



WestminsterLab Rei Monoblock Power Amplifiers

Not Your Father's Class A Amplifier

Robert Harley

SAY THE WORDS "CLASS A MONOBLOCK AMPLIFIER" TO ANY audiophile, and he will undoubtedly conjure up an image of a massive dreadnought of an amplifier delivered by forklift that can perform double duty as a room heater.

That description applies to just about every Class A monoblock amplifier except one—the Rei from WestminsterLab. The 100-watt Rei is housed in a compact chassis that runs cool to the touch and weighs just 35 pounds. What's more, this amplifier can double its power output into 4 ohms, double it again into 2 ohms, and is stable driving a 1-ohm load. As icing on the cake, full warm-up takes only 30 minutes.

How is this possible?

We'll get into that, but first the basics. WestminsterLab is a 10-year-old company founded by a gifted young engineer named Angus Leung, who hails from Hong Kong. Angus earned his engineering chops in the UK, including a graduate degree in architecture. Taking a radically different approach to amplifier design, Angus envisioned an amplifier that could drive any speaker, is compact, runs cool, doesn't require a long warm-up time, and most importantly, embodies the sonic virtues of Class A operation. (See the sidebar for a refresher on Class A operation.) The result is the \$33,900-per-pair Rei, the company's second amplifier, which has been in production since 2021.

The chassis construction is as innovative as the audio circuitry. The compact aluminum case is internally braced, looking a bit like the inside of a Magico speaker. It is composed of two separate chassis to isolate the power supply from the audio cir-

cuit. One entire side is heat-sink, and the top and bottom panels are made from carbon fiber. The chassis is minimalist in appearance, with just an illuminated logo on the front panel's lower-right corner above the hidden power switch. Only balanced input is provided. A second XLR jack provides signal pass-through for connecting two of these monoblocks to create a single bridged amplifier. In that mode, the Rei can deliver a whopping 400W into 8 ohms and 800W into 4 ohms. In fact, the amplifier was originally designed as a two-chassis bridged monoblock, and that is the configuration its creator says delivers the ultimate sound quality—and not just because of the higher output power. Of course, a purchaser of one pair of Rei's can add a second pair if more power is desired.

Given the Rei's size, weight,

and ability to deliver its rated power in Class A operation, it's obvious that some sort of variable-bias scheme is employed. There's absolutely no way that an amplifier with this power-supply size, relatively small number of output transistors (six per amplifier), and modest heatsink area can operate in Class A with a fixed bias. As detailed in the sidebar, bias is direct current that flows through the output transistors to partially turn them on; transistors biased into Class A operation are fully turned on all the time, which generates lots of heat. A conventional Class A amplifier dissipates as much heat at full output power as at idle. Dissipating all that heat requires lots of output transistors, big heatsinks, and a huge power supply—definitely not a description of the Rei. But variable bias continually adjusts the amount of bias current based on the input signal amplitude and other factors, greatly reducing the amount of heat generated and easing the requirements for the number of output transistors and the power supply that feeds them but still keeping the transistors in Class A operation.

Variable bias isn't a new idea; amplifier design genius Nelson Pass was awarded a patent in 1974 for a "dynamic bias" circuit introduced in the groundbreaking Threshold 800A amplifier of 1975. A variable-bias design is, indeed, the case with the Rei, but that's only part of how WestminsterLab managed to make an amplifier that so radically upends conventional thinking. WestminsterLab combines variable bias with what is claimed to be highly sophis-

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ticated thermal management, which includes lower rail voltages to reduce heat dissipation by 60%. The output stage has only six transistors, and the heatsink area is a fraction of the size of most 100W Class AB amplifiers, never mind one that operates in Class A. The company says that the power supply design plays a large role in realizing the Rei's unconventional attributes.

Still, I have a hard time wrapping my head around the idea of such a small and lightweight amplifier delivering 400W into 2 ohms. At some point, you run up against the laws of physics. That befuddlement only increased in the listening room when I heard the Rei's superb dynamic performance and ability to drive a wide range of speakers to full listening levels without strain. Clearly, the Rei features some innovative design techniques that shatter preconceptions of what an amplifier of this size can accomplish. It's worth noting that designer Angus Leung developed and tested the amplifier largely with his Apogee full-range ribbons, which present perhaps the most difficult-to-drive load of any speaker ever produced.

The circuit is ultra-minimalist, with just 12 parts between the input jack and loudspeaker terminals. WestminsterLab says the Rei has the shortest signal path ever implemented in an amplifier of this power output. The input buffer and gain stages feature matched transistor pairs, and the output transistors are not only matched to each other but also to the transistors in the other amplifier in the monoblock pair. The output transistors are matched over a range of operating levels rather than at just one level as is typical (if the transistors are even matched at all).

Hands-on experience setting up and using the Rei gives the impression of meticulous attention to detail in the build-quality. The amplifier exudes a high-precision vibe, much like a Swiss watch.

Listening

The Rei amplifiers were delivered and set up by Gary Leeds, a longtime industry veteran who imports and distributes WestminsterLab products through his company Hear This. Gary got his start in the 1970s when he was in his early 20s and working at Manhattan's legendary retailer Lyric Hi-Fi.

I was fortunate to have taken delivery of the Rei just as a parade of loudspeakers came through my listening room—Wilson Benesch Omnium, Vandersteen Model Seven XTRM, Alsyvox Caravaggio full-range ribbon (review forthcoming; see also a video preview on our YouTube channel), a friend's Audiovector R3 Arreté (stunningly great at \$13k), and my long-time reference, the

Specs & Pricing

Output power: 100W into 8 ohms, 200W into 4 ohms, 400W into 2 ohms

Output power in bridged mode: 400W into 8 ohms, 800W into 4 ohms (second amplifier required)

Frequency response: 5Hz–40kHz, ± 0.1 dB (2Hz–52kHz, -1 dB)

Distortion: $<0.1\%$ @ 1kHz, 100W into 8 ohms

Signal-to-noise ratio: 104dB A-weighted

Input: Balanced XLR

Line-level pass-through: Balanced XLR

Input impedance: 200k ohms

Output impedance: 0.018 ohms

Dimensions: 9.13" x 4.4" x 12.6"

Weight: 35.2 lbs. each

Price: \$33,900 per pair

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mighty Wilson Audio Chronosonic XVX.

Just as the Rei's size, appearance, and cool-running design buck the stereotype of a Class A amplifier, so does this amplifier's sound. In my experience, Class A amplifiers give up a bit in resolution and transparency for timbral liquidity, ease, and a relaxed sound—warm and inviting rather than incisive and detailed. That's because, in part, the distortion spectrum of Class A amplifiers is very different from that of Class AB, with the primary harmonic-distortion components being second and third harmonic with very little of the upper-order harmonics that can overlay timbres with a steely metallic hardness. Second-harmonic distortion adds a bit of plumpness and warmth to tex-

tures and is, in fact, sometimes intentionally added to recordings during mixing.

Plump and warm is not how the Rei sounds; you'd never suspect it's a Class A design. Instead, it has a neutrality that defies classification, along with a clarity and incisiveness in the upper midrange to lower treble that doesn't hew to the Class A stereotype. This amplifier is extremely resolving and transparent, with a sense of precision and finesse. It has transient speed without sounding etched. This combination imbued the music with a powerful immediacy, vibrancy, and sense of life. The track "Havana Moonlight" from Spyrogyra's *Got the Magic* is a great example; it opens with percussion instruments spread wide across the soundstage, followed by an acoustic guitar, and then the beautiful melody played on a sax. The



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percussion instruments seem to appear out of blackness and are portrayed with enough resolution to reveal the materials from which they are made. The Rei's transient speed brings them to life, and the instruments are surrounded by little puffs of air. The acoustic guitar is beautifully rendered, striking just the right balance between the transient zip of the attacks and the warmth of the instrument's body. Finally, the alto sax is smooth and liquid, fitting this track's laid-back groove.

The Rei's midrange and lower treble is a bit more forward than that of my reference CH Precision M10 amplifiers and not quite as pristine in texture as the six-times-the-price reference amplifiers. Nonetheless, the Rei's midrange clarity and transparency approach that of the Swiss amps for a fraction of the price.

One of this amplifier's strengths is resolution of fine detail, particularly in the treble. The delicate snare-drum brush work behind Samara Joy's vocal on the track "Two Hearts" from Terri Lyne Carrington's *New Standards Vol. 1* was rendered with delicacy and a finely filigreed texture. Rather than producing a high-frequency swishing sound, the Rei managed to convey the subtle details that contribute to musical realism.

I was amazed that this diminutive amplifier could drive the wide range of speakers I had on hand to full listening levels with no sense of strain on peaks, no softening of the bass, and no soundstage

collapse. Moreover, the Rei had a dynamic verve, speed, and impact that not only belied its size and output-power rating but was exceptional by any measure. Snare drum had tremendous "snap" with a sense of weight behind it, giving the amplifier a decidedly upbeat, lively, and rhythmically propulsive quality (try "Cousin Dupree" from Steely Dan's *Two Against Nature*, one of the best-recorded drum sounds I've heard). Driving the Alsyvox full-range ribbon speakers with their unmatched transient fidelity, the Rei resolved the full measure of a concert grand piano's intricate dynamic envelope, conveying the suddenness of the hammer hitting the strings without

sounding hard or "glassy" on the initial transient. The Rei's transient precision allowed it to unravel rhythmically complex music with alacrity and visceral body-moving power. From the Talking Heads' *Speaking in Tongues* to the powerful reggae beats of Steel Pulse's *True Democracy* to the intricate multilayered African percussion and guitars of the band African Guitar Summit, the Rei consistently exhibited a sense of precision, clarity, and an upbeat propulsive quality. It wasn't just percussion and drums that revealed the Rei's superb dynamic performance. These amplifiers wonderfully portrayed music's forward flow no matter the genre. On the spectacularly great new di-

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rect-to-disc double LP *Vivaldi in London* on the Chasing the Dragon label, the Italian chamber group Interpreti Veneziani performs Vivaldi concertos. These fabulous musicians, in perhaps the most realistic recording of chamber music I've heard, bring a vitality to the performances, particularly during the andante movements, that bristles with energy. The Rei had an uncanny ability to convey to the listener the sense of occasion, of contemporaneous music-making in these remarkable performances.

Finally, the Rei's bass is excellent, combining warmth, weight, and tonal density with good pitch articulation and transient fidelity. The Rei was particularly adept at revealing textural details in the lower octaves. It was easy to hear precisely what the bass player was doing, which, combined with the bottom-end solidity and rhythmic propulsion, made for viscerally engaging listening.

Conclusion

If you're looking for the classic "Class A sound" of softish bass and warm midrange textures at the expense of transparency and resolution, the WestminsterLab Rei monoblocks probably aren't for you. But if it's neutrality, high resolution, see-through transparency, dynamic liveliness, and outstanding bass you're after, these small but mighty monoblocks should be on your shortlist. The WestminsterLab Rei amplifiers possess clarity and alacrity

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through the midband that conveys a vibrancy and immediacy that's musically compelling. And then there's the wonderfully tuneful bass that beautifully conveys rhythmic nuances as well as rich tone color.

Don't be fooled by the Rei's size; this amplifier easily drove every speaker I tried. In addition, the Rei is capable of delivering powerful dynamic contrasts and transients without sounding aggressive. But

it went beyond just sounding dynamic; this amplifier conveyed a sense of musical energy that's rare from any amplifier, no matter the cost.

The REI monoblocks from WestminsterLab are ideal for the music lover who wants an exceptional-sounding amplifier without the size, weight, and heat of conventional electronics. A pair of Rei's will easily fit on a rack shelf. The short 30-minute warmup time is a bonus. In addition, the build-quality is outstanding.

In a world of "me-too" amplifiers, the WestminsterLab Rei monoblocks are something different in conception, design, build, and most importantly, the musical rewards they offer.