PRISM SOUND CALLIA

DAC

UK digital specialist Prism Sound is a newcomer to the audiophile arena, but it's an old hand in the professional audio sphere, having been founded back in 1987 by Graham Boswell and Ian Dennis, electronics engineers who'd just left Neve, where they'd developed the world's first commercial audio mixing console using DSP. According to Boswell, Prism Sound was founded '*with the aim of making digital conversion good enough for the most demanding listener.*'

They ended up making digital conversion so good that Prism Sound's first DACs and ADCs rapidly became popular in recording studios around the world, in particular the ADC-1. And when Prism Sound developed the world's first AES/EBU interface analyser (the DSA-1), it became the standard tool for broadcasters around the world, including the BBC, NHK, NBC, CBS, ABC and CCTV.

THE EQUIPMENT

Callia is a girl's name that was once popular in Greece and elsewhere around the world. Some linguists say it translates as 'beautiful voice' while others claim 'very beautiful' is a better translation. It would apply either way in the case of Prism Sound's Callia DAC, because it looks and sounds very beautiful. And if you're wondering why a totally British company (all products are designed and manufactured in Cambridgeshire, England) has a Greek name, it may be because Graham Boswell, Prism Sound's founder and owner, has a penchant for it. Several of the company's professional digital/analogue products also have Greek names: Orpheus, Lyra, Atlas, and Titan etc … though one is simply named 'Dream' … so not all Greek then.

The front panel is beautifully simple and beautifully laid-out. The large knob is the volume control for the line outputs, of which there are two: unbalanced (via gold-plated RCA terminals) and balanced (via gold-plated XLR terminals). It's surrounded by a ring of blue LEDs that illuminate to give a visual representation of volume setting. The provision of a volume control means the Callia can drive a power amplifier directly, if required, eliminating the need for a pre-amplifier, but this firstly means all your source components would need to be digital, because the Callia has only digital inputs, and secondly that you'd be limited to three source components, because it has only three digital inputs: USB, coaxial digital and optical digital. I could not quite believe there's no analogue input: IMHO, a definite oversight.

The USB input handles PCM at 44.1k, 48k, 88.2k, 96k, 176.4k, 192k, 352.8k and 384kHz at up to 32-bits as well as DSD64 and DSD128. The coaxial and optical digital inputs handle PCM at 44.1k, 48k, 88.2k, 96k, 176.4k and 192kHz at up to 24-bits as well as DSD64. Mac users using the USB input are good to go 'out of the box' but Windows users will need to install a UAC2 driver to send audio to the Callia. This software is handily included on a USB stick that's supplied with the Callia. The stick also contains the Callia's User Manual (written by Ian Dennis himself!), as well as software that will enable you to perform firmware upgrades yourself as they become available. I liked this: So much better than providing an optical disc or forcing you to download an instruction manual from a website. (A printed 'Quick Start' guide is also included, should you be in a hurry.)

The smaller rotary control to the right of the volume control is a volume control for the 6.35mm headphone jack on the front panel. Inserting a headphone plug into this socket mutes the analogue line inputs, which I didn't like. It was only when I had to consult the manual to find out what the DIP switches on the rear panel did that I discovered you can defeat this muting using these switches. The DIP-3 and DIP-4 switches also allow you to optimise the Callia's low-impedance headphone amplifier to perfectly match your headphones, with one setting for phones with a nominal impedance of <32Ω, another for phones with nominal impedances of between 32 and 50Ω, and another for high-impedance (>50Ω) headphones.

When setting the DIP switches you do need to be careful not to move DIP-1 inadvertently, because it disables the front-panel volume control so the Callia delivers its maximum output voltage at the output terminals. DIP-2 switches DSD headroom between 0dB and +3.1dB (the latter position is used to prevent 'hot' DSD streams from clipping).

Input switching is managed automatically, with the Callia automatically detecting an active digital input and switching to it, after which it 'locks' into position and shows the format of the data stream on the front panel, using the LEDs immediately to the left of the volume control. If you don't want to avail yourself of the convenience of auto-switching, you can switch the circuit off, after which manual switching is accomplished by brief presses of the power on/standby button at the far right of the front panel. (A longer press puts the Callia into standby mode.) This same button, used in conjunction with the main volume control, also allows you to vary the brightness of the front-panel LEDs.

Internally, Prism Sound does most of its processing using in-house algorithms, via a Spartan-6 FPGA and 32-Bit ARM Cortex microcontroller along with Prism Sound's own clocking circuitry, which it calls a 'CleverClox'. This is a hybrid phase-locked loop that locks the Callia's clock to the selected SPDIF source with better than ±50ppm local clock accuracy, resulting in ultra-low jitter, claimed to deliver >60dB/decade above 100Hz jitter rejection. Although some Cirrus Logic CS4398 DACs are on the PCB, Prism Sound reportedly uses only their final switched-capacitor stage.

The Callia is quite small, just 285×242×50mm (including feet) and correspondingly light, at 2.1kg.

IN USE AND LISTENING SESSIONS

Once I had installed the Callia and started to use it, my first thought was that either I would to have develop stronger fingers, or that the Callia's volume control would loosen-up after continued use, because out-of-the-box, it's quite stiff to turn. The headphone volume control, on the other hand, was quite easy to turn, but had a slightly 'raspy' action. Both are potentially teething issues that could disappear after some use, or simply may have been confined to my review sample. A remote control with the ability to adjust volume would have solved both issues but alas, the Callia does not come with a remote control. Prism Sound is likely expecting it to be used as a 'desktop' unit, in which case the user would always be within arm's reach.

The very first album I played through the Callia proved to be jaw-dropping on two fronts. For a start, it was made immediately obvious to me that the Callia is 'telling it like it is' and providing super-precise digital-to-analogue conversion, yet it wasn't a 'digital' sound, which made me immediately suspect that whatever filtering Prism Sound is using, it isn't a standard 'brick-wall' filter. The result was a 'cleanness' to the sound that was

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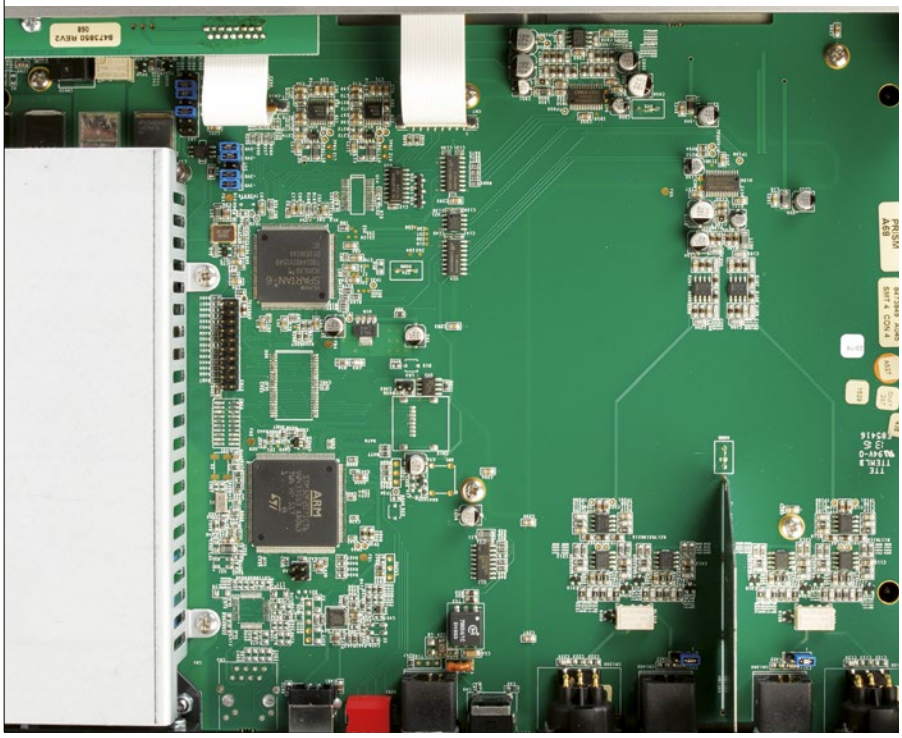

as revealing as it was involving. The second jaw-dropping event was the sound I was hearing from the disc, a 1958 live recording of Harry Belafonte in Carnegie Hall. It would appear that the engineer (Bob Simpson) just set up a few microphones, and didn't mess with levels or equalisation. Amazingly, it then seems that no-one 'mastered' the tape before its transfer to CD. The result is a recording that is amongst the best and most realistic I have ever heard in my life. I am not exactly a Belafonte fan, but I could listen to this album over and over just for the sheer pleasure of hearing how live recordings should be made—and no matter what I think of the music itself, the actual musicianship is stunningly good, both from Belafonte himself and also from his backing musicians.

Revealed the weave of the music while at the same time uniting the threads into a glorious tapestry of sound...

After the smoothness of Belafonte, the grim grit of The Peep Tempel's latest CD, 'Joy', was a jolt back to modern reality, but what a jolt. There's story-telling here (via spoken word), and more story-telling (yep, spoken word again), but it's also a musical bacchanalia. Beautifully recorded, too, as just a few seconds listening to *Neuroplasticity* will prove (and will show where the album title originated). And if you're looking for a track to show off your subwoofer's prowess, you could do worse than spin Joy's lead track, *Kalgoorlie*, which is bass and grunge pierced by ear-shredding, stabbing guitar.

All of which was revealed exactly by the Callia, whose own performance sinks you deep into the trio's performance, but at the same time almost contradictorily reveals the precision of Anna Laverty's superb engineering. But not an album for the faint-hearted, so listen at your own risk…

Trialled with even-more testing fare, a 70-piece symphony orchestra, the Callia once more showed its ability to reveal the 'weave' of the music while at the same time uniting the threads into a glorious tapestry of sound. No, not classical, but 'Live in Columbia' by The Alan Parsons Project. The only problem is that when you hear, say, *I Wouldn't Want to Be Like You*, you're going to want to hear the whole of the album that gave it life (I, Robot), and the same would be true of the tracks *Turn of a Friendly Card* and *Eye in the Sky*. (Though hearing *Friendly Card* made me wonder why Parsons wasn't enjoined in the recent 'Stairway to Heaven' lawsuit.)

No matter what type of digital music I played through the Callia, from CD quality up to DSD, I always perceived the backgrounds as being totally silent, but thankfully, it was always a truly 'musical' silence and not the 'digital black' that some DACs deliver when there's no music playing or, worse, 'between the notes'. When I was listening to the Callia, any silences—however short or long—merely served as pauses in the cause of the music, either to separate individual notes, musical phrases or tracks. And when listening to solo instruments played at a live venue, I could hear the 'acoustic' of the venue itself… though also, sometimes—alas!—traffic noises from outside that venue, such is the revealing nature of the Callia DAC.

I could not conclude this review without a mention of the Callia's headphone output, which is awesome. It drove all the headphones I had to hand to their maximum level without any audible distortion while also delivering outstandingly transparent sound. I particularly liked the dedicated volume control, because it meant I could leave the headphone volume at my preferred level while still adjusting the main volume control to suit the listening situation (with the same scenario operating *vice versa*, of course!).

CONCLUSION

The inexplicable omission of an analogue input or two aside, not to mention the lack of a remote for the purposes of volume control and input switching, Prism Sound's first foray into the consumer audio market is a *tour de force*, a genuine state-of-the-art DAC and headphone amplifier at a genuinely entry-level price. *Lesley Swan*

Readers interested in a full technical appraisal of the performance of the Prism Sound Callia DAC should continue on and read the LABORATORY REPORT published on the following pages.

CONTACT DETAILS

Brand: Prism Sound
Model: Callia
RRP: $2,695
Warranty: Three Years
Distributor: CDA Pro Audio
Address: Unit 17, 69 O'Riordan Street
Alexandria NSW 2015
T: (02) 9330 1750
E: info@cda-proaudio.com
W: www.cda-proaudio.com

⊕
- Superb sound
- Headphone amp
- Dual volume controls

⊖
- Analogue inputs
- Remote control

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LABORATORY TEST REPORT

The Callia certainly has sufficient output to drive any following component, with *Newport Test Labs* measuring 3.88-volts from the balanced outputs, 1.99-volts from the unbalanced outputs and, from the headphone output when loaded down with 25Ω, a hefty 411mW. The balance between the left and right channels was outstandingly good, at just 0.011dB, while the separation between the two channels was gulf-like: 128dB at the frequency extremes and 130dB across the midband.

The signal-to-noise ratio of the Callia was also outstandingly good, with *Newport Test Labs* measuring 112dB A-weighted using 16-bit/44.1 test signals, improving to 115dB using 24-bit/48kHz test signals. THD was measured at 0.001% with at 1kHz CD-standard signals. THD vs. Frequency with AES-17 signals is graphed for two levels (–1dB and –20dB) with the higher signal's distortion tracking better than 0.001% across the frequency range, and the lower –20dB signal tracking only very slightly higher. An excellent result, as you can see from looking at Graph 6.

Spectrum analysis of distortion at 1kHz at maximum output is shown in Graph 1 and you can see that there's just a second harmonic at –130dB (0.00003%), a third harmonic at –113dB (0.00022%), a fourth at –132dB (0.00002%), a fifth at –123dB (0.00007%), and a seventh at –130dB (0.00003%). The noise floor across the audio band is down at –140dB, so the tiny amount of noise there is is primarily low-frequency.

Distortion at –20dB, which would be more typical of the levels expected when listening to music than the result at 0dB, is shown in Graph 2. There's just a single third harmonic component at –130dB (0.00003%). Very low-level distortion (at a recorded level of –90.31dB) is shown in Graph 3. No distortion components are visible above the noise floor at –140dB.

Intermodulation distortion (IMD) was measured overall for AES-17 signals as being –108dB (0.00039%). CCIF-IM distortion is illustrated graphically (Graph 4) for CD-standard test signals of 19kHz and 20kHz. You can see there is no regenerated signal at 1kHz at all, and there are only two sidebands at 18kHz and 21kHz, both of which are down at around –118dB (0.00012%). Some sampling-related artefacts are visible up around 44.1kHz, but they're all more than 120dB down (0.0001%).

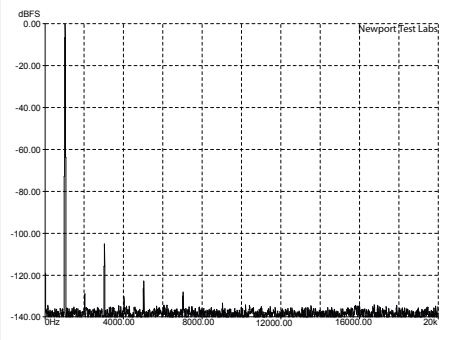
Frequency response was ruler-flat and

Prism Sound Callia DAC (AES-17 Standard using 48kHz/24-Bit)

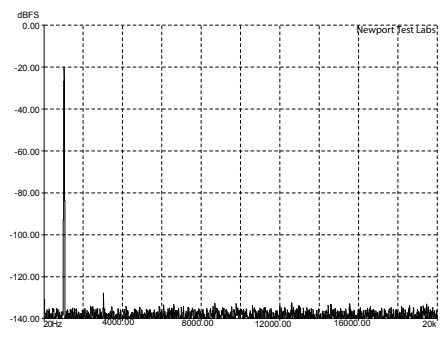
Digital Section	Result	Units/Comment
Out of Band Spurious Components	–117.214	
Suppression of Imaging Components	–107.762	(Worst Case)
Level Dependent Logarithmic Gain	0.195	
Intermodulation Distortion (1)	–108.312	18kHz/20kHz 1:1 Ratio
Intermodulation Distortion (2)	–108.702	41Hz/7993Hz 4:1 Ratio
Low Level Noise Modulation	8.536	Worst Case
Idle Channel Noise	–115.35	CCIR-RMS weighting
Signal-to-Noise Ratio	–115.044	CCIR-RMS weighting
Power Line Products	–142.269	50Hz
Non-Linear Interchannel Crosstalk (a)	–124.163	3kHz (2nd-order ref 17kHz/20kHz)
Non-Linear Interchannel Crosstalk (b)	–127.930	6kHz (3rd-order ref 17kHz/20kHz)
Non-Linear Interchannel Crosstalk (c)	–119.987	10.040kHz (2nd re 40Hz/10kHz)
Non-Linear Interchannel Crosstalk (d)	–113.721	10.080kHz (3rd re 40Hz/10kHz)
Absolute Phase	Non-Inverting	Normal/Inverted

Prism Sound Callia DAC — Laboratory Test Results

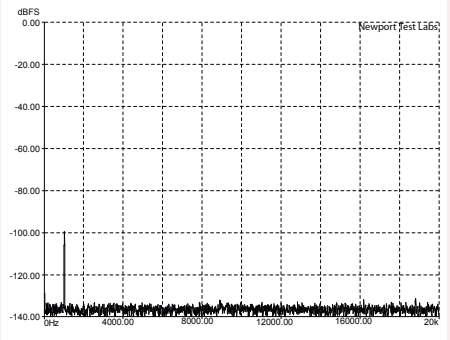
Analogue Section	Result	Units/Comment
Output Voltage	3.8815 / 3.8859	volts (Left Ch/ Right Ch)
Frequency Response	See Graph	dB (20Hz – 20kHz)
Channel Separation	128 / 130 / 128	dB at 16Hz / 1kHz / 20kHz
THD+N	0.001%	@ 1kHz @ 0dBFS
Channel Balance	0.011dB	@ 1kHz @ 0dBFS
Channel Phase	0.00 / 0.00 / 0.02	degrees at 16Hz / 1kHz / 20kHz
Group Delay	180 / 8.97	degrees (1–20kHz / 20–1kHz)
Signal-to-Noise Ratio (No Pre-emph)	105 / 112	dB (unweighted/weighted)
De-Emphasis Error	Not Fitted	at 1kHz / 4kHz / 16kHz
Linearity Error @ –60.00dB / –70.00dB	0.00 /0.06	dB (Test Signal Not Dithered)
Linearity Error @ –80.59dB / –85.24dB	0.05 / 0.00	dB (Test Signal Not Dithered)
Linearity Error @ –89.46dB / –91.24dB	0.01 / 0.03	dB (Test Signal Not Dithered)
Linearity Error @ –80.70dB / –90.31dB	0.08 / 0.02	dB (Test Signal Dithered)
Power Consumption	1.97 / 6.99	watts (Standby / On)
Mains Voltage During Testing	239 – 251	(Minimum – Maximum)



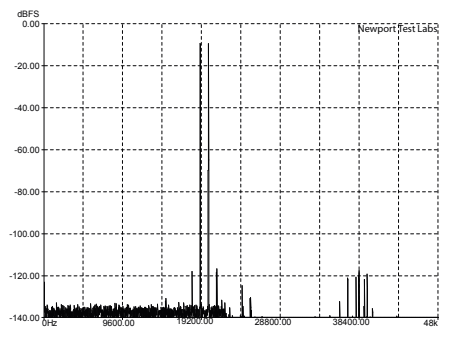
Graph 1: THD @ 1kHz @ 0dB recorded level. [Prism Sound Callia DAC]



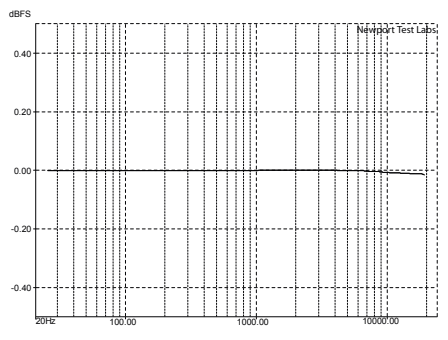
Graph 2: THD @ 1kHz @ –20dB recorded level. [Prism Sound Callia DAC]



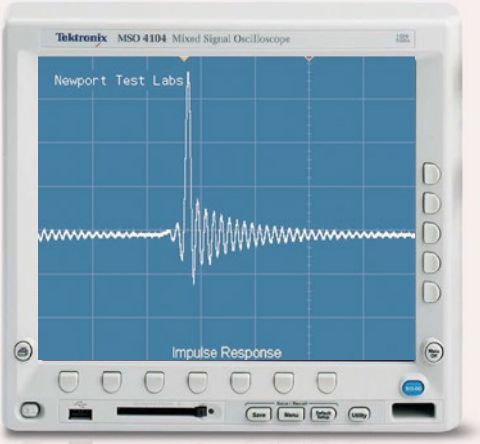
Graph 3: THD @ 1kHz @ –90.31dB recorded level. (With dither) [Prism Sound Callia DAC]

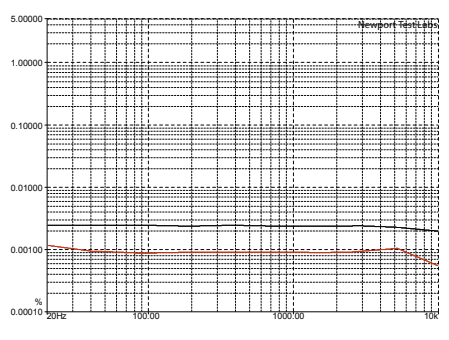


Graph 4: CCIF Distortion (Twin-Tone Intermodulation) @ 0dB using 19kHz and 20kHz test signals in 1:1 ratio. [Prism Sound Callia DAC]

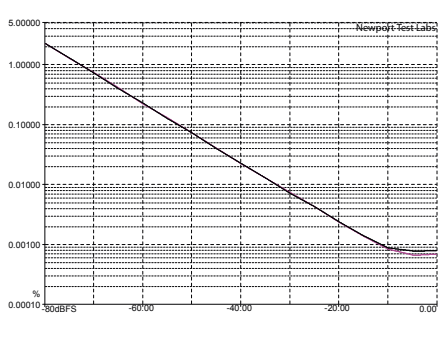


Graph 5: Frequency Response at @ 0dB recorded level. 44.1kHz/16-bit. [Prism Sound Callia DAC]

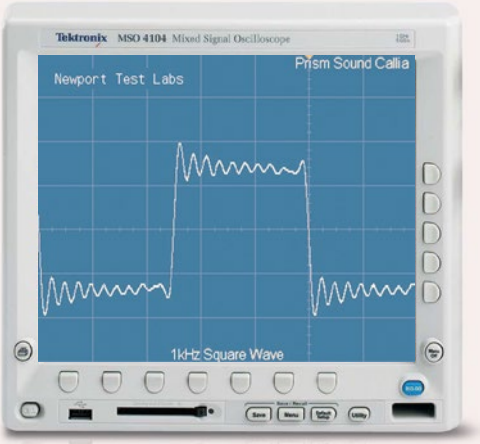




Graph 6: Total Harmonic Distortion & Noise (THD+N) vs Frequency at –20dB (Black Trace) and –1dB (Red Trace). Digital input. 24-bit/48kHz. [Prism Sound Callia DAC]



Graph 7: THD vs Level. Digital input. 24-bit/48kHz. [Prism Sound Callia DAC]



extended. The CD-standard frequency response is shown in Graph 5 and you can see that it's only around –0.01dB down at 20kHz (note the vertical scaling of 0.2dB per division). At higher sampling rates, the responses were as flat, with the frequency responses down just 0.32dB at 45kHz (96kHz) and 4.5dB at 90kHz (192kHz).

Newport Test Labs reported that de-emphasis was not implemented in the Callia, which means that CDs manufactured prior to 1989 may require a slight treble roll-off to compensate for the resulting increase in the level of high frequencies. There are no other implications.

Low-level linearity was excellent, as you can see from the tabulated results, and jitter was extraordinarily low… also excellent.

Square-wave and pulse testing showed that Prism Sound appears to be using an infinite impulse response (IIR) filter in preference to an FIR type, evidenced by the lack of pre-ringing, which is the type of filter most audiophiles report as being audibly superior to FIR or 'brickwall' types.

Interestingly, the standby power consumption of the Callia, at a measured 1.97-watts, is higher than the Australian standard, but at less than 2-watts, hardly significant. The interesting point is why Prism Sound didn't keep it below 0.5-watts, which would have been easy for a DAC.

I can happily report absolutely outstanding performance from Prism Sound's Callia DAC in every measurement made by *Newport Test Labs*. *Steve Holding*

Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.