
# Cambridge Audio 851E and 851W

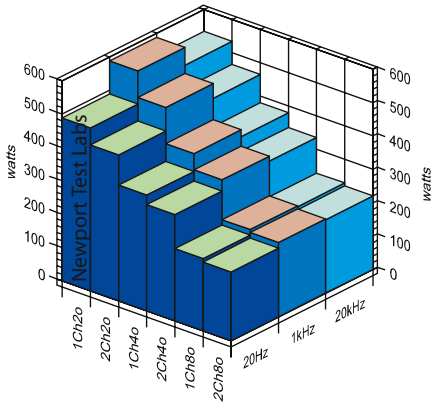
## PREAMPLIFIER AND POWER AMPLIFIER

If I had a dollar for every time someone told me '*there's nothing new in amplifier design*' I'd be rich. Yet all the people telling me that are wrong. On the contrary, there's so much new in amplifier design that it's very difficult to keep up with everything that's going on in the field. Anthony Barbetta's work on wideband, current-sharing, MOSFET power amplifiers with multiple feedback loops has been ground-breaking. Mark Alexander's current feedback audio power amplifier is very thought-provoking. Then there's Douglas Self's innovative crossover displacement circuit, for which he was awarded British Patent GB2424137.

Self's new circuit has been commercialised by Cambridge Audio under the trademark 'XD' (short for cross-over displacement, which describes what the circuit does) and features in several of the company's amplifiers, including in the Azur 851W power amplifier reviewed here. (For those readers removed from the heady world of audio amplifier engineering, Doug Self is one of the finest amplifier designers working in the world today, as well as the author of several textbooks about electronic design, the most recent of which is

the sixth edition of his most-famous classic work, 'Audio Power Amplifier Design' which is regarded as an essential reference work for amplifier designers. Self currently works for Audio Partnership, which owns Cambridge Audio and Mordaunt-Short. (See Break-Out Box on page 24.)

Self's 'XD' circuit addresses that *bete noir* of audio power amplifiers, crossover notch distortion, which is a distortion caused by the audio signal transitioning from one output device to another in a Class-B output stage. In Self's XD circuit implementation, the



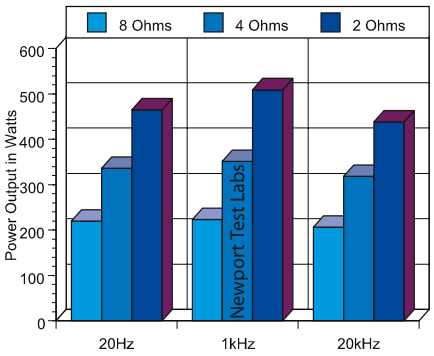

Power Output: Single and both channels driven into 8-ohm, 4-ohm and 2-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [CA 851W]

amplifier operates in Class-A at low signal levels and Class-B at high signal levels, (better known as a Class-AB design) but when operating in Class-B mode, instead of the transition between the two devices taking place at the same position in each cycle, as in conventional Class-B designs, it is instead constantly being moved around to different positions in the cycle by what Self calls a 'displacer' circuit.

The degree by which the displacer circuit shifts the transition point varies with the amount of current flowing in the output stage. First developed in 2005, the 'XD' circuit has undergone several iterations to improve its performance over the original.

## AZUR 851W POWER AMPLIFIER

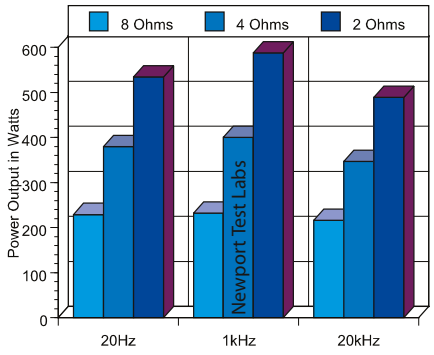
Visually, the Azur 851W has a dual personality. If you look at the amplifier from directly in front of it, you see an extraordinarily clean 'space-age' layout with a pristine alloy front panel that's broken only by a large window that hides LEDs that indicate operating status, and a single standby/on power switch. I have to say of this front panel that it reminded me of the spaceship in the movie '2001: A Space Odyssey'.




Power Output: Both channels driven into 8-ohm, 4-ohm and 2-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [CA 851W]

However, if you look at the amplifier from the sides, or look down on the top of the amplifier, the chassis' lines are broken by a criss-cross of diamond-shaped holes punched in the alloy: small holes on the sides, larger holes on the top edges and differently sized holes again—and this time in black anodized aluminium alloy, rather than silver anodized—over most of the top surface of the amplifier. In short, the Azur 851W is truly sculptural in appearance.

I personally loved the industrial design of the 851W and the duality of its visual appearance. Someone should have won an award for it. (Yes, I know the 851W *has* won awards,




Power Output: Single channel driven into 8-ohm, 4-ohm and 2-ohm non-inductive loads at 20Hz, 1kHz and 20kHz. [CA851W]

but to the best of my knowledge, all of them have been for sound quality and/or performance… not for industrial design!)

The left and right channels of the 851W each have three LED indicators—'Output', 'Protection', and 'Clipping'—and all shine blue. The 'Output' LED glows blue whenever there's a signal at the speaker output. The 'Clipping' indicator glows blue whenever the level of the input signal has resulted in the voltage at the speaker terminals exceeding the maximum power output capability of the 851W—basically a warning that you should turn down the volume to avoid damage to your loudspeakers.

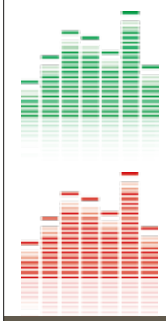
As for that Protection LED, well its purpose is obvious (to indicate that a protection circuit has triggered), but what isn't obvious is the comprehensiveness of the protection Cambridge Audio has put at your disposal. Called 'CAPS' protection (because it offers five main protection methods), it will protect against d.c., over-temperature, excessive voltage and/or current, short-circuits and the aforementioned clipping.

Directly in the centre of the front panel are two LEDs labelled 'Mono' and 'Bridged'. As the names would suggest, the 851W can be used as a conventional stereo amplifier, in which case neither LED would glow; as a

## CAMBRIDGE AUDIO 851E AND 851W

PRE & POWER AMPLIFIERS

**Brand:** Cambridge Audio
**Model:** 851E & 851W
**Category:** Pre & Power Amplifiers
**RRP:** $2,499 (851E) & $3,499 (851W)
**Warranty:** Two Years
**Distributor:** Synergy Audio Visual
**Address:** 107 Northern Road
Heidelberg Heights VIC 3081
**(03) 9459 7474**
**info@synergyaudio.com**
**www.synergyaudio.com**



- Chic styling
- Enormously powerful
- Volume control

## LAB REPORT

Readers interested in a full technical appraisal of the performance of the Cambridge Audio 851E Preamplifier and Cambridge Audio 851W Power Amplifier should continue on and read the laboratory report published on page 26. Readers should note that the results mentioned in the report, tabulated in performance charts and/or photographs should be construed as applying only to the specific sample tested.

**Lab Report on page 26**

***Absolutely everything about this Cambridge Audio 851E/851W duo screamed 'quality' with a capital 'Q'***

bi-amplified 'monobloc' amplifier, in which case 'Mono' would glow, or as a dedicated mono amplifier, with the outputs of the left and right channels bridged into just a single channel, in which case the 'Bridged' LED would glow and you will benefit from a substantial increase in output power (up from 200 watts to 500-watts according to Cambridge Audio's specifications, but rather more according to bench testing conducted by *Newport Test Labs*).

The rear panel of the 851W is beautifully laid out, with both unbalanced (via RCA) and balanced (via XLR) inputs, plus switching to select between them, trigger in/out/through facilities, a control bus (input/output) for linking with compatible Cambridge Audio units (such as the 851P, for example) for power on/off/standby synchronisation, plus a stereo/mono mode switch, and a mono mode switch (bi-amp/bridged). Two pairs of speaker terminals are provided for each channel.

## AZUR 851E PREAMPLIFIER

Don't be tricked by the paucity of controls on its front panel into thinking the Azur 851E doesn't offer any features: on the contrary, it is a *very* full-featured preamplifier. Firstly, it can accommodate up to eight source components, three of which can deliver their signal to the 851E via balanced or unbalanced connections. After you've connected a source, and selected a connection option, you can re-name the input from its default (Source 1, Source 2, etc) to reflect the actual component you've connected, so if you plugged Cambridge Audio's Azur 651C CD player into Source 1, you'd simply rename it 'CD', or '651C'… or anything you like really. After you've renamed the input, you can then use the 851E's volume trimmer to adjust the sensitivity of that input so that when you switch from it to another source, the volume levels of the two sources will match, eliminating any need to adjust volume when switching. Once you've done all this, source selection is accomplished simply by pressing the buttons arrayed vertically either side of the front panel display (or via the remote control).

The display itself is very cool… literally… it's black type on a champagne screen that's really easy to read. In the centre is a volume level display that can be switched between displaying the level in two different ways: in decibels referenced to rated output or in arbitrary display units. You can adjust the display brightness across two levels or turn it off entirely (in which case it illuminates briefly whenever you use a control to confirm that control's operation). The display can also show channel balance and when switched to do this (via the 'Mode' button) the volume control then acts as a balance control while you're using it, after which it will revert back to being a Volume control (the reversion being initiated by five seconds of inactivity on your part).

The bass and treble controls on the Azur 851E are really clever. First, they can be pushed back into the front panel so they don't protrude. Second, you can bypass them completely by using the Azur's 'Direct' mode. Third, you can set the controls differently for each input, so that when you select that input, the Cambridge will recall the exact bass and treble settings for it (or remember that you want to use the 'Direct' mode for that input). This makes the bass and treble controls enormously useful.

Although there is no muting function on the front panel of the Azur 851E, there is one on its remote control. The remote is a 'multi-use' one that will operate all components in the 851 series, as well as Cambridge Audio's 'Stream Magic' components, so it has rather more buttons than you'll need unless you own other 851 Series components. Of the 65 buttons on the remote, only 16 of them are used to operate the 851E.

One thing I particularly liked on the 851E was that Cambridge Audio has provided a full-sized 6.35mm headphone socket for a standard 6.35mm plug. I prefer this larger, more traditional, plug because it's mechanically and electrically superior and means that when using good-quality headphones there is no need to use a headphone adaptor.

## IN USE AND PERFORMANCE

Absolutely everything about this Cambridge Audio 851E/851W duo screamed 'quality' with a capital 'Q', basically from the moment I unpacked them. When making the connections using interconnect and speaker cable, even the fittings to allow this were high quality, and Cambridge prints all the connector labels 'right-way-up' as well as upside down, so you can easily identify which input is which no matter what angle you're viewing the rear panel from (though the printing is rather small… verging on tiny, in point of fact).

Then, when it came to setting up these two components to match my other equipment, it just got better and better, from the ability to name and trim all the inputs to best-suit the output voltages of my other components to the fact that I was able to do it individually for each one. And when I was making these adjustments, the 'feel' of all the controls and buttons, as well as the information shown in the front panel display while I was doing it all, was absolutely fabulous… with one exception: the volume control. It's actually a rotary encoder that instructs a software volume control, and not a standard analogue potentiometer, and I found it had some 'flex' in its mounting so I could wobble it by applying firm pressure, which I found

detracted from its 'feel' because it didn't feel solid (which is what I'd expect if it were a normal analogue potentiometer). Also, the encoder knob did not rotate perfectly symmetrically inside its front panel cut-out, so the rotation *appeared* to be eccentric, even though it was perfectly circular. However, these tiny failings did not prevent me from falling in love with this Cambridge duo—even before I'd started listening.

Luckily for those who believe in love at first sight, it only got better after I started my listening sessions because, once they'd warmed up, the sound that issued forth from this pair was gloriously rich and full-bodied and, if I felt like cranking up the volume—which I often did—all that good sound simply started sounding enormously, (and seemingly endlessly) more powerful. But I (mostly) started off listening at very low volume levels, low enough to enable the 851W to operate essentially as a Class-A amplifier, and was more than pleased to hear superb Class-A-like sound: that is, super-smooth and seriously musical. Listening via these Cambridges, no-one could fail to be moved by the hauntingly earthy sound of Christopher Young's bass clarinet, which has been captured perfectly on his album 'Brood Groove'. Just listen to the opening bars of *Domination*, where he plays against a beautifully rendered silence. Later on in this same track you can be amazed yet again by the stringily tangible sound of Nick Haywood's acoustic bass. And while you're listening, don't fail to notice how the two Cambridge components place Ted Vining's cymbals as if they're hanging in the air, suspended on invisible strings. Track 3 (*They Exist Within Your Dreams*) begins with Tom Fryer picking his acoustic guitar and letting the notes fade into silence, and both the 851E and 851W come to the party in letting us hear the complete decay of sound from an initial sharp transient, through a long sustain then finally descending into a delicious silence.

But this Cambridge duo can do raw music as well. Fire up Catherine Kelleher's album 'The Warmest Place' and once you've passed the first *a capella* track (a tribute to her father), just listen to the slam of electronic percussion that introduces *August*, and then to the wall of sound that follows, all underpinned by multi-tracked vocals… and don't forget to turn up the volume on this one! Kelleher (but she goes under the name Catcall) grew up with punk: '*I loved noisy bands so much. It was the only thing I could understand,*' she writes on her website. Music-wise, I'm not a Catcall fan, but I am a fan of British India, whose latest album, 'Nothing Touches Me', is a stand-out: indie rock at its finest, crisply recorded without the usual overkill on the production side, which means Declan Melia's lead vocals are perfectly-positioned in the mix as regards both volume level and spatial location. My favourite track is *Spider Chords* (punny, not…) which starts off soft and then becomes tumultuous, which is just a perfect demonstration of how well the Cambridge duo can make punchy pop sound as punchy and poppy as it does in live performance (and Melbournites have had ten years to catch up with the band's live performances). Nic Wilson's guitar solo on *Nothing Touches Me* is classic air guitar fodder as well as being totally different from his acoustic contribution on *The Departure Lounge*.

But of course you need to hear acoustic instruments that have been naturally recorded without artificial enhancement to appreciate the true purity of the sound that issues from Cambridge's 851E/851W combination, and I can do no more than recommend to you that you do this by investing in one or more discs from the 'Uncompressed World' series released by German outfit Accustic Arts, most particularly Volume 4, which focuses on the piano, though most audiophiles will probably prefer Volume 2, which is entirely composed of tracks sung by female vocalists and is, frankly, more listenable for the music, if you're not just listening for the sonics. Just listen to *A Little Loving* sung by Lisa Bassenge, or to Margriet Sjoerdsma singing *My Silly Heart* (the piano and percussion sound on this is fabulous) as just two exemplars, but all the tracks on this disc are amazing… and were reproduced with amazing fidelity by the 851E/851W. (As you've probably guessed, the performers aren't exactly household names, but after you've heard them, you'll agree with me that they should be.)

***The sound that issued forth from this pair was gloriously rich and full-bodied and, when I cranked up the volume—enormously and endlessly powerful***

## CONCLUSION

Pre/power combinations are viewed by most audiophiles as the 'holy grail' of audio amplifier perfection, and with good reason. The problem is that because of this, most manufacturers assume that the only buyers for this product category will be true card-carrying audiophiles, who traditionally want their components stripped down to the bare minimums, and since this is easier and more profitable for manufacturers, they oblige by building only 'basic' pre/power amplifiers, *sans* convenience (or any!) features.

With its 851E preamplifier and 851W, Cambridge Audio has taken the opposite approach and built a pre/power combination that offers not only 'holy grail' audio performance, but also an almost-complete suite of features and facilities. If you're in the market for separates (and you should be if you want seriously good audio!), this 851 duo should be high on your short list… if not at the very top of it. Highly recommended.

***Chris Croft***

LAB REPORT ON PAGE 26

## CAMBRIDGE AUDIO HISTORY

The shire of Cambridge, in the UK, is not only famous for its university. It's also regarded as Great Britain's own 'Silicon Valley' when it comes to hi-fi equipment, having over the years been home to Audiolab, Avid, Epos, Lecson, Lentek, Meridian, Mission, Audiolab, Epos, and many more. Two very well-known companies actually took their names from the shire: Arcam (originally A&R Cambridge) and, of course, Cambridge Audio, the latter being one of the very first hi-fi companies to get its start in Cambridge, having been established there in 1968 (originally as Cambridge Audio Laboratories Ltd) as an offshoot of Cambridge Consultants, a design consultancy company.

The company's very first model was the P40 integrated amplifier, which featured several innovations including an active volume control, but became famous primarily for its iconic slim-line case design. It was created by Gordon Edge, Peter Lee and Roy Gray and manufactured in premises alongside the old Enderby's Mill in St. Ives that CAL shared with a sister company, Advanced Instrumentation Modules. The P40 was an immediate success but was replaced in 1970 by a similar-looking but higher-powered version known as the P50. In 1971, CAL was purchased by Colin Hammond, who appointed Stan Curtis as Technical Director, who in turn hired Douglas Self for a short period to design Cambridge Audio's amplifiers while Curtis was designing what would become the world's first fully digital tuner. Audio Partnership (the partners are James Johnson-Flint and Julian and Rosie Richer) purchased Cambridge Audio in 1993 and in 2003 hired Douglas Self to develop a new line of amplifiers… the Azur Series. G.B.

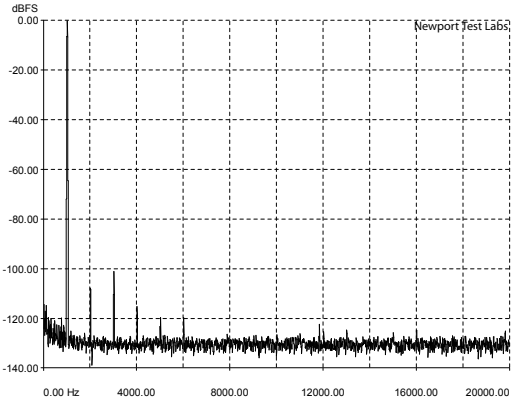
CONTINUED FROM PAGE 24

## LABORATORY TEST REPORT

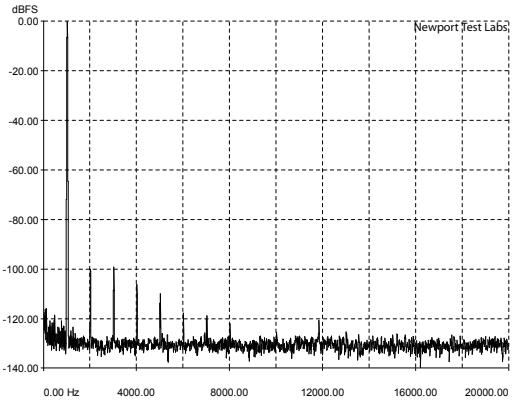
*Newport Test Labs'* tests of the Cambridge Audio 851W's power output showed that it certainly isn't shy on power delivery. On the test bench, with both channels driving 8Ω loads, the 851W was able to deliver 223-watts (23.5dBW) of power at 1kHz and only slightly less at 20Hz (220-watts/23.4dBW) and at 20kHz (206-watts/23.1dBW). When driving 4Ω loads, it delivered 351-watts per channel with a 1kHz test frequency, but slightly less at 20Hz (336-watts) and 20kHz (318-watts). The amplifier proved to be perfectly stable into 2Ω loads, and able to deliver over half-a-kilowatt (509-watts) at 1kHz with both channels driven into 2Ω. *Newport Test Labs* tested the power output of the 851W in its bridged mode as being 650-watts into 8Ω. The complete set of test results is tabulated in the accompanying table (Power Output Test Results) and shown graphically in the accompanying bar graphs. The clipping indicators came on right at the onset of clipping, so they will accurately indicate when clipping is occurring (unlikely though this may be, given the amount of power on tap).

The Cambridge Audio Azur 851E and 851W are obviously both very wideband devices. *Newport Test Labs* measured them together, and in this configuration they delivered a frequency response of 6Hz to 460kHz ±0.5dB. The –3dB down-points of the response were measured as being 3.5Hz and 561kHz. Since that high-frequency response is a tad over half a megahertz, it's what I'd call an extended high-frequency response.

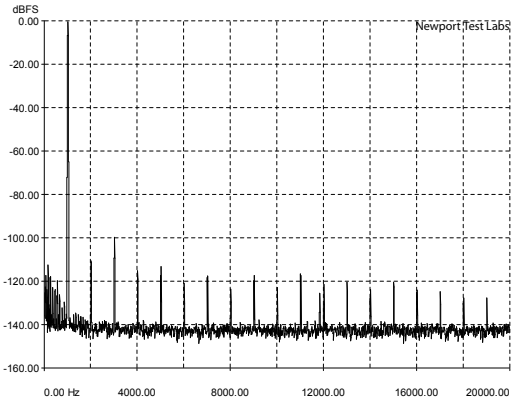
Perhaps because of this extension, the channel separation of the duo was only fair, averaging more than 70dB across most of the audio band (a best of 77dB at 1kHz) and diminishing to 66dB at 20kHz. Despite me identifying this performance as 'only fair', this level of separation is far more than required to ensure perfect audible channel separation and stereo imaging. And, on the imaging front, this would be enhanced by virtue of the balance between



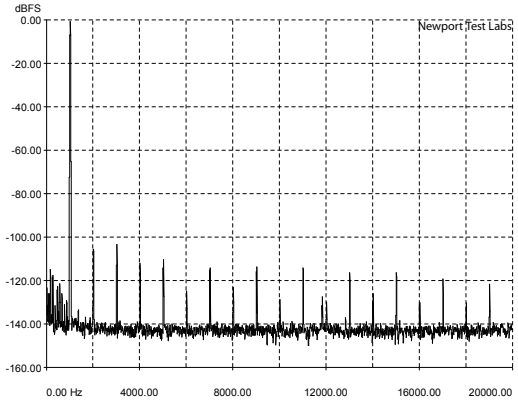

Graph 1: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB. [Cambridge Audio Azur 851E & 851W Pre/Power]



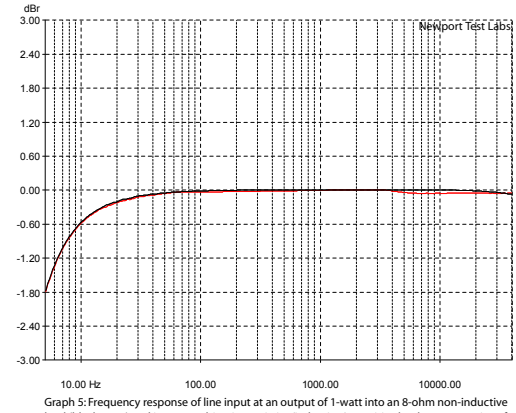

Graph 2: Total harmonic distortion (THD) at 1kHz at an output of 1-watt into a 4-ohm non-inductive load, referenced to 0dB. [Cambridge Audio Azur 851E & 851W Pre/Power Amps]



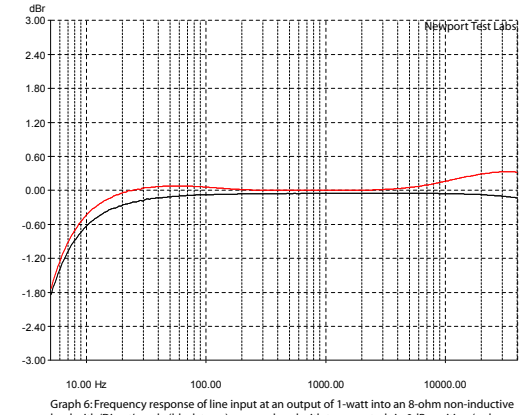

Graph 3: Total harmonic distortion (THD) at 1kHz at rated output (200 watts) into an 8-ohm non-inductive load, referenced to 0dB. [Cambridge Audio Azur 851E & 851W Pre/Power ]



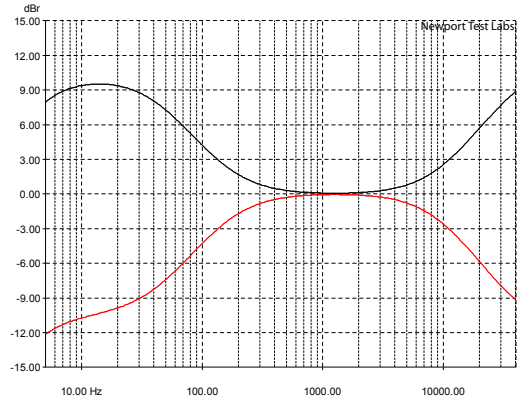

Graph 4: Total harmonic distortion (THD) at 1kHz at rated output (350 watts) into a 4-ohm non-inductive load, referenced to 0dB. [Cambridge Audio Azur 851E & 851W Pre/Power]



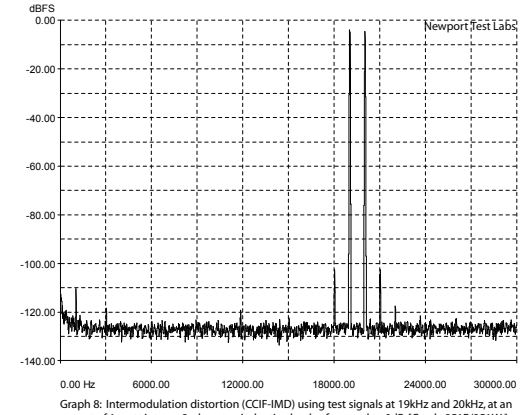

Graph 5: Frequency response of line input at an output of 1-watt into an 8-ohm non-inductive load (black trace) and into a combination resistive/inductive/capacitive load representative of a typical two-way loudspeaker system (red trace). [Cambridge Audio Azur 851E & 851W]




Graph 6: Frequency response of line input at an output of 1-watt into an 8-ohm non-inductive load with 'Direct' mode (black trace) engaged, and with tone controls in 0dB position (red trace). Cambridge Audio Azur 851E & 851W Pre/Power Amplifiers]




Graph 7: Tone control action ref to 0dB at 1kHz. [Cambridge Audio Azur 851E & 851W ]




Graph 8: Intermodulation distortion (CCIF-IMD) using test signals at 19kHz and 20kHz, at an output of 1-watt into an 8-ohm non-inductive load, referenced to 0dB. [Camb. 851E/851W ]

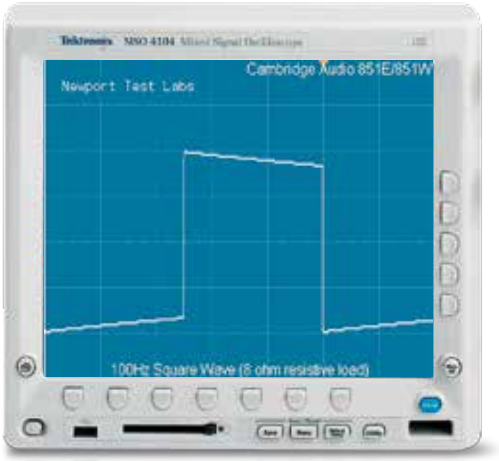
the two channels being so outstandingly good: an imbalance of a mere 0.0025dB between the two channels. Phase accuracy was also good, though curiously higher at low frequencies (6.53° at 20Hz) than at high frequencies (1.68° at 20kHz), which is the opposite of what I usually see. Either way, these interchannel phase errors are too low to be audible.

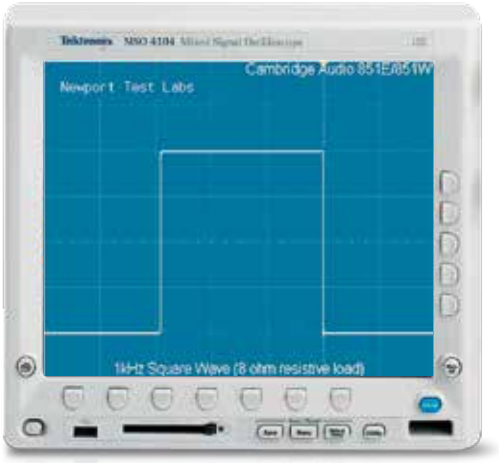
In-band frequency responses are shown in Graphs 5 and 6. You can see that across the audio band, the response of the Cambridge Audio 851E and 851W is almost ruler-flat, irrespective of whether the 851W is driving a standard non-inductive laboratory load (the black trace on Graph 5) or a load that simulates that of a two-way loudspeaker system (the red trace on Graph 5). The fact that there's so little difference means the Cambridge 851W will 'sound' the same no matter what loudspeakers you use with it. It also means a very high damping factor (*Newport Test Labs* measured DF as being 571 at 1kHz), so the amplifier will exert excellent control over even the largest-coned bass drivers, and won't allow any unwanted inertial cone movement.

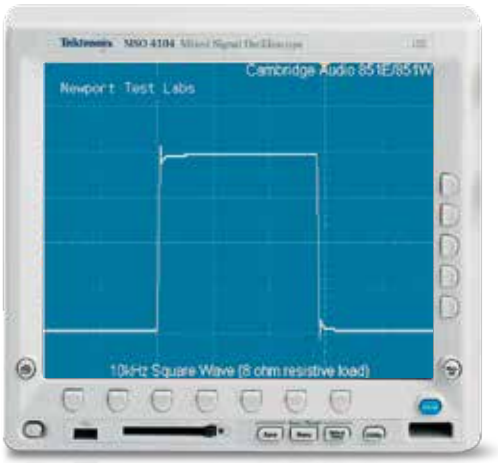
Graph 6 shows that even when the bass and treble tone controls are in their 'detent' positions, they still have a slight influence on the 851E's frequency response. I doubt anyone could perceive the resulting minuscule 0.1dB boost at around 80Hz, or that 0.3dB lift at 20kHz, but if you can hear it, simply select the 'Direct' mode and you'll get the ruler-flat response shown by the black trace on Figure 6.

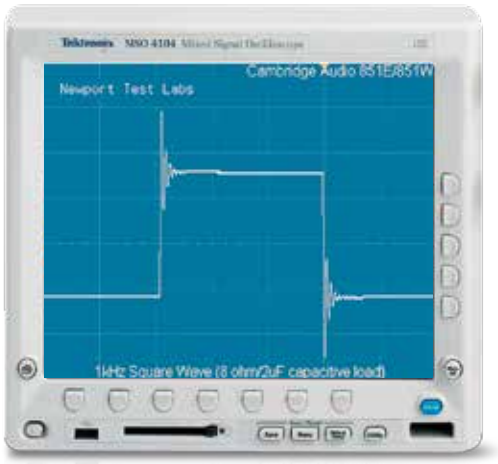
Harmonic distortion was very low. At an output of one watt into 8Ω (Graph 1), five harmonic distortion components are visible above the noise floor, but all are more than 100dB down: a second harmonic at –110dB (0.0003162%), a third at –101dB (0.0008913%), a fourth at –115dB (0.0001778%), a fifth at –119dB (0.0001122%) and a sixth at –120dB (0.0001%). Distortion increased slightly when load impedance was reduced to 4Ω (Graph 2), but all individual harmonic distortion components were still more than 100dB down. Overall wideband THD+N was measured at just 0.0022% at 1-watt, as is shown in the tabulated results.

Distortion remained low at rated output for both 8Ω and 4Ω loads, as you can see in Graph 3 (200-watts into 8Ω) and Graph 4 (350-watts into 4Ω). Although there are now many more harmonically-related distortion components visible above the noise floor, all are still more than 100dB down (0.001%).



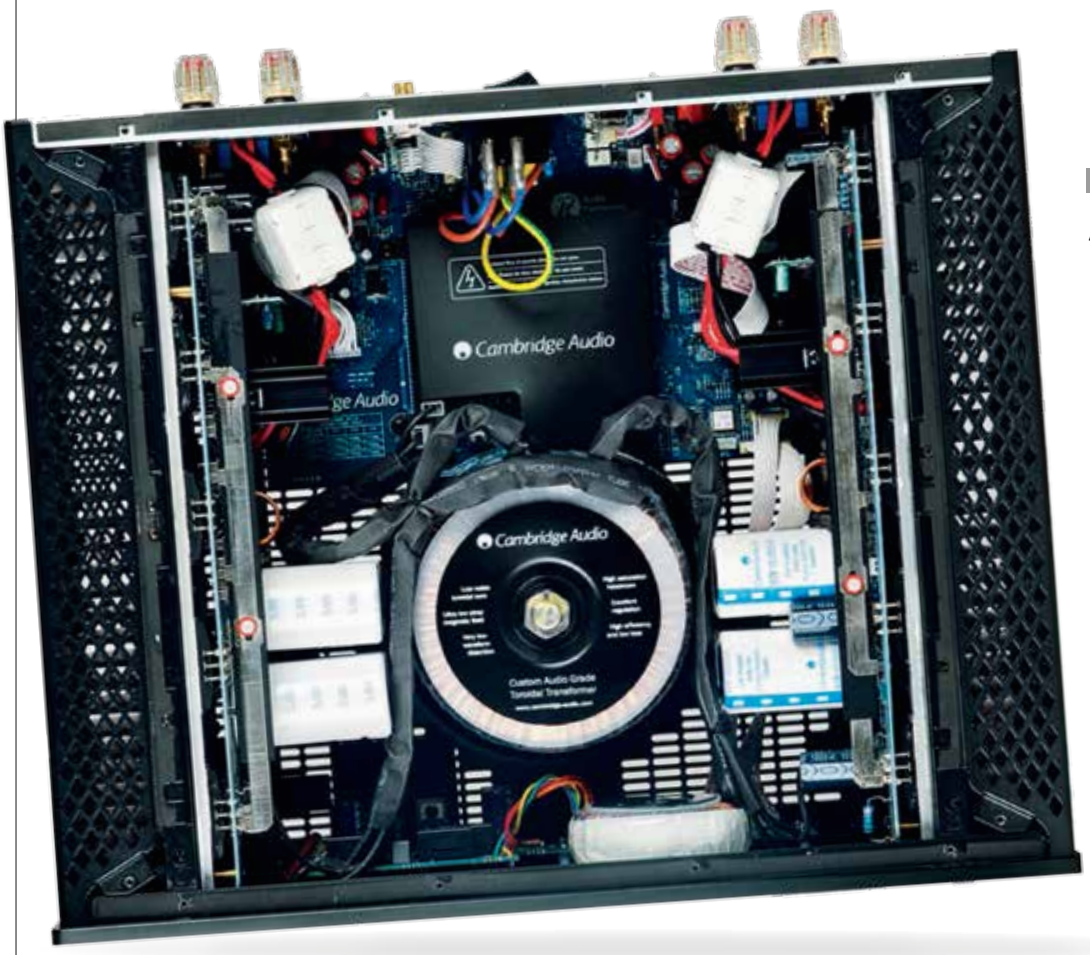

### Cambridge Azur 851W Power Amp — Power Output Test Results

| Channel | Load (Ω) | 20Hz (watts) | 20Hz (dBW) | 1kHz (watts) | 1kHz (dBW) | 20kHz (watts) | 20kHz (dBW) |
|---|---|---|---|---|---|---|---|
| 1 | 8 Ω | 229 | 23.6 | 232 | 23.6 | 216 | 23.3 |
| 2 | 8 Ω | 220 | 23.4 | 223 | 23.5 | 206 | 23.1 |
| 1 | 4 Ω | 380 | 25.8 | 400 | 26.0 | 347 | 25.4 |
| 2 | 4 Ω | 336 | 25.3 | 351 | 25.5 | 318 | 25.0 |
| 1 | 2 Ω | 534 | 27.3 | 588 | 27.7 | 489 | 26.0 |
| 2 | 2 Ω | 465 | 26.7 | 509 | 27.1 | 438 | 26.4 |

Note: Figures in the dBW column represent output level in decibels referred to one watt output.

### Cambridge Azur 851E/851W Pre/Power Amps — Lab Test Results

| Test | Measured Result | Units/Comment |
|---|---|---|
| Frequency Response @ 1 watt o/p | 6Hz – 460kHz | –1dB |
| Frequency Response @ 1 watt o/p | 3.5Hz – 561kHz | –3dB |
| Channel Separation (dB) | 74dB / 77dB / 66dB | (20Hz / 1kHz / 20kHz) |
| Channel Balance | 0.0025 | dB @ 1kHz |
| Interchannel Phase | 6.53 / 0.24 / 1.68 | degrees ( 20Hz / 1kHz / 20kHz) |
| THD+N | 0.0022% /0.0016% | @ 1-watt / @ rated output |
| Signal-to-Noise (unwghted/wghted) | 87dB / 93dB | dB referred to 1-watt output |
| Signal-to-Noise (unwghted/wghted) | 100dB / 106dB | dB referred to rated output |
| Input Sensitivity (Balanced Input) | 576mV / 810mV | (1-watt / rated output) |
| Output Impedance | 0.014Ω | OC = 2.4985V 8Ω = 2.4945V |
| Damping Factor | 571 | @1kHz |
| Power Consumption | 0.65 / 202.33 | watts (Standby / On) |
| Power Consumption | 206.69 / 690.80 | watts at 1-watt / at rated output |
| Mains Voltage Variation during Test | 238 – 252 | Minimum – Maximum |




***Superbly flat and superbly extended frequency response, impressively high power output into all tested loads, vanishingly low noise levels, and ultra-low levels of distortion… and all from a bomb-proof circuit design. Bravo!***

Again, overall THD+N at rated output was measured at 0.0016%.

Intermodulation distortion was also very low, as shown in Graph 8. There are two IMD sidebands at 18kHz and 21kHz (either side of the twin-tone IMD test signals at 19kHz and 20kHz), but both are 104dB (0.000631%) down. The unwanted signal regenerated down at 1kHz is at –110dB (0.0003162%), where it would be completely inaudible.

The graph showing tone control action shows that the bass tone control will have a more audible effect than the treble control, as it offers more boost and cut over a much wider range of audible frequencies than the treble control, which effectively gives only 3dB of boost and cut at 10kHz. Unusually, the treble control's boost action appears to be unshelved, so if you use it, high frequency boost will get greater at higher frequencies, which could potentially cause issues with your tweeters if ultrasonic information is present in the audio signal. As such, I would recommend leaving the treble control either at its 'detent' position or programming the 'Direct' mode for all inputs.

Signal-to-noise ratios were good, rather than being excellent, with *Newport Test Labs* measuring the 1-watt SNRs as being 87dB unweighted and 93dB A-weighted. These figures are undoubtedly slightly higher than they might otherwise have been were it not for the fact that this Cambridge Audio duo has such a wide operating bandwidth. Also, the excellent-looking results of 100dB unweighted and 106dB A-weighted referenced to rated output must be viewed in the light of the 851W's very high power output, which gives it a leg up in the 'Signal' part of the signal-to-noise ratio equation. (It is worth noting that all the signal-to-noise ratios measured by *Newport Test Labs* exceeded Cambridge's own specifications.)

Reproduction of square waves was excellent. The 100Hz square wave shows the tilt I'd expect as the result of a frequency response that does not extend down to d.c., but there is no bending that would have indicated l.f. phase shift. The 1kHz square wave is magnificent, looking for all the world like it came straight from the square wave generator, rather than through two components and a length of interconnect. The 10kHz square wave is also excellent, with a very fast rise-time, as you'd expect from the 851W's 3dB h.f. down-point of 561kHz, but there is some slight overshoot that would seem to indicate a 'not-quite-linear' response at ultrasonic frequencies.

The square wave showing the 851W's performance into a highly capacitative load (one simulating that of an electrostatic loudspeaker) shows that the 851W will be unconditionally stable into such loads, but there is a half-wave-height overshoot and some ringing. Speaking of stability, *Newport Test Labs* tested all aspects of the 851W's protection circuitry and found it worked perfectly to protect the amplifier against all the specified fault conditions. The amplifier simply shut down gracefully and then, once the fault was removed, started up again as if nothing untoward had happened.

Power consumption, as you'd expect, was very high, with the Cambridge duo pulling more than 200-watts from your mains power supply during normal operation, and nearly 700-watts when you're listening at high volume levels. Although stand-by power consumption is shown as being 0.65-watts, slightly above the legislated Australian standby consumption maximum, this measurement was the combined consumption of both the 851E *and* the 651W, so had they been measured individually, they would both have consumed less than 0.5-watts and come within the standard.As you have no doubt already gathered, the performance of the Cambridge Audio 851E and 851W pre and power amplifiers was outstanding, with the pair delivering a superbly flat and superbly extended frequency response, impressively high power output into all tested loads, vanishingly low noise levels, and ultra-low levels of distortion… all from a bomb-proof circuit design. Bravo!

***Steve Holding***

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