

Krell

Evolution 202 & 600

PREAMPLIFIER & MONOBLOCK POWER AMPLIFIER

Wes Phillips

Talk about going from the ridiculous to the sublime. One day I'm reviewing the \$139 Sonic Impact Super T power amplifier, and the next day Krell Industries delivers their \$10,000 Evolution 505 SACD/CD player, \$15,000 Evolution 202 preamplifier, and their \$30,000/pair Evolution 600 monoblocks.

And I whined. "I don't like to review complete systems," I moaned to Krell's Randy Bingham. "That's too many changes, and it takes forever to do comparisons."

"We don't want to impose, but with the CAST current gain system, the only way you can evaluate how good any individual component is is to hear it in concert with the other components running CAST. That way, from source to output, the system consists of a single gain stage, which is about as simple as it gets. Besides, we don't want you to review the universal player—we promised it to Fremer."

"Okay, but I'm going to listen to my reference Ayre C5-xe player, Conrad-Johnson CT5 preamp, and Musical Fidelity Nu-Vista 300 in the system, not just the other CAST gear."

"Actually, we insist on it—and while you're at it, disconnect the CAST cables and hear the Evolutions in balanced and single-ended modes. We're convinced that even an

EVOLUTION 202 Solid-state pre-amplifier. Frequency responses: 20Hz–20kHz, ± 0.02 dB; 0.01Hz–1.5MHz, $+0/-3$ dB. THD: $<0.004\%$, 20Hz–20kHz at 4V or 4mA RMS. Signal/noise: >100 dB wideband, unweighted; >109 dB A-weighted (both at 4V or 4mA RMS). Input impedance: 45 ohms CAST (current mode operation), 95k ohms balanced, 47.5k ohms single-ended. Output impedance: >1 M ohm CAST, 50 ohms balanced, 25 ohms single-ended. Input overload: 14mA RMS CAST, 14V RMS balanced, 7V RMS single-ended. Output overload: 16mA RMS CAST, 16V RMS balanced, 8V RMS single-ended. Gain: 12dB CAST or balanced, 6dB single-ended. Inputs: 2 pairs CAST (LEMO), 2 pairs balanced (XLR), 3 pairs single-ended (RCA), 1 tape loop (RCA). Power consumption: 45W standby, 70W power on.

DIMENSIONS Preamplifier: 17.25" (438mm) W by 3.8" (96mm) H by

18.25" (464mm) D. Power supply: 17.25" (433mm) W by 3.8" (96mm) H by 18.25" (464mm) D. Total weight: 46 lbs (20.8kg).

SERIAL NUMBER OF UNIT REVIEWED 17606050032.
PRICE \$15,000.

EVOLUTION 600 Solid-state monoblock power. Inputs: 1 pair CAST (current mode operation, LEMO), 1 pair balanced (XLR), 1 pair single-ended (RCA). Outputs: 1 pair speaker binding posts. Output power: 600W RMS into 8 ohms (27.8dBW), 1200W into 4 ohms (27.8dBW). THD: $<0.02\%$ at 1kHz at 600W into 8 ohms, $<0.15\%$ at 20kHz at 600W into 8 ohms. Maximum output: 196V peak-peak, 69V RMS. Slew rate: 100V/ μ s. Input impedance: 70 ohms CAST, 200k ohms balanced, 100k ohms single-ended. Input sensitivity: 3.72mA CAST, 3.72 V RMS single-ended or balanced. Frequency responses: 20Hz–20kHz, $+0/-0.13$ dB;

<0.5 Hz–150kHz, $+0/-3$ dB. Signal/noise ratio: >110 dB wideband, unweighted, ref. full power; >119 dB A-weighted. Voltage gain: 25.4dB. Maximum Output current: 49A peak. Output impedance: >0.03 ohm, 20Hz–20kHz. Damping factor: >270 , 20Hz–20kHz, ref. 8 ohms. Power consumption: 260W standby, 410W idle. Heat output: 890 BTU/hour standby, 1400 BTU/hour maximum.

DIMENSIONS 17.25" (438mm) W by 9.75" (248mm) H by 22.05" (560mm) D. Weight: 135 lbs (61.1kg) each.

SERIAL NUMBERS OF UNITS REVIEWED 18706050019/20.
PRICE \$30,000/pair.

BOTH Approximate number of dealers: 200. Warranty: 5 years, transferable.

MANUFACTURER Krell Industries, 45 Connair Road, Orange, CT 06477-0533. Tel: (203) 799-9954. Fax: (203) 799-9796. Web: www.krellonline.com.

designer, Dan D'Agostino, is crucial. When D'Agostino was working on Krell's CMT, "I noticed that every time we did an I-to-V conversion, the converter added noise and grain and messed with detail, so I just said, 'Wouldn't it be wonderful if we didn't convert this at all and ran it as a pure current signal from input to output?' Once we thought of it—well, it would be wrong to say it was simple, but getting out of the voltage-gain mindset was the 'ah-ha!' moment, and the rest was just engineering. And engineering is what we *do*."

Of course, to run CAST, you need to use CAST cables (\$500/m), which are

thin and flexible and sport four-conductor LEMO connectors. The Evolution 202 has two CAST inputs, three single-ended RCA inputs (and a tape loop), and two balanced XLR inputs. There are four outputs: one single-ended (SE), one balanced, and two CAST.

The Evolution 600 monoblock, obviously, also employs CAST, but also has SE and balanced inputs. It puts out 600W into 8 ohms (1200W into 4 ohms) and employs Krell's Active Cascode Topology. ACT is not precisely the same as conventional cascode technology, which generally means combining a transconductance amplifier

stage with a current buffer stage.

Krell's technical support manager, Jim Ludoviconi, likens Krell's ACT to the saying "many hands make light work." Cascoding is a simple method of doubling the amount of devices per rail in a push/pull configuration for linear operation. With our FPB amps, we split the audio waveform and assign an output stage to each phase. Where typical push/pull designs divide up the current, ACT splits the voltage as well—but here's where it gets unusual for Krell: We're not in class-A anymore.

"Class-A is a needy technology in terms of space, heat management, and

MEASUREMENTS

I don't have the necessary equipment to test the Krell components in their current-mode (CAST) operation. Therefore, I performed all the technical tests using conventional voltage-mode drive, in both balanced and unbalanced operation.

With its volume control set to "151," the Evolution 202 preamplifier offered maximum voltage gains of 11.8dB in full balanced mode, 5.75dB in unbalanced mode. Both modes

preserved absolute polarity; *i.e.*, were noninverting. The volume control's unity-gain setting was "101" for balanced operation, "124" for unbalanced. The unbalanced input impedance was a usefully high 38k ohms in the bass and midrange, dropping slightly but inconsequentially to 33k ohms at 20kHz. The balanced input impedance was exactly twice the unbalanced, as expected. The output impedance

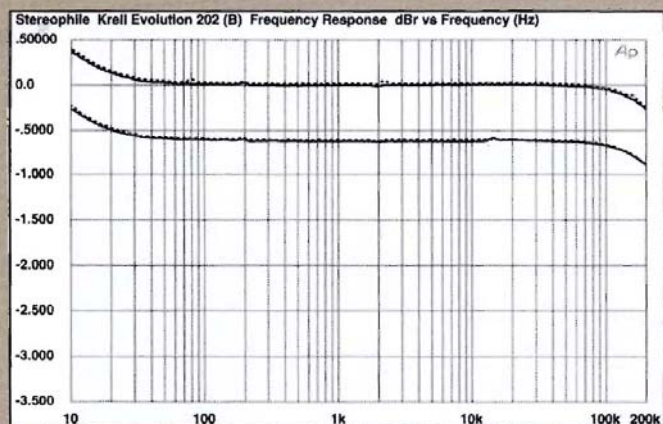


Fig.1 Krell Evolution 202, balanced frequency response at 1V into (from top to bottom): 100k, 600 ohms (0.5dB/vertical div., right channel dashed).

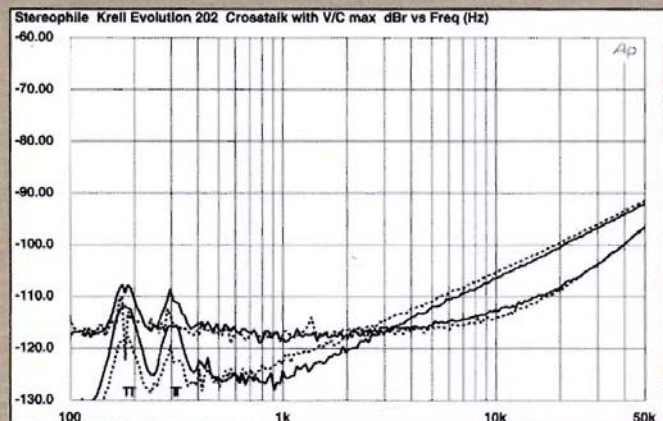


Fig.2 Krell Evolution 202, channel separation in balanced (top) and unbalanced (bottom) modes (R-L dashed, 10dB/vertical div.).

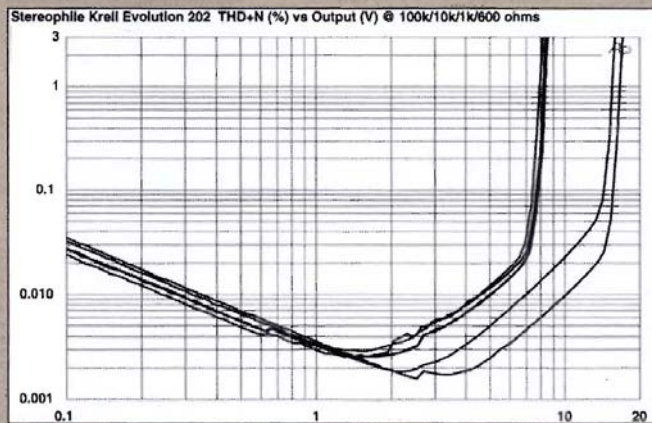


Fig.3 Krell Evolution 202, THD+N (%) vs 1kHz output voltage (from right to left): balanced into 100k ohms, 600 ohms; unbalanced into 100k, 10k, 1k, 600 ohms.

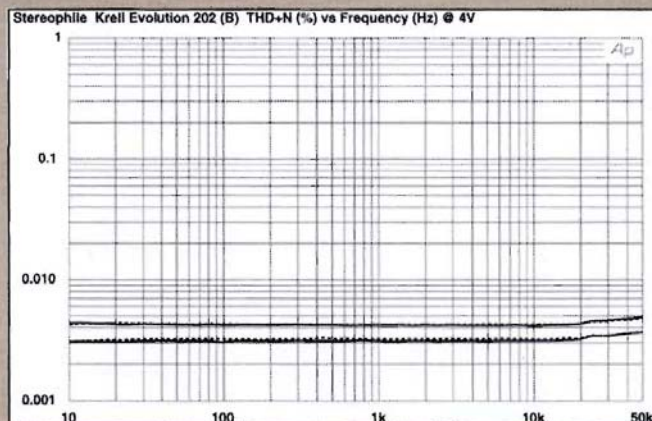


Fig.4 Krell Evolution 202, balanced THD+N (%) vs frequency at 4V into (from bottom to top): 100k, 600 ohms (right channel dashed).

efficiency, which nobody knows better than Krell. The problem with not using class-A is notch distortion, which is where our *driver* stage comes in. The driver stage, designed like a mini-output stage, takes over and shoulders the load, just bulling the output stage through the area where notch distortion would occur if it weren't being controlled by the driver. The pre-driver stage is designed to deliver massive throughput—Dan D'Agostino calls it 'Hoover Dam'—and the input stage is a triple-cascoded current mirror, which is very low distortion, which means we aren't introducing errors at that point

that get amplified down the line."

The guts of the 600 are its 5000VA power supply, which is electrically and magnetically shielded to keep radiated interference out of the signal paths. The 600 also sports internal high-current line-conditioning filters, which Krell says not only remove AC noise but compensate for asymmetric power waveforms and DC on the mains. Additionally, the rails that power the amp's low-level and gain stages are dual-regulated.

Each Evolution 600 has a single pair of high-quality T-type binding posts, best suited for bare wire (ha!) or spade-

lug connections. They are a joy to use.

Whether you choose the silver or satin black color schemes, the fit'n'finish of the Evolution products is superb.

Evolution of a review

There were a few practical considerations in setting up the Evolution system. First, it's *heavy*. The 600s weigh 135 lbs each, and while I can lift 135 lbs in barbell form, I found it darned awkward to manipulate same in Evolution 600 form, with most of the weight behind the front panel. You'll need a friend to set them up—better yet, a dealer.

The Evolution components run hot,

was low, at 45 ohms balanced, 22.5 ohms unbalanced.

The Evolution 202 offered a very wide bandwidth, its response down by just a quarter of a dB at 200kHz (fig.1). This didn't vary with volume-control setting or load impedance, and was identical in the balanced and unbalanced modes. There is a small rise in output at infrasonic frequencies, presumably a function of the DC servo. DC offset was negligible. Channel separation (fig.2) was superb, at better than 110dB below 5kHz (balanced) and 198kHz (unbalanced), with the volume control set to its maximum. Note, however, the slight peaks at 180Hz and 300Hz in this graph, possibly due to magnetic coupling from the power supply, which had to be placed directly under the preamp chassis for the testing due to the short umbilical cable. Even so, the levels of these spuriae are way too low to be audible, though they did reduce the worst-case, unweighted, wideband signal/noise ratio to a still good 82.2dB (input shorted, volume control maximum, ref. 1V output). A-weighting increased this figure to a superb 95.7dB.

The Krell preamp could swing very high output voltages, even into low impedances. Fig.3 reveals that the balanced output didn't clip (defined as 1% THD) into 100k ohms until 16V RMS, with the unbalanced output clipping at 8V. These figures are significantly higher than that required to drive the Evolution 600 power amplifier into clipping. More important,

you can see in this graph how the actual distortion remains below the noise floor until 4V (balanced) and 2V (unbalanced), which suggests that the preamp's gain architecture has been sensibly optimized. I plotted the balanced THD percentage against frequency at 4V, the level suggested by fig.3, but there was no difference in the preamp's behavior across the audioband, and the THD remained very low even into the punishing 600 ohm load (fig.4).

And even with its very low level of distortion, the spectral content of that distortion was benign, with only the second and third harmonics rising above the residual level of my signal generator (fig.5). Intermodulation distortion was also low (fig.6).

I preconditioned the Evolution 600 power amplifier by running it at 200W into 8 ohms for an hour. At the end of that period, the THD+noise percentage had dropped from 0.0159% to 0.0064%, but the internally housed heatsinks were too hot to touch. The chassis itself was around 55°C at the rear, but cooler than that toward the front. Like the Evolution 202, the Evolution 600 monoblock was measured only in voltage mode. Its voltage gain (into 8 ohms) was a little lower than average, at 25.25dB, meaning that it needs almost 4V RMS from both its balanced and unbalanced inputs to be driven to its maximum output power. It preserved absolute polarity, and the input impedance

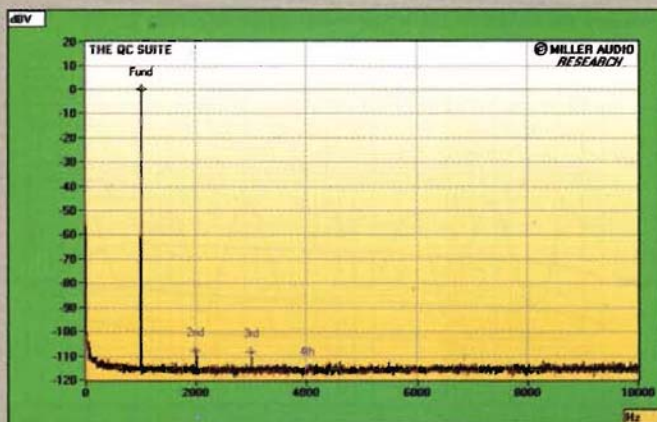


Fig.5 Krell Evolution 202, unbalanced spectrum of 1kHz sinewave, DC-10kHz, at 1V into 8k ohms (linear frequency scale).

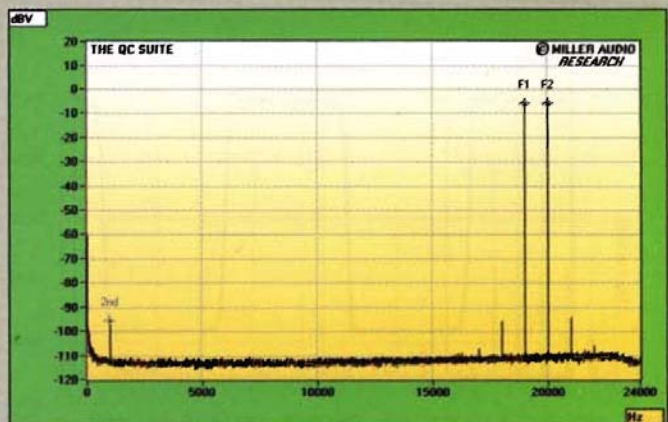


Fig.6 Krell Evolution 202, HF intermodulation spectrum, DC-24kHz, 19+20kHz at 1V peak into 8k ohms (linear frequency scale).

too—even the SACD/CD player. Krell delivered the Evolutions on the first day of 2006's heat wave, and they turned my living room into a sauna, forcing me to choose between listening to the Krells and running my air-conditioning. Fortunately, I did an end run around that problem by having an electrician install a dedicated circuit for the hi-fi.

If you can spend \$55k on components, spend a few hundred more on a dedicated circuit to run them on. The difference was not subtle—I thought the Evolution stack was dead quiet *before* I got the separate line for the hi-fi. After, I heard far deeper into every recording. There was less noise, less

grain, and more of everything else: space, dimensionality, and dynamics.

You probably think that by *dynamics* I mean the loud end of the spectrum. Well, I kind of anticipated that myself, but the Evolution 600s were already powering my system to levels that pretty much maxed out the room's acoustic ceiling. The differences I heard were at the *silent* end of the dynamic continuum—beyond the point that lesser systems define as silence. There's more stuff going on down there? I had no idea.

This was most noticeable with everything connected in CAST mode: Music was grain-free, liquid, detailed, and full of jump. Disconnecting the CAST inter-

connects and running the same components as balanced caused the Evolution system to sound ever so slightly rougher in texture, less detailed, and somewhat more curtailed at the extremes. Not a lot, but enough that I wanted to go back to CAST immediately.

CAST works—and it's addictive.

Evolution of a sound

Running the Evolution stack—including, for now, the Evolution 505 SACD/CD player—in CAST mode through the Canton Vento Reference 1 DC loudspeakers, I cued up *El Canto de la Sibilla II*, by Montserrat Figueras, La Capella Reial de Catalunya, and Jordi

measurements, continued

was a high 90k ohms unbalanced, 200k ohms balanced.

My measurement of the 600's output impedance was 0.124 ohm, which is higher than the specified figure. My measurement does include 6' of cable, though this should account for no more than a small fraction of the difference. But this is still low enough that the modification of the amplifier's frequency response by the interaction between

this impedance and that of the loudspeaker is negligible, at ± 0.1 dB (fig.7). This graph also reveals that the power amplifier has a wide small-signal bandwidth, though not as wide as the Evolution 202 preamplifier. The -3 dB point lay at 116kHz, with a very-well-defined 10kHz squarewave the result (fig.8). The bandwidth did decrease slightly into 2 ohms, but was the same for balanced and unbalanced drive.

Fig.9 reveals that the Evolution 600 was a powerhouse,

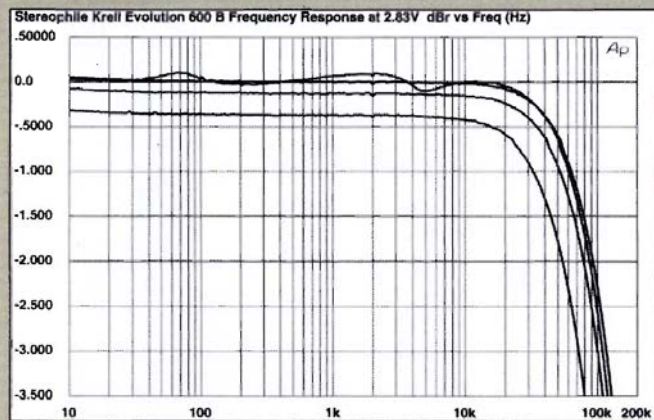


Fig.7 Krell Evolution 600, frequency response at 2.83V into (from top to bottom at 2kHz): simulated loudspeaker load, 8, 4, 2 ohms (0.5dB/vertical div.).

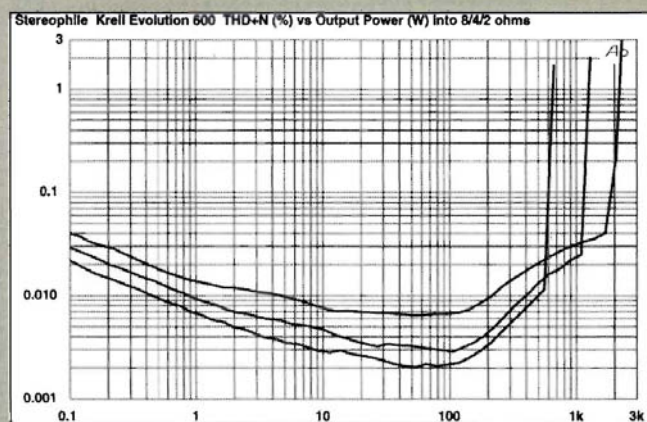


Fig.9 Krell Evolution 600, distortion (%) vs 1kHz continuous output power into (from bottom to top at 100W): 8, 4, 2 ohms.

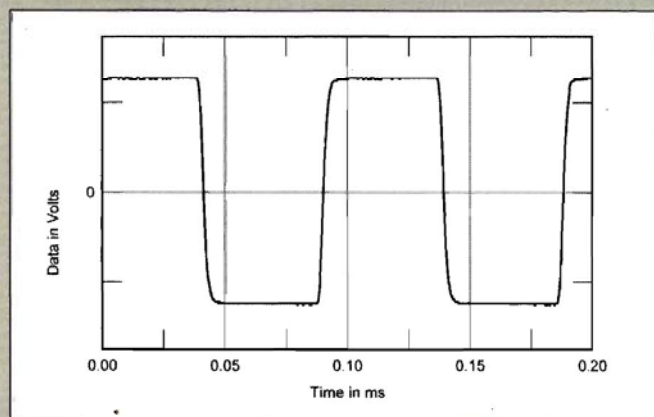


Fig.8 Krell Evolution 600, small-signal 10kHz squarewave into 8 ohms.

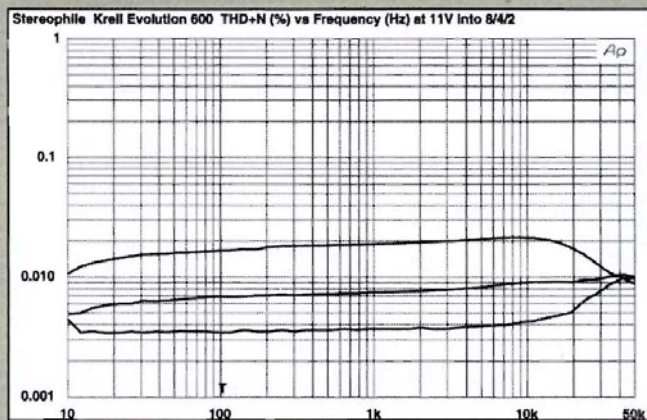


Fig.10 Krell Evolution 600, THD+N (%) vs frequency at 11V into (from bottom to top): 8, 4, 2 ohms.

Savall (CD, Fontalis ES 9900). "Sibila Galaica," one of the little ditties of Alfons X (El Sabio), begins in total silence. Well not *total*—it's silence informed by the acoustic space of La Collégiale Romane du Château de Cardona. You think that's an unimportant detail? I might have too, but the Evolutions so clearly made that space *one specific and unique space* that it sure didn't seem unimportant while I was listening to it.

Then La Capella Reial de Catalunya began singing softly and Figueras' voice began soaring over it—once again, I was immersed not just in a gorgeous performance, but in a gorgeous perfor-

mance happening in that singular acoustic, and being both defined by it and glorifying it.

Then they rang the bells. Holy crap—I nearly fouled myself. Those immense tolls—hitting peaks about 30dB louder than the singers—just about launched me out of my almost not-so-sweet spot. The Evolutions' vanishingly low noise floor may have defined the chapel, but their sheer grunt factor made that mad expostulation *real*. I've heard lots of stuff that excels at one or the other end of the dynamic range window but the Evolutions delivered the whole package.

Britten's *Four Sea Interludes* from Peter

Grimes, performed by the Cincinnati Symphony Orchestra conducted by Paavo Järvi (CD, Telarc CD-80660), also starts softly, but ebbs and flows dynamically throughout its entirety. Here I was incredibly aware of the precision of the Evolutions' re-creation of the chattering woodwinds and the low grumbling of the basses and cellos. This last was particularly impressive—most systems can't quite re-create the low-level, almost *subliminally* sensed perception of very softly played low strings in a big hall. With the systems I'm used to, even the very good ones, I need to turn up the volume to hear that—and then everything else is out of

clipping with continuous drive at 610W into 8 ohms (27.85dBW), 1190W into 4 ohms (27.75dBW), and 2.2kW into 2 ohms (27.4dBW). I don't hold my AC wall voltage constant for these tests; at 125.8V with the amplifier quiescent, it had dropped to 121.8V with the amplifier clipping into 4 ohms, 119V with it clipping into 2 ohms. With its S/N ratio (input shorted, ref. 1W into 8 ohms) of 81.7dB (wide-band, unweighted) improving to 92.3dB when A-weighted, the Evolution 600 offers a superbly wide dynamic range that well exceeds that of the 16-bit CD medium.

I plotted the 600's THD+N percentage against frequency at 11V output, the level at which, as indicated in fig.9, the distortion harmonics begin to rise out of the (low) noise floor. Even so, as fig.10 reveals, though the percentage does rise with decreasing load impedance, it remains very low and constant with frequency at audio frequencies. And, as with the 202 preamplifier, the harmonic content of the 600's distortion remains low in order, almost entirely second- and third-harmonic in nature (fig.11), with no AC-supply spurious visible even at high powers (fig.12). Intermodulation distortion was also very low, even at almost 800W into 4 ohms (fig.13)!

Having had on my test bench in recent months a number of, shall I say, idiosyncratically engineered

products, it was a pleasure to measure such a well-engineered pair of components as the Krell Evolution 202 and 600.

—John Atkinson

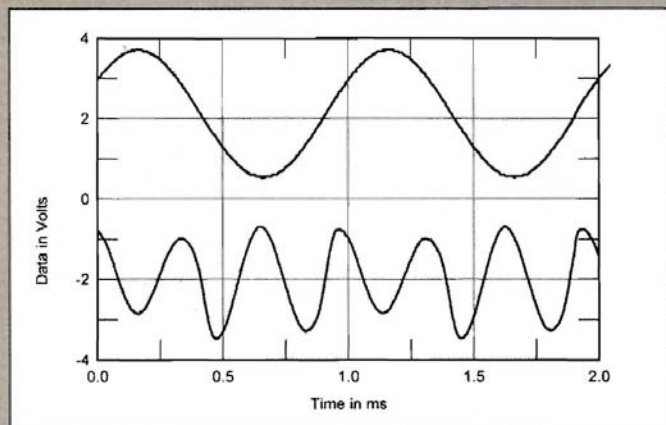


Fig.11 Krell Evolution 600, 1kHz waveform at 200W into 8 ohms (top), 0.0065% THD+N; distortion and noise waveform with fundamental notched out (bottom, not to scale).

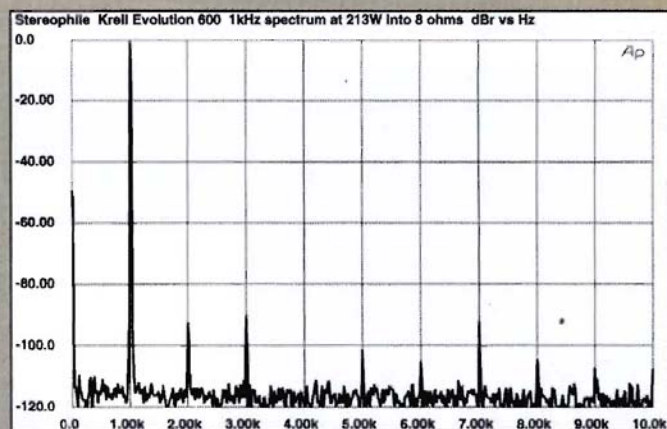


Fig.12 Krell Evolution 600, spectrum of 1kHz sine wave, DC–10kHz, at 213W into 8 ohms (linear frequency scale).

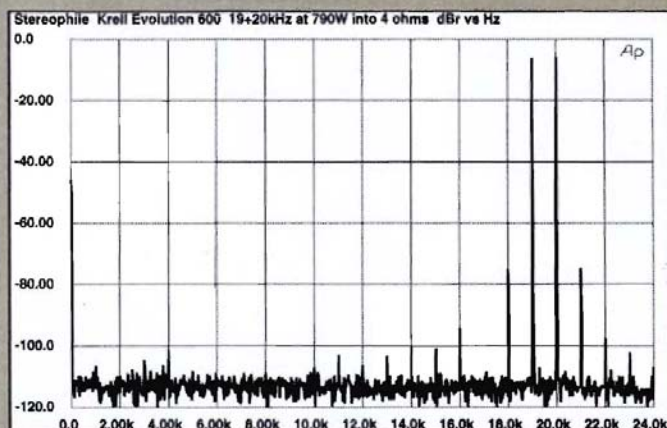


Fig.13 Krell Evolution 600, HF intermodulation spectrum, DC–24kHz, 19+20kHz at 790W peak into 4 ohms (linear frequency scale).

whack with reality. The Krells got it precisely—and uniquely—right.

Want to fry your ears with high-decibel rock'n'roll? The Evolutions did that, too, as clearly demonstrated by Stevie Ray Vaughan's *Couldn't Stand the Weather* (SACD, Indie 512). I don't mean just paint-peelingly loud (*they* can do that, but I can't—not for long), but the 600s *did* give that sense of physical/audible attack that live amplified music has, and that very little canned music delivers. And "Stang's Swang" swung.

Evolution of the Ayre

Substituting the Ayre C-5xe universal player meant leaving the realm of a pure CAST system, although the Evolution 202 did do an I/V conversion, thus allowing me to keep the 202 and 600s connected in CAST. However, switching to the voltage-domain Ayre did insert, as advertised, small amounts of grain—not so noticeable with Stevie Ray, but irritating with El Sabio. I *love* my C-5xe, and I suppose I was rooting for it a bit (perhaps not the most professional admission), but I wanted the Evolution 505 SACD/CD player back in the system. That couldn't happen, however, because I needed to keep that point of familiarity when I substituted the Conrad-Johnson CT5 for the Evolution 202 preamp.

Evolution of the tube

Why Conrad-Johnson's CT5 and not their ACT2? Well, partly because the CT5 is so close to the ACT2, and mostly because C-J had my ACT2 at the factory, preparing it for its third act, so it wasn't available.

The system of CT5, Ayre C-5xe, and Evolution 600 was really, really good, and very much what I'd grown used to before the Evolution system arrived at my house: dynamic, spacious, and tremendously easy to listen to. However, I felt it had added some things and removed others. Specifically, there *was* more noise and electronic texture in the sound, and less of that compelling below-the-noise-floor detail I'd begun to expect from the all-Evolution stack. Could I live with that system? Oh my gosh yes! As good as all of the Evolution components are individually, perhaps the standout—at least on its own—is the power amp, which has more muscle and fewer of the side effects of muscularity than pretty near any big amp I've heard...

Evolution of the hybrid

...including, I'm sorry to report, my reference Musical Fidelity Nu-Vista 300, which is itself quite a brute—not to mention one of the most linear-measuring power amps John Atkinson has ever had on his test bench. But the Evolution 600s were—you know this is coming, don'tcha?—quieter. No, I don't mean that the Nu-Vista hissed or buzzed (the C-J didn't either). I just *heard* deeper. Not only did acoustic spaces seem more distinct from one another and sounds more intensely embedded in them, but I could discern sounds and spatial cues more easily, particularly at the quiet end of the spectrum.

Let's face it—one thing that separates real live music from recordings is that we frequently have to mess with recordings' playback gain to hear stuff that, at a concert, we can effortlessly extract. That means turning up the quiet parts and turning down the loud parts, all so that we can stay in the same room with our electronic toys. The Evolutions are better at extracting those quiet cues than any device I've heard. They are scary real. And they were with every speaker system, large or small, that I connected them to.

I've lived with many Krell amps over the years, from the KSA-50 to the Krell Audio Standards to the FPB 600s. They've always been impressive, and there has been a clear progression from those early amps to the later models in terms of finesse, detail, and pace. The Evolution 600 put all of its forebears to shame.

Is it the best power amplifier I've ever

heard? Quite possibly. Is that because I'm a Krell junkie? No. As good as Krell components have always been, I've always admired more than loved them. They've always been impeccably engineered, gloriously built, and not quite *my* cup of tea—they lacked, to my way of thinking, lovability.

Not this time. The low-level detail, sinuous pacing, and sheer power of the Evolution 600 amplifier captured music the way *I* hear it—and if the whole system is running CAST technology, you've got something that's very close to perfection squared.

Evolution of an idea

The Krell Evolution 202 preamplifier and Evolution 600 monoblocks are superb bits of kit. While taste always enters into such matters, I can't imagine any music lover not responding to their performance, which is darn nigh flawless. Yet buyers will have to accommodate the Evolution gear on a few levels. It takes up a lot of real estate—I had to completely rearrange my equipment supports several times before I had a scheme that supported everything without actually imposing on the soundstage (stacking the 600s between the speakers created an acoustic obstacle). It also consumes a *lot* of power and throws off a *lot* of heat.

Reality check: Am I really suggesting that the ne plus ultra of high-end sound starts with a system whose electronics cost \$45,000, not including the source. Well, yes. It *is* an expensive system. I can't afford it, none of my friends can afford it, and perhaps few of you readers can afford it. But that doesn't mean that Krell shouldn't be making the Evolutions—or that you shouldn't buy them if you *can* afford them. The Krell Evolution components aren't flashy faceplates on empty boxes—those boxes are packed with expensive parts assembled beautifully, and the overall designs are based on extremely advanced thinking. They may be the best-engineered components I've ever experienced—and I thought I'd had some experience in that arena.

It's only money. I can say that because I don't have any, but if you can say it because you have lots, I can think of far less attractive luxuries to spend it on than the Krell Evolution components. As for the rest of us, Krell has a history of breaking new ground, then figuring out how to downscale it into more affordable components. That's what I'll be telling myself next month, when I go back to reviewing \$139 amps. ■

ASSOCIATED EQUIPMENT

DIGITAL SOURCE Ayre C5-xe universal player, Krell Evolution 505 SACD/CD player.

PREAMPLIFIERS Conrad-Johnson CT5, Musical Fidelity Nu-Vista.

POWER AMPLIFIERS Moscode 401HR, Musical Fidelity Nu-Vista 300.

LOUDSPEAKERS Canton Vento Reference 1 DC, Dynaudio Confidence 1 & 4.

CABLES Interconnect: Shunyata Research Aries & Antares. Speaker: Shunyata Research Lyra.

ACCESSORIES Furutech eTP-609 distribution box, FP-20A (R) duplex outlets, RDP panels; OSAR Selway/Magruder equipment racks; Ayre Myrtle Wood Blocks.

—Wes Phillips