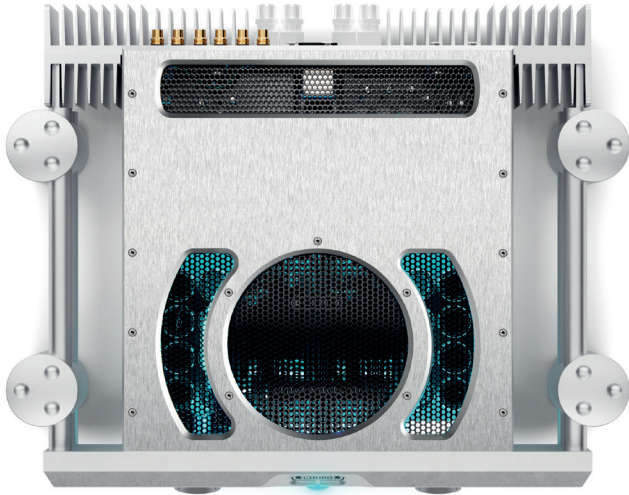
Sliding bias

The amplifier operates as a Class AB sliding bias design, which means it operates in Class A most of the time, with Class B operation only coming into play in the most demanding situations. The output stages use Chord's own metal-on-silicon MOSFET devices, made for them in





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» an aerospace-sector fabrication house. They are a dual-die design, which means they are thermally coupled in production to match each other perfectly.

Franks's development of Hawksford and Cordell's original dual feed-forward technology is the other exciting part of the amplifier circuit topology. The Ultima has two additional amplifier circuits that monitor and correct the difference between the output of the reference input, both inputs fed to the MOSFETs, and the output of the power MOSFETs. If this detects a discrepancy, the circuit will add a 'difference signal' to the input of the MOSFETs to correct it and provide an accurate output. This corrected output is then fed back as part of the amplifier's overall global feedback.

Franks says that Class AB and B amplifiers have an Achilles heel. While more efficient than Class A designs, the N channel devices that handle the top half of the music waveform hand over to the P channel devices that deal with the negative part of the waveform, which is where crossover distortion is generated. The dual feed-forward circuitry is designed to minimise this.

Unboxing

As I unpacked and handled the Ultima, it exuded quality. It shares the same 28mm thick solid aluminium front panel with the recently introduced Ultima PRE 3 preamp. All of its casework is made from precision-machined, solid aircraft-grade aluminium.

It is a stunning piece of modern industrial design, and its reassuring solidity is complemented by the customary Chord Electronics light show supplied by an internal ring of

LEDs. Although mainly cosmetic, Franks hinted when we spoke that any spurious RF can be dissipated within LEDs.

The amplifier is minimalist in its styling, with just two large rotary knobs on the front panel to the left and right of the spherical on/off switch, which glows red when in standby mode and cycles from green to cyan to indicate it is ready to use.

The left-hand knob controls the volume and, when pressed, allows input selection. It has a light circling that changes colour to denote the selected input. Input 1 is a balanced XLR while the other three RCA line inputs are unbalanced. It also has an XLR AV bypass and a balanced XLR preamp output on the rear panel. The right-hand knob controls balance and AV bypass.

You have chosen, wisely

To evaluate the Ultima integrated I connected it to a pair of Russell K Red 120Se speakers, which are a favourite of mine. The Ultima, with its 125 watts of power, would drive them well.

My music source was an Audio Note CDT-Five CD transport and DAC 5 Special, which provided a super-high-quality input. I did not use the balanced input, but anyone who has source components that provide a balanced output is well advised to do so.

Setting the Ultima up was child's play. Controls are minimal, so you can't go wrong. Inputs are clearly marked, and polarity is easy to discern, and with the coloured light that surrounds the volume/input selector knob easy to see even from a distance; once you have memorised which colour denotes which input, you should be ready for action.

The remote control provided is also easy to use and responsive, so I used it throughout my listening. There is, of course, no phono input on the Ultima, but that is not unusual these days. Chord Electronics has its own to offer with the Huei MM phono stage and the Symphony if you have a moving coil cartridge.

Warmed to

I am pleased to say that the Ultima was one of those products that I warmed to from the very start. Straight in with a favourite track from guitarist Peter White, his version of the Johnny Nash classic 'I Can See Clearly Now', the Ultima impressed with its easy, detailed, layered, and dynamic presentation, portraying each player of this gorgeous instrumental in their proper place within the music. It was free from random fireworks or pitching



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» elements at me that did nothing to enhance my appreciation of the music. No, the whole track hung together well, with great insight into how White played each note. The bass line was tight, tuneful and the Ultima conveyed its twists and turns beautifully. Drums and percussion were controlled and syncopated and the accordion part, often lost in the mix on poorer products, was well conveyed and separated.

Switching to the lovely ballad 'Lo Siento Mi Vida' from Linda Ronstadt's *Hasten Down the Wind* album, the Ultima brilliantly conveyed the two guitars on the intro. It allowed you to hear the differences between them, while Ronstadt's vocals came across as powerful yet sensual. The walk and growl of the bass line were well handled, and on the drumkit, you could hear various strikes of differing power and delicacy on snare or cymbals. And it all flowed beautifully with that dreamlike feel this track has.

Grabbing the *Saxophonic* album by sax ace Dave Koz, I was keen to play the track 'All I See Is You'. The Ultima did not disappoint, conveying the body and 'raunch' of Koz's tenor sax that gives it that typical quality you can only describe as 'sexy', and here it had all of that. The electric bass line that really drives the track along was conveyed with great pace and everything was in its place musically, playing its proper role in the appreciation of the track.

Ben Sidran is a favourite jazz singer/songwriter/pianist of mine and following up for me was 'Sunny Side of the Street' from his *Enivr  d'Amour* CD. I know his voice well from seeing him live on many occasions and I can say the Ultima did justice to his style and sound. His vocals were expressive and characterful, while his Yamaha DX7 synth had the top-end sparkle and liveliness it should have. The excellent, raunchy bass line was tight and tuneful, while the saxophone was nicely voiced and articulated. The track moved and flowed well, and its staccato, lilting rhythm was conveyed well.

Mood change

Changing the mood, I reached for George Benson's excellent *20/20* album and played the track 'No One

Emotion'. This track flies along at a breakneck pace and is unbelievably tight regarding the musicianship and arrangement, and the Ultima took it in its stride. Pacey, detailed, tuneful, dynamic, and controlled, it captured Benson's immaculate vocals very well while that relentless synth bass line drove the track along at breathtaking speed. I could also savour Michael Sembello's scorching guitar solo, which the Ultima pitched with just the right combination of raunch and poise.

Whether it was delicate guitar work from Larry Carlton or Earl Klugh, scorching sax from Dave Koz or David Sanborn, heartfelt vocals from Linda Ronstadt, or hardcore rocking from ZZ Top, the Ultima handled it all with control, detail rendition, and dynamics while holding it all together as a musical whole.

The integrated amp market has heated up in recent years, and buyers are spoilt for choice for good-sounding amps. Thanks to the Ultima, things just got even hotter. If you are in the market at this price point, you should consider the Chord Electronics Ultima. +

Technical specifications

Type: Sliding Class A/AB, 2-channel integrated amplifier

Analogue inputs: Four line inputs. Three unbalanced (RCA) one balanced (XLR). One AV bypass (XLR)

Digital inputs: None

Analogue outputs: One balanced pre out (XLR)

Input impedance: 100k ohms

Power output: 125Wpc @ 8 ohms

Frequency response: 10Hz-200 kHz \pm 3dB

Distortion THD: 0.01 % (20Hz-20kHz)

Signal-to-noise ratio: 90dB on all inputs

Dimensions (WxHxD) with Integra legs: 480mm x 130mm x 380mm

Weight: 14.75 kg

Price: £8,500, \$11,250

Manufacturer: Chord Electronics

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