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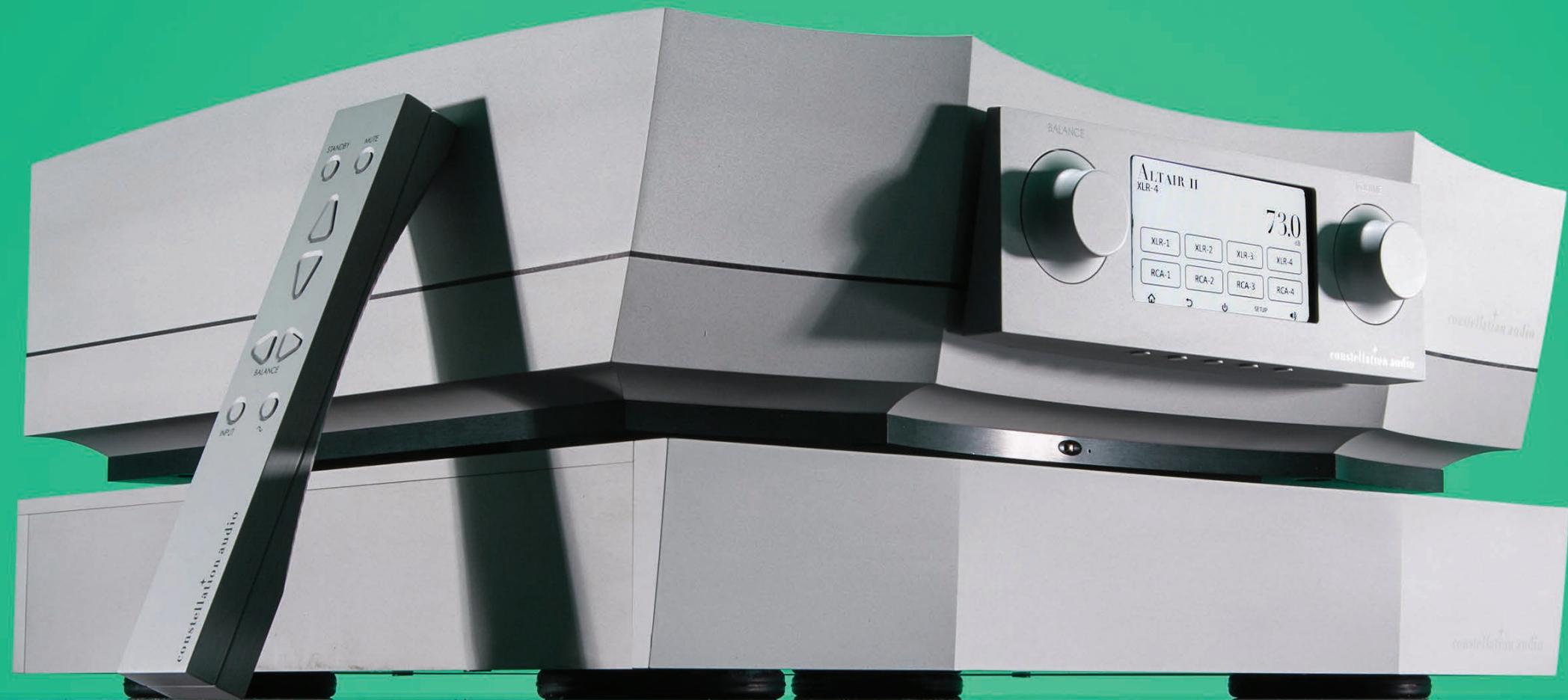


## State of the Art!

### CONSTELLATION'S ALTAIR II & HERCULES II



# A LANDMARK REFINED



## Constellation Audio Altair II Linestage and Hercules II Monoblock Power Amplifiers

Robert Harley

Photography by Dennis Burnett

No other electronics manufacturer in recent memory has risen from start-up to major global brand as quickly or as decisively as Constellation Audio. The company appeared on the scene in late 2010 with the ultra-tweaky (and ultra-expensive) Altair linestage and Hercules monoblock power amplifiers. In my review of those electronics in Issue 215 (September, 2011), I concluded “the Altair and Hercules set new standards in transparency, resolution, absence of grain, and sheer realism, in my experience.”

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Power Amplifiers**

Constellation leveraged this early success by creating a full line of components based on the same circuits found in the Reference Series Altair and Hercules. (The Performance and Inspiration Series are simply less elaborate implementations of the topologies developed for the cost-no-object Reference.) As we enter 2016, Constellation is armed with the \$13,500 Inspiration Integrated amplifier at one end of its line, and the newly revised and updated Altair II linestage and Hercules II monoblocks at the other. The Altair II’s price of \$80,000, and the Hercules’ tag of \$180,000 per pair position them at the top end of the price scale. Are the revised components better-sounding than the originals? Do they still hold their status as the state of the art in solid-state amplification?

Before tackling those questions, let’s look at the key differences between the new products and the originals. The most obvious change is the Altair’s more traditional user interface. The first Altair was housed in a monolithic chassis with no display or readily apparent controls. Despite the exceptional two-handed touchscreen that controlled the Altair, the lack of controls or of a display on the Altair was a bit unnerving. Customers apparently agreed that that approach was a bit too avant-garde; the new Altair features a touchscreen similar to that of the old remote, but now integrated into the front panel. The new remote, a slim wand beautifully machined from aluminum, is much easier to use. Overall, the move to the front-panel display and a more conventional remote control is welcome.

Inside, the Altair’s volume control is now a monolithic stepped-attenuator under digital control rather than the elaborate light-dependent-resistor circuit of the original. The light-dependent-resistor volume control took a long time to stabilize and sound its best, leading to the decision to implement the new attenuator. Other changes include additional power-supply buffers around the volume control as well as another regulation stage in the supply powering the audio circuit. The result is reportedly wider dynamics and lower noise. The floating “raft” on which the audio circuitry is suspended has had its suspension retuned, with a heavier weight to the raft and optimized mechanical damping. Apart from a few component swaps, the circuit is unchanged.

The Altair’s power supply is still housed in a separate enclosure, and connects to the main chassis via three umbilical cords. Constellation Audio offers a product called a DC Filter that looks identical to the power supply. It fits in line between the power supply and the Altair’s main chassis, and provides additional filtering of the DC supply voltages before they get to the preamplifier. The optional DC filter can be added at any time, and is priced at \$9000. In a typical configuration, the Altair linestage sits atop the power supply and DC filter. When viewed this way, the Altair’s extraordinary industrial design and chassis-work are on full display. The three chassis together almost look like sculpture.

The Altair offers eight inputs, four unbalanced on RCA jacks and four balanced on XLR connectors. You can scroll through the inputs from a button on the remote, but that’s tedious if you want to go from Input 2 to Input 1. A better method is to press a small button concealed beneath the Altair’s front-panel display, which brings up the eight inputs on the touchscreen. The touchscreen also shows you the volume setting, selected input, and balance control (which, incidentally, is adjustable in 0.1dB steps). I missed the ability to select any input directly from the remote, which was possible with the original Altair. On the plus side, the new wand remote is easier to hold and use than the two-handed Pyxis remote.

The Hercules II has undergone more extensive revisions. For starters, the original’s vertical form factor has been replaced by a more traditional chassis. The power rating has increased from 1000W to 1100W. Although the output stage and heatsink area of the two amplifiers are identical, the Series 2 features more robust Plitron power transformers that can deliver higher current.

One of my criticisms of the original Hercules was a bass response that was polite rather than visceral. The bottom end lacked the weight, extension, and authority one would expect from a “super-amp.” That shortcoming has been addressed in the Hercules II by tripling the power-supply filter capacitance and adding another regulation stage in the supply for the front-end audio circuitry. Interestingly, according to Constellation, making either one of these changes without the other rendered only a marginal improvement in bass and dynamics. But together the two changes reportedly resulted in significantly wider dynamics and more robust bass.

Hercules has two sets of inputs, one of them marked “Constellation Direct.” This input is designed for connection to a Constellation preamp; it simply bypasses the amplifier’s input buffer for one less gain stage in the signal path. The output binding posts are big and robust, but the slots in the posts for inserting spade lugs are oddly positioned to face toward the outside of the chassis in opposite directions, making it tricky to connect certain speaker cables. The AC input jack is a 20A connector rather than the typical 15A type. (See the sidebar for a recap of the two products’ technical features.)

## LISTENING

I’ve had extensive experience with the Constellation line, from the Inspiration Series (Issue 249) all the way to the flagship Altair and Hercules in the Reference Series (Issue 215). The family shares many common sonic attributes, which isn’t surprising since all the linestages and power



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amplifiers feature the same circuit topologies, and in some cases the same parts (the output transistors, for example). The differences are in the level of execution, parts-quality, chassis work, and power-supply sophistication.

I'll refer you to my review of the Altair and Hercules in Issue 215 for a detailed sonic description of the originals. The new Mk.2 versions sound very similar, with one notable exception, which I'll describe later.

The common thread in all Constellation products, which reaches its zenith in the Altair II and Hercules II, is truly astonishing transparency to sources. These electronics are as colorless as you're likely to find. The word "crystalline" comes to mind when I think of the Altair II and Hercules II, like a perfectly colorless and flawless diamond. They impose so little of their own character on the music that listening to them is like hearing directly through the amplification to the music-making. With an outstanding source like the Basis Inspiration and Superarm 9, and highly resolving loudspeakers such as the Magico Q7 Mk.II or MartinLogan Neolith, the effect is quite startling. The system produces a *frisson* of lifelike immediacy and vividness. Some listeners may prefer a bit of added midrange warmth, or a slight softening of transient detail, or a subtle darkening of timbres. Although, amplifiers that sound richer and more voluptuous can have a certain appeal, ultimately I think that they are less musically engaging and rewarding than electronics that tell you everything that's on a recording.

In addition to this transparency to sources, the Altair II and Hercules II exhibit two other qualities that vault them into state-of-the-art territory. The first is resolution, and the second is their treble performance. These qualities are directly related, working together in a synergy that is truly extraordinary.

In this issue's From The Editor I posit that a hi-fi system can never have too much resolution of detail. Those who argue that past a certain point resolution becomes amusical clinical analysis, or isn't important to musical communication, haven't heard the kind of resolution delivered by the Constellation electronics driving a first-rate loudspeaker.

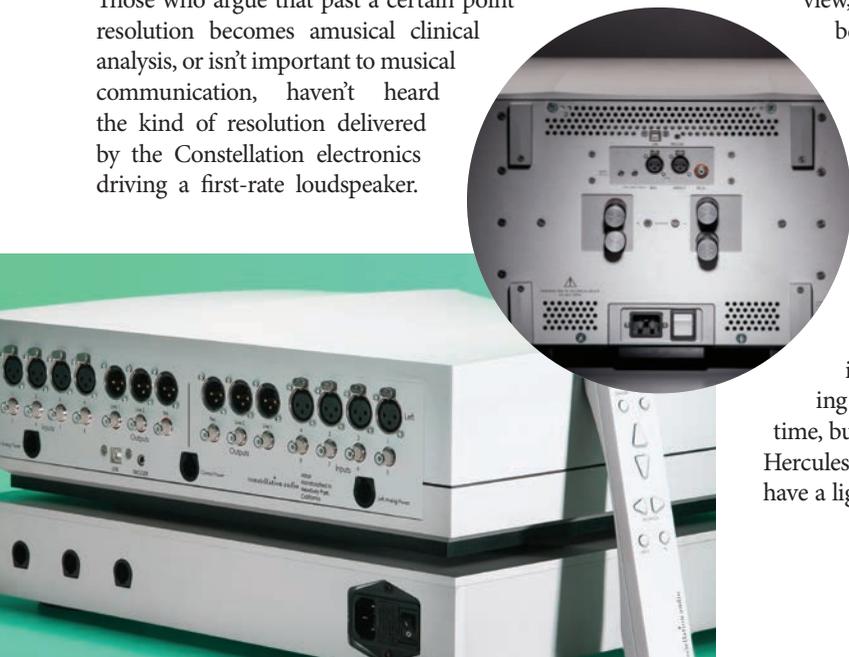
The Altair II and Hercules II are stunningly dense in the amount of information presented to the listener. The finest microstructures of how sounds are created are gloriously revealed. Take a simple instrument such as wood blocks. How hard could they be to reproduce? Through the vast majority of amplifiers, wood blocks and similar percussion instruments sound like transient pops without much texture or inner detail. Through the Constellation electronics, they unmistakably become two pieces of wood striking each other. I'll give you another example: On the wonderful Analogue Productions 45rpm reissue of Phoebe Snow's 1974 self-titled album, the track "Poetry Man" includes maracas played very gently underneath other instruments. Through the Constellation electronics, I could clearly hear beads moving within hollow wooden spheres. The maracas add an almost hypnotic quality to the track.

I use these examples not because I listen to music with an ear to how natural wood blocks or maracas sound, but to convey the realism with which these electronics reproduce the timbre and transient detail of all instruments. Greater realism in tone color and dynamic shading translates directly into a more lifelike rendering of the sound and deeper musical involvement. This resolution isn't limited to the micro-level; the Altair II and Hercules II allow me, to an unprecedented extent, to hear individual instruments and voices even within dense musical passages with startling clarity.

The second quality that sets the Constellation electronics apart is their reproduction of the treble. If the level of resolution I've just described is accompanied by the slightest bit of glare, etch, grain, hardness, emphasized transient zip, or forwardness, the sound quickly becomes annoying and fatiguing. Rather than fostering musical intimacy, such brightness precludes it. And here's where the resolution of the Altair II and Hercules II becomes so magical; all that wonderful detail is presented in a supremely subtle, refined, suave, and sophisticated way that never calls attention to itself. There's no need to soften the presentation of the Altair II and Hercules II to mitigate an electronic patina because there is no electronic patina. Moreover, the treble has a delicate filigreed quality that is unique in my experience. Although the top end has a full measure of energy and life, it's also rendered with a sweetness and grace that are departures from the stereotype of a big solid-state amplifier. The combination of resolution with ease is, in my view, what distinguishes a really great hi-fi system from one that becomes transcendental. That quality is also what makes the Mk.II upgrade to the Magico Q7 such a triumph; it delivers more information *and* a more relaxed sound.

One quality isn't sacrificed to advance the other. In both the Q7 Mk.II and the Constellation electronics, resolution combines synergistically with ease to foster total musical involvement. The presentation is musically vivid without being sonically vivid.

The Altair II and Hercules II's overall character is one of lightness, illumination, clarity, and transparency. Many years ago, before I worked in the industry, I read in *The Absolute Sound* a description of a component as having a "deep chocolate midrange." I thought it humorous at the time, but the phrase comes to mind here because the Altair II and Hercules II do *not* have a "deep chocolate midrange." Rather, they have a lighter, fresher, and more radiant quality that is at the other



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end of the spectrum from “deep chocolate.” The Constellation pair is harmonically rich and dense, but not in a way that dilutes realism by rendering textures as slightly darker than life. In fact, their reproduction of instrumental timbre has a kind of effervescence that is simply sensational. Listening to ensembles with woodwinds and brass, I can hear each instrument’s individual timbre with vivid clarity, and the combinations of those instruments’ tone colors take on a new sense of organic wholeness.

My only reservation about the original Hercules was a slight lack of weight and authority in the bottom end. Constellation has addressed this issue with the Hercules II, tripling the power-supply

filter capacitance and adding additional power-supply regulation in the amplifier’s front end. (These techniques have now been implemented throughout the Constellation line.) I’m pleased to report that the Hercules II’s bass now has much more weight, power, and dynamic authority. The improved low end gives the music a more solid tonal and rhythmic foundation. The sense of lightness and illumination described above is still a hallmark of the design, but in the new amplifier that character is supported by richer and fuller bottom octaves.

I mentioned this in my original review, but it bears further discussion here. The Hercules II doesn’t sound like an 1100W amplifier. It’s not that it doesn’t sound powerful or has trouble driving loudspeakers. The Hercules II is a powerhouse, reproducing the most demanding bass dynamics with completely effortless grace and authority. When I say that the Hercules II doesn’t sound like an 1100W amplifier, I mean that as a compliment. Many high-power “dreadnought” amplifiers can sound hard and artificial, a character perhaps introduced because the transistors in the output stage all exhibit slightly different operating characteristics. The more transistors in the output stage, the greater the potential for the individual transistors not to work together in unison. There are many examples of an amplifier line in which the amplifiers are identical to each other except for the number of output transistors (along with the size of the power supply and heatsinks). The lower-powered amplifiers always sound better, the most famous example being the Adcom GFA-535 (60Wpc), GFA-545 (100Wpc), and GFA-555 (200Wpc). Cognoscenti knew that the GFA-535 was the sweetest-sounding of the line. Despite an output stage of 64 MOSFETs, the Hercules II is capable of the delicacy and finesse of a low-powered unit, yet can deliver seemingly unrestricted dynamics with grace and ease.

Finally, I should note that the Hercules II takes a very long time to sound its best. The treble purity and resolution are apparent within half an hour or so, but after about four hours the amplifier really opens up, with a greater sense of space and an overall increase in ease and relaxation.

## CONCLUSION

The Constellation Audio Altair linestage and Hercules monoblock amplifiers in their updated version maintain their status as world-class references. They are a convergence of beautiful design and build-quality, practically unlimited power delivery, and, most importantly, state-of-the-art sound. Yes, these electronics are priced in the stratosphere—better than a quarter of a million dollars. That number is breathtaking, but then again so is the performance. If there are electronics that are more resolving and trans-

parent, or that have a cleaner and more filigreed treble, I haven’t heard them.

I concluded my review of the original Altair and Hercules by writing that these electronics have “established a benchmark against which all other linestages and power amplifiers can be compared.” Nearly five years and one update later, along with extensive experience with reference-grade associated equipment under my belt, that conclusion still holds true.

## SPECS & PRICING

### Altair II Linestage

**Inputs:** Four balanced on XLR jacks, four unbalanced on RCA jacks

**Outputs:** Two balanced on XLR jacks, two unbalanced on RCA jacks (both main outputs); one record output on XLR jacks, one record output on RCA jacks

**Input impedance:** 200k

ohms balanced, 400k ohms unbalanced

**Output impedance:** <50 ohms

**Volume control resolution:** 0.1dB, 0.5dB, 1dB (level-dependent)

**Weight:** 84 lbs. (linestage), 26.2 lbs. (power supply)

**Dimensions:** 17.5" x 5.53" x 14.82" (linestage); 17.5" x 2.82" x 14.5" (power supply)

**Price:** \$78,000

### DC Filter for Altair II

**Dimensions:** 17.5" x 2.82" x 14.5"

**Price:** \$9000

### Hercules II Power Amplifier

**Output power:** 1100W into 8 ohms, 1500W into 4 ohms, 2000W into 2 ohms (1kHz, 1%THD)

**Gain:** 32dB

**Input impedance:** 100k ohms unbalanced, 200k ohms balanced

**Output impedance:** 0.05 ohms

**Inputs:** Two balanced on XLR, one unbalanced on RCA

**Dimensions:** 19" x 13" x 32"

**Weight:** 220 lbs. each, net

**Price:** \$180,000/pr.

### CONSTELLATION AUDIO

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### ASSOCIATED EQUIPMENT

Digital front end: Aurender W20 music server, Berkeley Alpha Reference DAC, Berkeley Alpha USB converter  
Analog front end: Basis Inspiration turntable with Basis Vector IV and Superarm 9 tonearms, Air Tight PC-1 Supreme cartridge, Moon by Simaudio 810LP phonostage  
Support: Critical Mass Systems  
Maxxum equipment racks (x2), Maxxum amplifier stands (x2)  
Cables: MIT Oracle MA-X and Oracle SHD, AudioQuest Wild Digital AES/EBU, WireWorld Platinum Starlight USB  
AC: Four dedicated 20A AC lines; Shunyata Triton 2, Triton DP, Typhon (x3) conditioners, Shunyata Sigma power cords  
Acoustics: ASC 16" Full-Round Tube Traps, ASC Tower Trap, Stillpoints Aperture Panels  
Accessories: Kaudio ultrasonic record cleaner; Shunyata cable lifters, Critical Mass Systems Rize isolation

## INSIDE COST-NO-OBJECT DESIGN AND EXECUTION

As I reported in my original review in Issue 215, the Altair's chassis is made from a two-piece clamshell structure, with each block machined from solid aluminum billet. Within this 60-pound framework is a shielded sub-enclosure that hangs inside the main chassis on an elastomeric suspension. The sub-enclosure is made from two non-magnetic steel plates laminated with a polymer sheet between them. This sub-enclosure is then divided into two more sub-sub-enclosures, with the top half containing the audio signal electronics and the bottom half housing power-supply regulation. This entire "raft" structure "floats" within the massive 8.2mm-thick outer chassis. In addition, the mass-loaded, vault-like, solid-aluminum outer chassis is airtight. The anti-resonance engineering of this system was designed in conjunction with Michael Latvis of Harmonic Resolution Systems, maker of state-of-the-art equipment racks and vibration-control products. HRS feet are also featured underneath the Altair's chassis.

The audio circuit is fully balanced and built from FETs that are hand-selected for low noise and matched gain. When Constellation found this FET they bought out the manufacturer's entire stock and the manufacturer discontinued the device.

The outboard power supply features three separate R-core transformers, one each for left channel audio, right channel audio, and control circuitry. Three umbilical cords connect the power supply to the linestage. The power supply's output is unregulated; all regulation occurs next to the audio circuits. The Altair features cascaded discrete regulation, with the regulated voltages supplying the audio circuits through solid-copper bus bars. ("Cascaded" means that the output of one regulator feeds another regulator for even greater isolation of the DC supply from the AC source. "Discrete" means that the regulators are built from separate transistors rather than integrated circuits.) The result of this heroic power-supply design and execution is DC so pure that any noise is down more than 140dB, the limits of the Audio Precision analyzer. (Constellation shared with me the noise plots.)

All of these techniques, from the massive aluminum chassis with sub-enclosures, the floating raft, and the extensive power supply design are all designed to isolate the audio circuitry from vibration and noise.



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## HERCULES POWER AMPLIFIER

Just as the Altair incorporates innovative, cost-no-object design and execution, so does the Hercules power amplifier. For starters, when driving the Hercules through the Constellation Direct input, the power amplifier's input buffer is bypassed. (Removing this active stage can be done because the Altair outputs a signal that doesn't need buffering.) A second XLR input is available for driving the Hercules with another brand of preamplifier. This input adds an input buffer, which is based on the same topology as the Altair's gain module. Selecting between these inputs is done via a rear-panel control. This system removes an entire active gain stage from the signal path compared with a conventional preamplifier and power amplifier system.

The Hercules' output stage is highly unusual. Virtually all push-pull output stages employ complementary pairs of P-channel and N-channel transistors that work together. These designations refer to the transistors' polarity. The P-channel transistor amplifies the positive-going half of the waveform, and the N-channel amplifies the waveform's negative-going half. Unfortunately, P-channel and N-channel transistors exhibit different operational characteristics, specifically the amount of time they take to turn on and to turn off. This disparity results in a waveform discontinuity at the zero-crossing point. Single-ended amplifiers sound so good in part because one device (tube or transistor) amplifies the entire waveform, and thus cannot exhibit zero-crossing distortion.

Constellation has attempted to merge the purity of a single-ended output stage with the high power of a Class AB gain stage. The output stage is built entirely of N-channel MOSFETs, and split into two completely separate

amplifiers per monoblock. One amplifier is fed the positive phase of the balanced signal, and the other amplifier receives the negative phase. The two amplifiers in each monoblock "float" (are not referenced to ground) and are connected to each other by the loudspeaker load. This configuration is identical to using two separate amplifiers in bridged mode.

It's well known that low-power models within an amplifier manufacturer's line often sound sweeter and more refined than their more powerful efforts. Constellation wanted to build an amplifier with massive power that exhibited the delicacy of low-powered designs. It therefore started by developing the best-sounding 125W amplifier it could, and once satisfied with the results, grouped many of these 125W single-ended modules together to achieve the Hercules' 1100W rating. The design is reportedly scalable with no change in sound quality. In fact, the Centaur amplifier, rated at 250Wpc, uses two of these modules per channel rather than the Hercules' eight. Each module is based on eight output transistors, giving the Hercules a mind-blowing 64 MOSFET output transistors per monoblock. Unlike most power amplifiers Hercules requires no stabilizing inductor on the output; the output transistors are connected directly to the speaker binding posts via solid-copper bus bars.

As you might imagine, this gargantuan output stage requires a big power supply and lots of heat sinking. The power supply features dual 3kW transformers with multiple secondary windings. Each transformer supplies one "side" of the output stage. These transformers account for much of the Hercules' 270-pound heft. The heat sinking is readily apparent just by glancing at the Hercules' side panels, which are perforated with hundreds of ventilation holes.

The level of design and execution in the Altair and Hercules is unprecedented, in my experience. The truly cost-no-object realization provides an interesting insight into how the world's best audio designers apply ingenious solutions to advance the audio art. tas