Warwick Acoustics Bravura M1 Headphone System

State of the Art

Steven Stone

When I reviewed Warwick Acoustics' first offering, the Sonoma M1 headphone system, in 2017, I was impressed by its sonics. Only ergonomic issues prevented it from garnering a slack-jawed, glazed-eyed rave. Now, five years later, the Sonoma M1 system has been replaced by the new Warwick Acoustics Bravura M1 system. The design goals are the same: "to deliver high-resolution audio in unparalleled sound quality, and to provide the ultimate in listener comfort." If fully realized, the Warwick Acoustics Bravura M1 system could be the ultimate headphone transducer, capable of producing uncolored, reference-quality sound. Let's see if the company has achieved its lofty goals.

Some audio firms, such as Dan Clark Audio, are content to exclusively manufacture earphones, but Warwick has bigger plans. According to CEO Mike Grant, Warwick's technology is in the process of being expanded to include automotive audio applications. By next year, its growth plan includes expanding to the point where it will have between 50 to 60 employees. For now, Warwick is still a relatively new headphone manufacturer, fighting for market share with the old guard of headphone purveyors.

Technological Tour

The Warwick Acoustics headphone system has two parts—the headphones themselves and the amp/driver unit that powers them. These two units can be purchased as a package, or the headphones can be purchased alone (for those who already have the original Sonoma M1 system). Any Warwick headset will function with any M1 amplifier regardless of age, but none can be used with other manufacturers' electrostatic-headphone-amplifier designs. Warwick Acoustics has another ultra-high-end headphone, the APERIO, and this has its own amp/driver unit, which has a higher polarizing voltage than the Sonoma M1.

The Warwick Acoustics system hosts unique proprietary technology, beginning with the electrostatic panels themselves. This patented High-Precision Electrostatic Laminate (HPEL) audio transducer was developed in the UK by Warwick Audio Technologies Ltd. (WAT), which was renamed 'Warwick Acoustics Limited' in October 2018. Instead of a thin membrane coated with a conductive material mounted between two electrically conducting metal grids, as in a conventional electrostatic panel, the HPEL uses a thin, flexible, laminated film for the "front" grid. The laminate is attached to an insulating spacer and the film is machine-tensioned in both the x and y planes. Each cell is like a small drum-skin. There are eight drum skin sections in each enclosure. Finally, a stainless-steel mesh forms the back grid.

The Bravura takes the HPEL system to another level by building on Warwick's patented technology with innovative improvement to HPEL materials and cell structure. Warwick declined to give further details until its latest patent is approved. While still a single stator design (unlike the APERIO, which is a double stator system), the new Bravura design ups the headset's sensitivity by an average of 8 to 10dB, depending on frequency. It also increases the signal-to-noise ratio by the same amount.

The enclosure, which Warwick Acoustics calls "earcups," is made of injected magnesium, which, Warwick claims, is a third less weight (with superior sonic characteristics) than aluminum. The earpads are top-grain Cabretta sheepskin, hand-sewn in Germany and tanned by Pittards in the UK, who have been tanning leathers since 1826. The frames that house the HPEL transducer assembly is made from composite PPS to ensure maximum stiffness, reducing distortion and helping to provide clean and transparent sound reproduction.

The headband design is at least eight times stronger than the earlier Sonoma M1 headband, though it applies more compliant head-clamping pressure for optimized comfort and minimal listening fatigue. The earcups are connected to the headband using high-precision machined-aluminum yokes to ensure no residual stresses are present in this strong but lightweight design. While the Bravura is 30% heavier than its predecessor, it is still an exceptionally lightweight headphone, weighing in at a little over 14 ounces (400g).

The headphone cable uses fine strands of silver-plated, oxygen-free, high-conductivity (OFHC) ultra-pure copper insulated with high-grade silicone. There is no shared ground between the left and right channel signal cables, and the fiber filler material in the jacket keeps the conductors as far apart as possible. For strength, multiple Kevlar fibers are woven into the cable. The Bravura's headphone cable is custom made in collaboration with Atlas and Lemo in the UK.

The amplifier/energizer unit of the M1 system uses a high-performance, single-ended, discrete-FET, Class A amplifier, which is matched to the HPEL. The amplifier is designed to drive the HPEL's inherently capacitive load. Its output stage operates at a high bias level, so it can deliver a very high slew rate and improved linearity. The drive signal has a maximum amplitude of 145V (rms), which is superimposed on the 1350V DC polarizing voltage. The output devices in the M1 are Field Effect Transistors from International Rectifier, spec'd for linear amplifier applications. Passive amplifier components are all optimized for their specific application in the design and sourced from AVX, Bourns, and Vishay. The chassis itself is encased in a completely shielded, machined-aluminum enclosure.

The Warwick Acoustics Bravura system has provisions for four inputs: USB 2.0 digital; SPDIF coaxial digital; single-ended analog RCA stereo; and 3.5mm analog stereo. The USB 2.0 input accepts all hi-res audio formats up to 32-bit/384kHz PCM and DSD via DoP (DSD64/DSD128), while the SPDIF input accepts all PCM formats up to 24-bit/192kHz. Two stereo ESS 32-bit Reference DAC chips are used in a special mono mode to deliver a measured 129dB signal-to-noise ratio (SNR).

The Warwick Acoustics system digitally processes all signals using custom 64-bit, double-precision, fixed-point arithmetic, running within a high performance, multi-core XMOS processor. All the filter responses within the DSP are minimum-phase and slow roll-off, optimized for excellent time-domain response. The 64-bit DSP also allows Warwick Acoustics to implement a fully digital interpolated volume control within the amplifier.

Due to the need for DSP to achieve a target frequency response, all incoming analog signals are converted to digital by the Warwick

Acoustics Bravura system. The A-to-D device employed for this is a 32-bit/384kHz AKM Premium ADC chip. Because the amplifier has both low-level (3.5mm) and high-level (RCA) inputs, Warwick Acoustics uses separate ADC channels depending on the input selected. There are two independent, fully optimized signal paths, one each for the low- and high-level inputs. The measured SNR of the ADC stage for either analog input exceeds 120dB.

Because the quality of the power supply has a major effect on overall performance, the first stage of Warwick Acoustic's two-part power supply employs an outboard, custom-designed, universal-voltage, switch-mode PSU. To avoid any headroom issues, this unit can deliver about 3.5 times the maximum power the amplifier is designed to draw under steady-state conditions. In addition, the unit uses a fixed-frequency switcher (operating at over 85kHz) to avoid any possibility of the switching-frequency dropping into the audio band as the power draw changes. The PSU also has improved internal filtering to yield extremely low noise and ripple (<50mV peak-to-peak). The other power supply components are inside the amplifier chassis itself, where all audio circuitry is supplied by multiple stages of low-noise, high-current linear regulators from Analog Devices.

Setup

The Warwick Acoustics Bravura headphone system's M1 amplifier can be connected either by its USB 2.0 digital or SPDIF coaxial digital inputs, or by one of its two analog inputs. I divided listening time between the USB digital and analog input from a Topping D90SE connected to a MacBook Pro 13" portable running Roon. My review sample of the original Sonoma M1 headphone system had issues with overload from analog sources. I recommended limiting the output levels, so they did not exceed 2.1 volts on the RCA inputs and 2.4 volts on the mini-stereo input. Since the original Sonoma M1 drive unit had more than enough

Specs & Pricing

Type: Open-back, circumaural electrostatic
Headphone amplifier type: Discrete FET, single-ended Class A, solid-state
Impedance: N/A (closed electrostatic system)
Sensitivity: 94dB SPL at -10dB full-scale digital input and 75mV analog input
Weight: 403 grams (14.2 oz)
Price: $5995 (sold as a system with silver M1 energizing amplifier/DAC); Black Edition $6795; headphones alone, silver $1995, black $2395

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gain to drive the headphone's volume well past my own comfort level at these lower, friendlier peak voltages, I did not consider this a deal-killer. Listening to the Bravura system I did not notice any distortion via the analog inputs when the Topping D90SE was set so its maximum level was below 2 volts.

I used several different manufacturers' cables during the review period. I settled on the Wireworld Starlight 8 USB cable for the USB connection and the Kimber KCAG cable for the analog feed. Although the Bravura M1 amplifier is a Class A design, known to throw off a large percentage of its consumed energy as heat, the Bravura amplifier remained only warm to the touch, even after it was powered on continuously for several days.

Ergonomic Comparison Between the Bravura and the Sonoma Headsets

It's hard to find anything that has not changed from the Sonoma to the Bravura headset, starting with the cable, which is thicker but just as flexible as the original, and extending to the strain relief collar at the amplifier connection. The original had a soft rubber section that kept coming off, while the Bravura's cable has a more secure strain relief that bends but does not come off. The Bravura size adjustment and gimble system, which allows the headphone to adapt to the angle of your ears and head, is far superior to the original's. It's considerably more precise. The original was loose to the point of flopping around when held loosely. The Bravura's movement is nicely damped. No flopping.

The biggest comfort difference between the Sonoma and the Bravura headsets is the headband itself. The Bravura headband has better padding. It's thicker and wider in the center where most of the weight rests on your head. With the Sonoma, I did need to take periodic comfort breaks to relieve pressure points, but with the Bravura headset I did not need any "comfort breaks" from listening.

For anyone who has the original Sonoma M1 system, the Bravura poses a dilemma…do the improvements to the headset warrant replacing the original with the new Bravura? I suspect for many owners the answer will be yes. But what to do with the original headset, which needs an M1 to be functional? I'm still working on that one… because once you have a Bravura, you will probably not be using the original Sonoma headset much.

Sound

Obviously, the Bravura sounds very much like the original Sonoma M1 system. The Bravura M1 has the same amplifier; only the headset is different. At low and moderate volumes, I heard no perceptible differences between the two headsets. But when the *fortissimo* and *fortississimo* passages came around, the differences between the two headsets became audible. The Bravura headset handles loud passages with no issues or sonic changes, while the original Sonoma begins to get hard and to exhibit signs of audible stress, especially from analog sources.

The two words that keep popping up in my listening notes for the Bravura were "clarity and cohesion." That "whole cloth" quality that I've only heard from full-range transducers that use a single driver (planar or dynamic) and have no crossover circuitry is very much in evidence here, even though the reality is that the M1 headphone panel has separate sections. Also, the speed and clarity that electrostatic headphone technology is known for is definitely present in the Bravura M1 system. Listening into a mix, no matter how dense, seems effortless through the Bravura M1. Want to focus on the background vocalist? Through the M1, once you locate a source within the mix it is a simple matter of following it throughout a performance.

I am, technically, an old guy. My treble range currently extends to 13kHz (and I don't expect it will increase). But I'm as sensitive to treble nonlinearities as I was when I was younger. That said, I was hard-pressed to discern any hint of overemphasized peaks in the treble region. My venerable pair of Stax Lambda Pro earspeakers can sound slightly sterile and a shade too matter of fact, especially when coupled with the Stax SRM-1 Mark II solid-state drive unit, but much of that edge vanishes when it is connected to the SRM-007t tube unit. The Bravura, right out of the box, has a less antiseptic and more organic character, especially in the upper midrange and treble region than my vintage Stax, regardless of which energizer it is connected to.

The Bravura's midrange is as close to harmonically neutral as any headphone (or loudspeaker) that I've heard recently. Not too dry or too lush, the M1's midrange characteristics are ideal for its primary intended use—as a reference monitor. Listening to my recording of the Matt Flinner Trio from a live concert at the Salina Schoolhouse through the Warwick Acoustics system was both a delightful listening experience and a very accurate rendition of the event. Listening through the Bravura system brought me back to the moment I made the recording.

And how does the Warwick Acoustics handle bass? Very

well, indeed. The Bravura delivers all the impact while retaining pitch and timbre. For deep bass and pulse control listen to Royal Blood's "Boilermaker." Through the M1 system, even these low-bass transients have definition and solid, visceral impact. This bass weight is one particular sonic attribute that separates the Warwick Acoustics M1 from the Stax Earspeaker Lambda Professional series earspeakers. The Stax bass response is fast, but somewhat ethereal when it comes to in-your-face bass weight. Through the Stax you are slapped instead of punched.

Analog adherents may not be pleased by the fact that the M1 system converts all incoming analog signals to digital. But try as I might, I could not hear any sonic hints that the additional A/D and D/A conversion reduced the fidelity from analog sources.

Competition

I have reviewed one of Stax's three earspeaker systems that compete with the Warwick Acoustics Bravura, the Stax SR-L700 ($1400) coupled with SRM-007tII amplifier ($2150) for a combined system price of $3650. The most notable differences between the two systems are how they handle bass, their fit, and their ability to withstand moderate abuse. The Stax bass is airier with less "meat and potatoes" impact than the Bravura. Both are fast and detailed, but the Warwick Acoustic's bass is more organic and impactful.

The two headphones fit quite differently, with the Bravura has slightly more side pressure, while the Stax are lighter but larger, with a more delicate yoke/headband system. Having owned the Stax Lambda Pro for many years and having replaced the headband twice during that time, I can vouch for its delicacy. In comparison, I suspect the Bravura could survive several long tosses across the room with no lasting ill effects.

Another difference is the Stax amplifiers have provisions for L/R balance adjustments, while the Warwick Acoustics M1 does not. Finally, analog adherents may prefer to remain in the all-analog domain with the Stax's all-analog (and tube) signal chain versus Warwick Acoustic's digital one.

One disadvantage of the Bravura M1 system is that it requires the M1 amplifier. In comparison, the Dan Clark flagship Stealth headphone (review in process), can be driven by almost any headphone amplifier, even one in a smartphone. The Bravura system is less convenient, but if you are the kind of critical listener who also brings along a quality headphone amplifier, the differences in portability may end up being minimal.

Summary

When I reviewed the original Sonoma M1 system, I said that "its variations from perfection were small, involving long-term listening comfort, cable hardware, and susceptibility to distortion from excessively high analog input levels." The new Bravura headset has rectified these issues. Does the Bravura M1 rate as the best in the world? Since I have not heard every flagship headphone, I can't make that statement, but I can write with conviction that the Bravura is the best headphone system I've experienced so far and may well be the endgame for anyone looking for a state-of-the-art reference headphone. tas