

Ypsilon Aelius monoblock power amplifier



I knew nothing of Ypsilon when I first saw its products in a room at an overseas audio show. Even though the speakers in this system were complete unknowns, I was convinced that it was the electronics that were responsible for the magical balance of what I was hearing. That was confirmed when I reviewed the VPS-100 phono preamplifier in August 2009 and PST-100 Mk.II preamplifier in [July 2011](#).

Greek austerity ends at the factory door of Ypsilon Electronics. The luxury components designed and manufactured within are innovative, high-performance, visually elegant, and expensive. They're aimed at audio enthusiasts, mostly outside Greece, who can afford to indulge themselves. Obviously, no Greek would object—the nation's economy, and those employed by Ypsilon, can only benefit from this small company's success, however minor the contribution.

Ypsilon's Aelius monoblocks cost \$36,000/pair. That's a lot of money, but compared to some really expensive gear, including the Wilson Alexandria XLF speakers I [reviewed in January](#) (\$200,000/pair) and Ypsilon's own SET 100 Ultimate amplifiers (\$125,000/pair), the Aelius may be, for some, as Ypsilon's slogan suggests, "untouchable . . . but not unreachable."

Tube-rectified tube input, MOSFET output

The Aelius is moderately large and blocky; it measures 16.6" square by 9" tall and weighs 99 lbs. It's specified as outputting 200W into 8 ohms, 380W into 4 ohms, or 500W into 2 ohms, with the first 60W in pure class-A. Its tastefully understated satiny finish, sculpted front accent, and blue LED slit match the looks of the rest of the Ypsilon line.

Electrical engineer Demetris Backlavas has designed a circuit for the Aelius that has only two gain stages and almost no passive components in the signal path. The single-ended class-A tubed input stage uses a single C3g pentode tube (rectification for this stage is supplied by another tube) transformer-coupled to the push-pull output stage of six matched pairs of N-channel polarity MOSFETs. There are no source resistors in the circuit.

An interstage transformer is unusual in a solid-state or hybrid amplifier; one is used here as a "perfect" phase splitter for the Aelius's push-pull operation, and as a step-down transformer to

greatly lower the input tube's impedance to drive the capacitance of the output MOSFETs. Though the phase is split and the amp is push-pull, it's really two single-ended amplifiers with six transistors driving the plus terminal and six driving the minus terminal—a very unusual circuit.

I visited Ypsilon while in Athens a few years ago. One afternoon, using an amplifier he was designing, Backlavas demonstrated the significant sonic differences produced by swapping out various capacitors, transformer core materials, and other components. The guy is steeped in theory but, ultimately, guided by his ears. Like a great chef, he knows how to obtain and mix the best ingredients to produce a sublime dish.

Backlavas points out that, without the transformer, an additional one or two active stages would have been needed to split the phase and lower the impedance and that those additional stages would reduce the amp's notable transparency and signal purity. Of course, transformers have their own problems, and building one with a sufficiently wide bandwidth (in this case, 10Hz–70kHz) is both difficult and necessary: the transformer's bandwidth defines the amplifier's bandwidth.

Backlavas says that while the Aelius's circuit is in some ways similar to the Circlotron configuration used in some output-transformerless (OTL) tube amps, it is not a true Circlotron. Unlike the Circlotron's unity-gain output, the Aelius's output is greater than unity gain. The result, Backlavas claims, is an amplifier with the sonic purity of a single-ended design, with push-pull power sufficient to drive virtually any loudspeaker.

Easy Connections

The Aelius's flat rear panel made all connections easy. Each of the "pure copper and gold-plated" speaker terminals has a large, round, screw-in knob of frosted plastic. These knobs are big enough to produce enough torque for a secure fit with even the stiffest cable when tightened by hand, and there's enough space between them to accept spades of any size, as well as banana plugs. Don't diminish the importance of this aspect of amplifier design—there's nothing more annoying than stupidly designed and/or placed terminals that seem to have been created by people who have never actually connected a speaker cable to an amplifier. Pay attention to this when you shop.

There are both single-ended RCA and balanced XLR inputs, chosen with an adjacent switch. Also on the rear panel is a handy ground lift switch for thwarting ground loops; this disconnects the ground circuit from the chassis ground. As with all Ypsilon products I've reviewed, the On/Off switch is on the rear.

As Supplied

Ypsilon specifies for the Aelius new old stock (NOS) of the military-grade Siemens C3g tube, which has eight pins, a metal sleeve, and a minimum lifespan of 10,000 hours. Unbeknownst to me, my review samples had been fitted with a Russian-made Electro-Harmonix 6C45PiEH tube, each with nine gold pins, that had been soldered into circular eight-pin adapter plates. (More below about why the swap was made.) I didn't discover this until after a month or so of listening, during which time I was also reviewing the Dan D'Agostino Momentum monoblocks (reviewed in [February 2013](#)), and using as references darTZeel's big NHB-458 monoblocks ([August 2012](#)).

With the 6C45PiEH tube, the Aelius produced a warm, voluptuous, somewhat darkly "tubey" sound that gave little hint of its solid-state MOSFET output (though MOSFETs are reputed to have a warmer, softer sound than bipolar devices). Yet despite the voluminous soundstage and generous bloom, instrumental attacks were precise and transients were cleanly delineated through much of the audioband, though the bass was less than taut, and not as nimble and as well controlled as I like it—and as I know the Wilson Alexandria XLFs are capable of producing.

Driving the very sensitive XLFs, the Aelius was probably running in class-A all the time, even when producing high (sometimes *ridiculously* high) SPLs in my moderately sized room. Considering the Aelius's class-A operation, zero feedback, and two-stage simplicity, it produced less transparency, and less of a direct, "straight-through" sound, than I'd expected. Nor, despite the use of tubes, did it produce the uncanny tonal neutrality I've come to expect from Ypsilon electronics.

My family visits during the holidays, and both of my sisters and my brother-in-law usually indulge me by spending 10 minutes or so listening to "what's going on down there" in my basement listening room. This time, the three of them sat there for well over an hour, and had to be prodded into going back upstairs. They sat through a side of *Mel Tormé and Friends: Recorded Live at Marty's, New York City* (2 LPs, Finesse W2X37484), and all of side 2 of the Beatles' *Abbey Road*. Unprecedented! What kept them sitting? The speakers, of course, but as driven by the Aeliuses, the width and depth of the Wilsons' soundstage was unusually enormous and enveloping—overwhelming, actually, and almost in our laps. Add a mesmerizing ease of sound that produced both reasonably good resolution of detail and billowy amounts of air and spaciousness, and it made for a very "wow" experience for all of us. The Mel Tormé record, in particular, was as "you are there" live as I've ever heard it.

Still, to my more experienced and critical ear the sound was overripe, somewhat diffuse, and tended toward softness, both at the very bottom and in the lower midrange, despite the latter's most attractive harmonic richness and the overall sound's uncanny textural verisimilitude.

The Aeliuses reproduced full-bodied, woody-sounding pianos from good recordings of solo pianos, but the attack cheated on the soft, diffuse, romantic side—too soft to correctly reproduce the attack of either startling and appropriately hard fortissimos or delicate yet well-focused pianissimos, not to mention all the dynamic gradations in between. Of course, the sound was always *pleasing*, but in the way that some audiophiles tend to romanticize how live music actually sounds.

It took me decades to acquire a system capable of cleanly and accurately delineating the honky-tonk piano of Nicky Hopkins (not Ian Stewart) in "Rocks Off," from the Rolling Stones' raucous *Exile on Main Street* (LP)—not to mention a system capable of separating out most of the parts from what *most* critics (with crappy systems) declared, in the early '70s, was "total sonic murk"—not that the proper playback of that particular album was my long-term goal!

Clearly hearing instruments and voices heretofore buried in the mix has always been among the more revelatory experiences of a worthwhile system upgrade, though it's not as wondrous as when a new component increases the listener's *understanding* of the music. The softness of that piano part clearly demonstrated the general softness of the Ypsilons' sound, particularly in the lower mids.

Switching to the admittedly more expensive D'Agostino Momentums (\$55,000/pair), or to the *hideously* more expensive [darTZeel NHB-458s](#) (\$150,000/pair), revealed—at least in my system—not only the Aelius's transient softness, but a dab of Vaseline on its sonic lens. This made *everything* sound "good," but robbed the greatness from recordings that truly were. Transparency, in particular, suffered.

Normally, I would have simply reviewed the amps as delivered, but given that these samples strayed from the preternaturally neutral, natural sound produced by every other Ypsilon product I've reviewed or heard at audio shows, I thought it best to contact the designer. Plus, last year, when a pair of preproduction Aeliuses were on the East Coast for some reason, Backlavas had asked if I'd like to hear them. I'd said I did, but that I wouldn't comment on what I heard or didn't hear.

The review samples did not sound at all like the preproduction pair. As I recall, Backlavas did tell me that for his first production run he was changing the material of the Aelius's transformer core, among other things, which would affect the sound, but the differences in sound between the two pairs of amps were so big that I called him.

After inquiring about the overall softness, and asking if that was what I was supposed to be hearing, I was told to expect another pair of input tubes. When the box arrived, I wasn't surprised to find in it a pair of C3g tubes, as specified in the instruction manual. But when I removed the amplifiers' ornately machined top plates, I *was* surprised to find, inside each, a 6C45PiEH instead of a C3g.

At the 2013 Consumer Electronics Show, I asked Backlavas what was going on. It turned out to be a combination of designer second-guessing and bureaucratic bullshit. Since 2006, the European

Union's RoHS regulations (which mandate that solder be lead free but not CRTs—a much greater source of lead contamination, you can be sure) require documentation proving that no part of a new electronic component contains hazardous metals. This essentially outlawed the use of NOS vacuum tubes, of which the C3g is but one of many models, because no documentation exists that can prove their compliance with the regulations. While many high-performance audio manufacturers use NOS tubes anyway and ship to EU countries, Ypsilon was concerned about this and sought an alternative, currently manufactured tube. The 6C45PiEH proved a good choice that produced "interesting" results, Backlavas told me, adding that the tube "has midrange energy and body but it's darker and warmer."

Currently, Ypsilon ships to EU countries Aeliuses equipped with 6C45s. More significant, the amps are manufactured with the 6C45 tube-socket base, making them incompatible with the C3g (which Ypsilon also uses in their VPS-100 phono and PST-100 line preamplifiers). Amps shipped to the US are fitted with the C3g base and are normally shipped with that tube, which Backlavas admits has "greater openness and transparency." However, he thinks which tube sounds best will depend on the system the Aelius is used in. He assumed that I'd be reviewing his amps with the less lush-sounding Wilson MAXX 3s, and so shipped the review samples equipped with 6C45s. So glad I asked! When I'd replaced the input tubes with the C3gs and spent some time listening, I understood Backlavas's tube rolling—though I think it was an unnecessary defensive posture, even had I been listening through the MAXX 3s.

Clean and Direct

With the C3g tubes in place, and after about an hour's warm-up (both before and after the tube swap, I left the amps on continually), I sat down and listened. At first, they sounded like completely different amplifiers; later, the Aeliuses revealed themselves to be the same amps, but their soft and fluffy gatekeeper had gotten out of the way. The C3g tightened the screws on the musical framework, producing a punchier, more direct, more insistent sound. Little remained of those soft billows.

The Aelius's solid-state-ness now asserted itself more intensely, particularly on the bottom, where excess bloom gave way to grip and punch. The amps came rhythmically alive and physically assertive in a most pleasing and immediate way, yet in no way was the sound clinical or harmonically bleached.

I didn't hear the effect of the C3g as an identifiable "tubeyness" but rather as a graceful, gentle, infinitesimal rounding of transients and sculpting of images that produced mesmerizing three-dimensionality with zero negative consequences. It just sounded right. Instrumental attacks became alarmingly urgent and precise, but never clinical or etched. Sustain was still generous—though not like before, when it was *too* much—and decays were effervescent, fading into pitch-dark backdrops. The Aelius was very quiet and super-transparent, and its microdynamic performance was as good as I've heard.



Like the Ypsilon VPS-100 phono preamp, which sounds like neither solid-state nor tubes, the Aeliuses, fitted with the same tube, sounded likewise: neither warm and fuzzy nor cool and clinical, but with a distinctly direct and upfront sound that perhaps had influenced the designer's decision to fit the amps with the 6C45 tube.

If Dan D'Agostino's [Momentum amps](#) were liquid and demanded an almost feminine listening melt, the Aelius amps produced the opposite sensation: a bracing masculine steeling and grip, a rush of adrenaline vs the Momentums' flood of endorphins.

A test pressing of Analogue Productions' upcoming vinyl reissue of Ray Brown's *Soular Energy* (it was reissued in 2002 on two LPs by Pure Audiophile, and before that in a Super Analogue edition from King Records Japan) produced exceptional clarity, hair-raising speed and transparency, and a profusion of accurate tonal colors from Ray Brown's double bass, Gene Harris's piano, and Gerryck King's drums, the cymbals being particularly spotlit (in a good way). The amplifier's proficient microdynamic expression, combined with its taut rhythm'n'pacing abilities, proved ideal for this trio recording. Harris is all over the keyboard in "Cry Me a River," and when he goes for the very top, where the "pingy" notes are, the Ypsilons fully fleshed them out. The sound of the hammer striking the strings, the excitation of the instrument's metal frame and the high-frequency wooden resonance of the soundboard were accurately reproduced in terms of time, space, tonality, and texture—not too hard, not too soft. If you've ever plinked those upper keys yourself, you'd recognize how right they sounded as reproduced by these amps—not that the rest of the piano sounded any less convincing.

Guitarist Grant Green's version of "My Favorite Things," from his *The Complete Quartets with Sonny Clark*, recorded by Rudy Van Gelder (2 CDs, Blue Note CDP 8 57194 2), produced a different sonic picture. There was definitely greater emphasis of the transient pluck and less on the three-dimensional aura around each pluck. As I wrote in the Momentum review, "A faster, more clinical-sounding amp might emphasize the transient at the expense of the aura; a slower, softer-sounding one might get the aura but fail to cleanly delineate it. Given that choice, I'd go for clinical over mush. . . ."

The Aelius with C3g tube definitely sounded more clinical than the Momentum (which produced more relaxed transients). I suspect that with the other input tube the Aelius would have properly reproduced the aura around Green's guitar, but would have failed to delineate it cleanly in space,

and would have softened the transient. That's why I thought the C3g tube produced better sound with my system. I prefer correct, clean attacks, and that's something at which the c3G-equipped Aelius excelled, without sounding clinical or hard—unless the recording itself did.

Closer to the Action

The overall sonic perspective produced by the Aelius was more forward than that of the D'Agostino Momentum or the [darTZeel NHB-458](#) or the [Musical Fidelity Titan](#)—not in-my-face, but definitely more upfront. Yet compared to the darTZeels', the Ypsilons' images were somewhat more gracefully rounded, more three-dimensional, and texturally more supple.

I'm always happy to play Lorin Maazel and the Cleveland Orchestra's recording of Gershwin's *Porgy and Bess* (LP, UK Decca SET 609-11), to hear how a system handles space. This recording, engineered by Kenneth Wilkinson, produces an enormous, well-delineated space and an exquisitely well-focused orchestral picture. The solo vocalists are also well back in space on the stage, as you'd hear in concert, and superbly focused and solidly three-dimensional, surrounded by a cushion of natural reverberation. If you're trying to stop someone in his or her tracks with music, it's a can't-miss record.

After a short opening fanfare (which, years later, Charles Strouse stole for the opening of *Bye Bye Birdie*) that highlights the brass and percussion, there's a long solo for upright piano, the piano in the distance, on the right. The Aelius excelled at reproducing the lesser-quality piano's somewhat tinny tonality, but pushed the instrument farther forward than usual. This was more than made up for by the well-focused image of the piano and the transient clarity of individual notes. When the chorus unexpectedly enters at center stage, their "Dah-doo-dahs" hovering in space, they, too, appeared farther forward than usual. (In this opening sequence of Gershwin's opera, which includes "Summertime," you can also hear where Peter Knight got his ideas for the orchestral arrangements he wrote for the Moody Blues' *Days of Future Past*, and even elements of Bernstein's *West Side Story*.)

Vocal and instrumental timbres also were spot on, thanks to the Aelius's robust, full-bodied midrange. Overall, the amp's presentation of this sonic spectacular was tonally, spatially, dynamically, and rhythmically mesmerizing, and its transient purity and transparency only added to my pleasure. However, if the other components in your system exhibit even a hint of hardness, the Aelius with C3g tubes will accentuate it.

Norah Jones's *The Vinyl Collection* (7 LPs, Blue Note/Analogue Productions AAPP NJBOX 33) demonstrated the Ypsilon's superb midrange palpability. These records, remastered by Kevin Gray and pressed at QRP, are so quiet, their sound so velvety, that it seems as if you're listening on the other side of the mike, hearing Jones's voice before it's captured.

The Aeliiuses put Jones's voice dramatically up front, tightly focused in three dimensions and as texturally full-bodied as it needs to be to sound real. Getting that means that there can be no audible leading edges to transients, no lower-midrange emphasis that might add a chesty quality, no sustain anything less than generous, no decay into black anything less than ideal. Jones whistles in "Little Room," and through the Ypsilons I'd swear she was whistling in my room. Not an easy illusion to create.

Switching to the darTZeels produced different sonic pleasures. The perspective was a bit less forward, the overall picture somewhat more relaxed. Images were somewhat less intensely focused, yet the articulation of transients was more precise, and there was a greater sense of the space around Jones's voice—as well as around Grant Green's guitar in *The Complete Quartets with Sonny Clark*.

Unique Circuit, Unique Sound

The Ypsilon Aelius, the D'Agostino Momentum, the darTZeel NHB-458, the Musical Fidelity Titan—all accomplished amplifiers, each with a different sound. Which is "correct"?

In the world of recorded sound and complex combinations of gear, there's no such thing as the

"correct" sound. Certainly, some amplifiers are *wrong*, producing gross tonal colorations, transient artifacts, glaze, grain, glare, smear, etc. But at the level of the models I've just listed, none of those should be present, and none are.

The problem with absolutism in reproduced sound is that if you judge a component using your 20 favorite recordings, you're judging it against those recordings' tonal balances, and you end up in a maddening sonic feedback loop. That's why, in addition to my favorites, I include in my listening dozens of unfamiliar recordings, plus some that I know sound bad.

At an audio show a few years back, I'd just finished listening, through Krell amps and speakers, to a wide variety of sonically reliable LP tracks that I'd previously recorded to CD and that I'd already heard through dozens, if not hundreds, of good systems. They sounded superb. A guy walked in and asked to hear his favorite recording, an opera. Within a few bars, it was obvious that this recording was awful: bright, glazed, hard, and spatially compressed. This was *not* the inherent sound of those components in that room. Yet this was the single recording with which he gauged a system's performance. He stopped the disc, declared the sound in the room "awful," left, then spent the rest of the show telling everyone how bad the sound in Krell's room was. But what was clearly awful was his CD.

The Ypsilon Aelius's sonic character, like that of the D'Agostino Momentum, was obvious early on, but so fully realized from top to bottom as to be unnoticeable after a short period of acclimatization. That left only the enjoyment produced by an amplifier that is unique in both design and sound. The Aelius's top-to-bottom rhythmic agility may be in a class of its own. Its bottom end was nimble, clean, and well extended, and did the best job of controlling the woofers of the Wilson Alexandria XLFs of any amplifier that's been here since those speakers arrived, though the darTZeel NHB-485 was close enough. The D'Agostino Momentum was somewhat softer, the Musical Fidelity Titan softer yet.

With the C3g tube, the Aelius's reproduction of the highs was as fast, clean, extended, and assertive as its reproduction of the rest of the audioband. It all added up to a rhythmically spectacular amplifier that was like a shot of adrenaline. That might not appeal to the Lincoln Town Car sound crowd, but definitely will to those who like to press the pedal to the metal, even when listening to chamber music. On second thought, maybe with the alternate input tube, the limo crowd might like it too. The great thing is, if you're in America, you have freedom of choice, and with it, Two! Two! Two amps in one!

Conclusions

After installing the stock C3g tubes, it took me a while to warm up to the Ypsilon Aelius monoblocks. But with the tubes originally supplied, the sound was *too* warm (though perhaps not for you). With the C3gs, the Aeliuses were definitely not too warm. Coming from the polar-opposite D'Agostino Momentums required a period of adjustment—but not because the Aeliuses were too bright, too fast, or too *anything*. Their sound was simply too different—but equally valid.

The Aelius amps were just right if you like a tight, fast, nimble top-to-bottom ride, if you like sounds so transparent it's almost alarming, convincingly yet not analytically precise transients, and three-dimensional imaging—all without paying the high price of too-sharply-defined edges or a clinical, soulless, harmonically bleached sound.

The Aelius is yet another spectacular sonic and technological achievement from Ypsilon Electronics. I remain impressed by everything they do.

Sidebar 1: Specifications

Description: Hybrid monoblock power amplifier. Tube complement: one Siemens C3g or Electro-Harmonix 6C45PiEH. Output power (before clipping): 200W into 8 ohms (23dBW), 380W into 4 ohms (22.8dBW), 500W into 2 ohms (21.0dB), with the first 60W in class-A. Inputs: unbalanced (RCA), balanced (XLR). Voltage gain: $\times 30$ (29.5dB). Input impedance: 47k ohms. Bandwidth: 11Hz–75kHz, –3dB. Output impedance: 0.4 ohm, 20Hz–20kHz (into 8 ohms). Frequency response: N/A. THD: N/A. Signal/noise: N/A.

Dimensions: 16.6" (425mm) W by 9" (230mm) H by 16.6" (425mm) D. Weight: 99 lbs (45kg).

Serial numbers of units reviewed: 31, 32.

Price: \$36,000/pair. Approximate number of dealers: 9.

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Sidebar 2: Associated Equipment

Analog Sources: [Continuum Audio Labs Caliburn](#), [Cobra](#), [Castellon](#) turntable, tonearm, stand; TechDAS Air Force One turntable; Graham Engineering Phantom Supreme II, [Kuzma 4Point](#) tonearms; [Lyra Atlas](#) & *Titan i*, Ortofon Anna, Miyajima Labs Focus (mono), cartridges.

Digital Sources; [MSB Platinum Diamond DAC IV & Platinum Data CD IV](#) D/A converter & CD transport, [Simaudio Moon Evolution 650D](#) DAC–CD transport, BPT-modified [Alesis Masterlink](#) hard-disk recorder, [Meridian Digital Media System](#) music server, [Pure Music](#) playback software.

Preamplifiers: [darTZeel NHB-18ns](#), Ypsilon VPS-100.

Power Amplifiers: [darTZeel NHB-458](#) (monoblocks), [Dan D'Agostino Momentum](#) (monoblocks), and [Musical Fidelity Titan](#) (stereo).

Loudspeakers: [Wilson Audio Specialties Alexandria XLF](#).

Cables: Phono: Hovland/Graham MG2 Music Groove, [Nordost Valhalla](#). Interconnect: [TARA Labs Zero Gold](#), Stealth Sakra & Indra, Nordost Tyr. Speaker: TARA Labs Omega Gold, Stealth Dream V10, Nordost Tyr. AC: Shunyata Research Zi-Tron Anaconda, TARA Labs Cobalt, Nordost Tyr.

Accessories: Shunyata Research Triton power conditioner; Oyaide AC wall box & receptacles; [Finite Elemente Pagode](#), HRS Signature SXR stands; Symposium Rollerblocks & Ultra platform; [ASC Tube Traps](#); RPG BAD, Skyline, & Abbfusor room treatments; Audiodharma Cable Cooker; Furutech, Stein Audio demagnetizers; Furutech deStat LP treatment; Loricraft PRC4 Deluxe, Audio Desk record-cleaning machines.—**Michael Fremer**

Sidebar 3: Measurements

Before performing any measurements, I ran one of the Ypsilon Aelius amplifiers (serial no.31) for an hour at one-third its specified maximum power of 67W into 8 ohms, thermally the worst case for an amplifier with a class-B output stage. At the end of that period, the heatsinks were moderately hot at 44.2°C (111.5°F), while the chassis was cooler at 40°C (103.9°F).

I then measured the amplifier, using *Stereophile's* loan sample of the top-of-the-line Audio Precision SYS2722 system (see www.ap.com and the January 2008 "[As We See It](#)"). I first performed a complete set of tests using the Siemens NOS C3g input tube, whose sound Michael Fremer preferred, then repeated some tests using the Electro-Harmonix 6C45PiEH, Ypsilon's stock input tube for sales outside the US. I used the Aelius's unbalanced, RCA input; the balanced input appears actually to be single-ended, connecting pin 2 of the XLR jack in parallel with the unbalanced input.

The Aelius's voltage gain at 1kHz was the same with either input tube: 30.2dB into 8 ohms, which is slightly higher than specified. The Aelius preserved absolute polarity (*ie*, was non-inverting), and the input impedance was very slightly lower than the specified 47k ohms, at 45k ohms at low and middle frequencies, dropping slightly to 37k ohms at 20kHz.

The output impedance was high for a solid-state design, at 0.44 ohm at 20Hz and 1kHz, 0.47 ohm at 20kHz. As a result, the modulation of the amplifier's frequency response by the Ohm's Law interaction between this impedance and the impedance of our standard [simulated loudspeaker](#) was a moderate ± 0.3 dB (fig.1, gray trace). The audioband response in this graph is flat, though with a very slight downward tilt into 2 ohms (red trace), and steep rolloffs above 50kHz and below 30Hz into all loads. A 10kHz squarewave (fig.2) was reproduced with short risetimes but a critically damped overshoot, the latter presumably due to the interstage coupling transformer in the input tube's plate circuit. Fig.1 was taken with the C3g tube; repeating the measurement into 8 ohms with the 6C45 tube gave the response shown in fig.3. The ultrasonic rolloff is identical, reaching -3 dB at 90kHz. However, there is now a small rise in response below 100Hz, peaking at $+0.65$ dB at 17Hz. I doubt that this will be audible as extra bass, given how little energy music has below 40Hz, but it's possible that the additional group delay from this peak contributed to some people's preferring this tube.

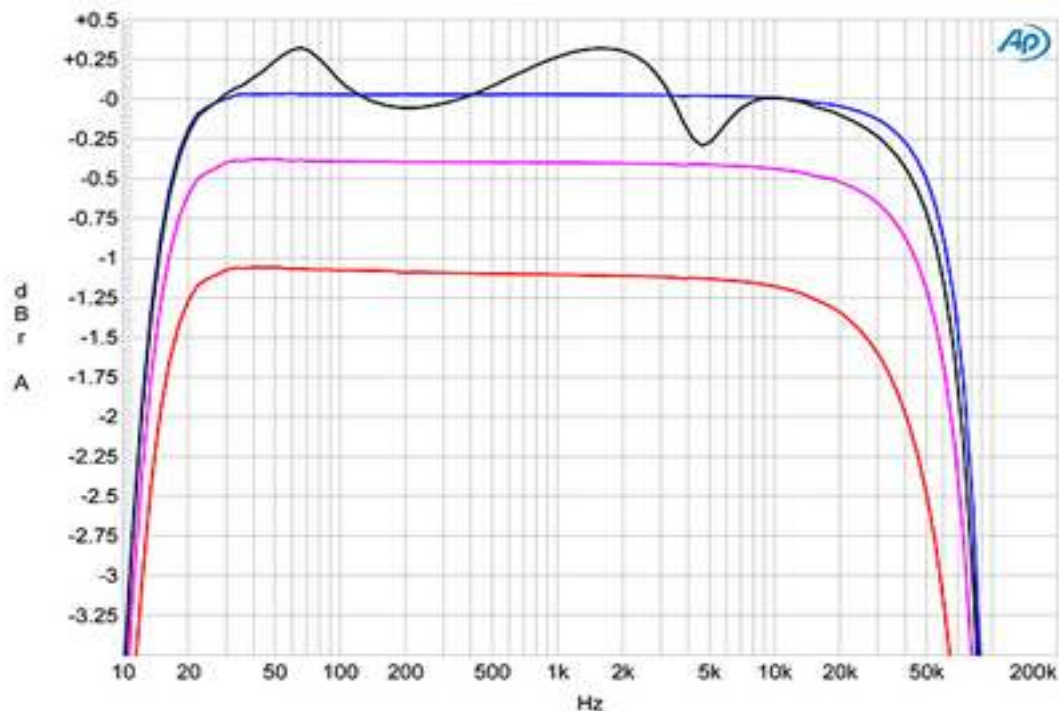


Fig.1 Ypsilon Aelius, C3g input tube, frequency response at 2.83V into: simulated loudspeaker load (gray), 8 ohms (blue), 4 ohms (magenta), 2 ohms (red) (0.25dB/vertical div.).

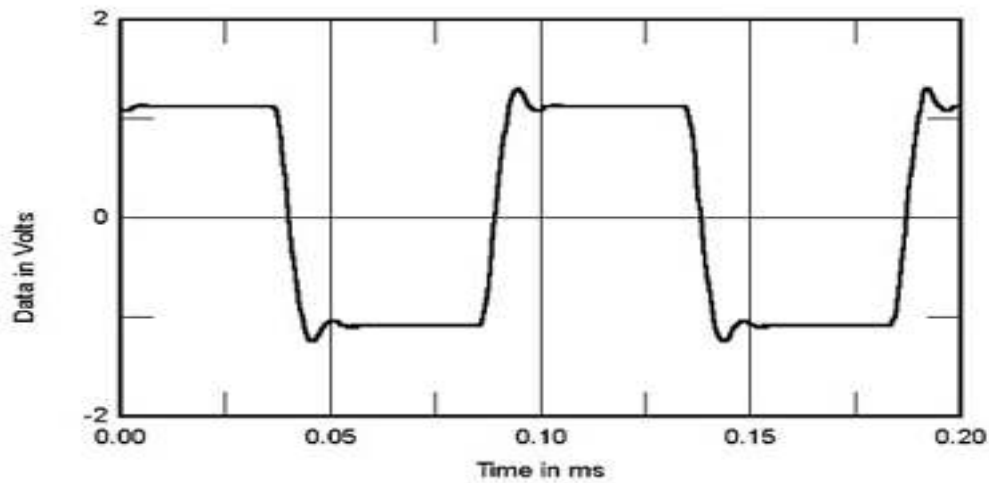


Fig.2 Ypsilon Aelius, C3g input tube, small-signal 10kHz squarewave into 8 ohms.

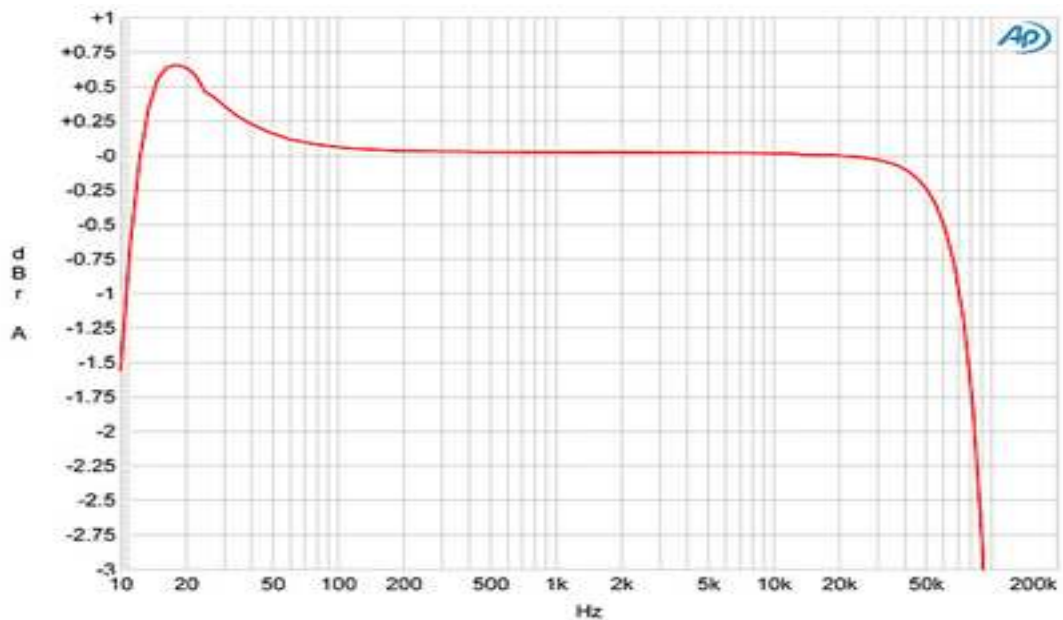


Fig.3 Ypsilon Aelius, 6C45 input tube, frequency response at 2.83V into 8 ohms (red) (0.25dB/vertical div.).

I commend Ypsilon for including a ground-lift switch on the Aelius, though I found the lowest level of noise during the measurements with the ground connected with this switch. The noise levels with the two different tubes were basically identical; though there was slightly more 240Hz component with the 6C45 (fig.4, blue trace), this was not even close to an extent that would be audible. The wideband, unweighted signal/noise ratio with the input shorted was 75.8dB ref. 2.83V or 1W into 8 ohms, this improving to 89.3dB when A-weighted.

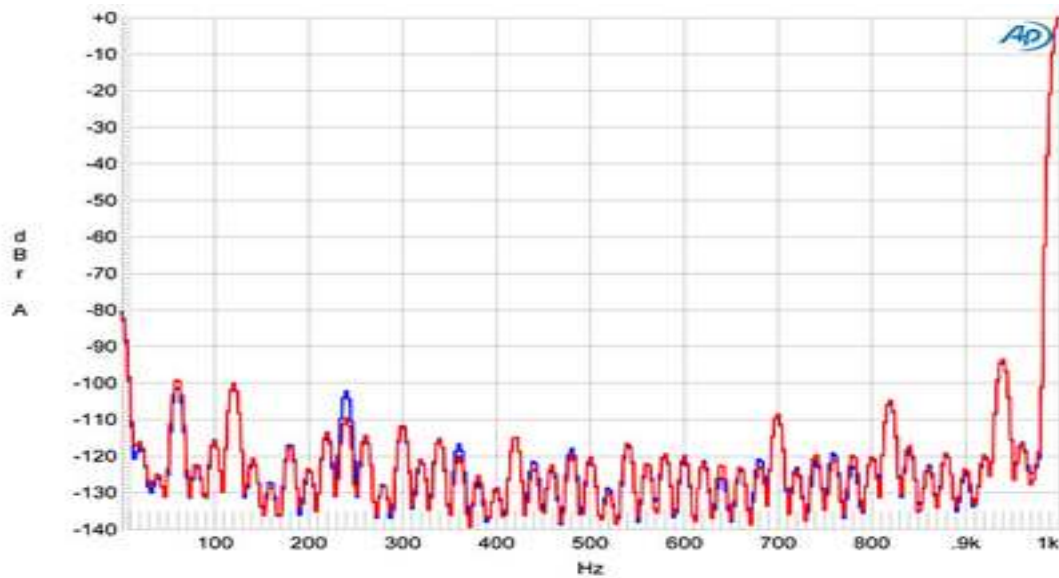


Fig.4 Ypsilon Aelius, spectrum of 1kHz sine wave, DC–1kHz, at 100W into 8 ohms with: C3g tube (red), 6C45 tube (blue) (linear frequency scale).

The lack of global negative feedback in the Aelius's unusual circuit—the input tube feeds the interstage transformer, which has two antiphase secondaries to feed the six matched pairs of output MOSFETs, and that's it!—means that the percentage of THD+noise steadily increases with the output power. Figs. 5, 6, and 7 show how this percentage changes into 8, 4, and 2 ohms, respectively. Below 1W or so into any load, where the measured distortion is very low, the percentage is dominated by noise. The actual THD then rises slowly before reaching clipping. Defining clipping as when THD+N reaches 1%, these three graphs indicate that the Aelius clips at 233W into 8 ohms (23.7dBW), 455W into 4 ohms (23.6dBW), and 444W into 2 ohms (20.45dBW). The first two powers exceed the specified maximum output power by 0.5dB or so; the third is 0.55dB lower, but this is most likely due to the fact that I don't hold the wall AC voltage constant for this test.

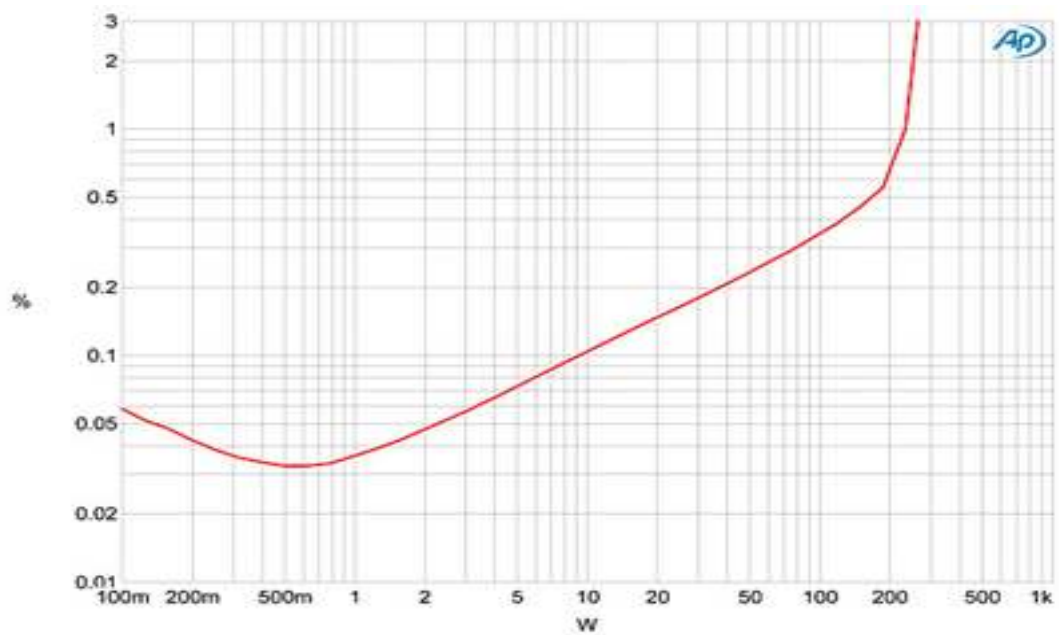


Fig.5 Ypsilon Aelius, C3g input tube, distortion (%) vs 1kHz continuous output power into 8 ohms.

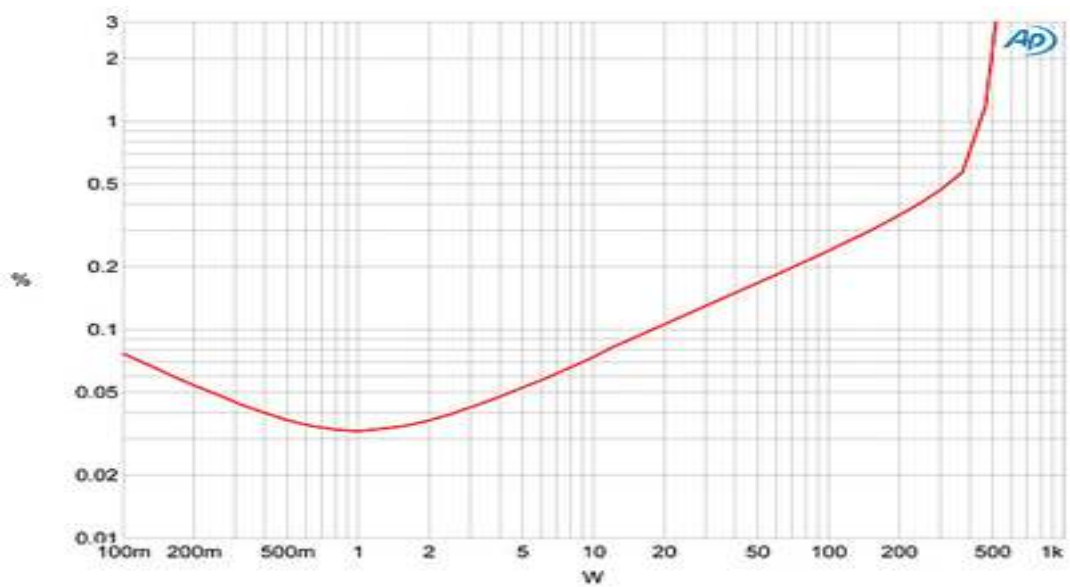


Fig.6 Ypsilon Aelius, C3g input tube, distortion (%) vs 1kHz continuous output power into 4 ohms.

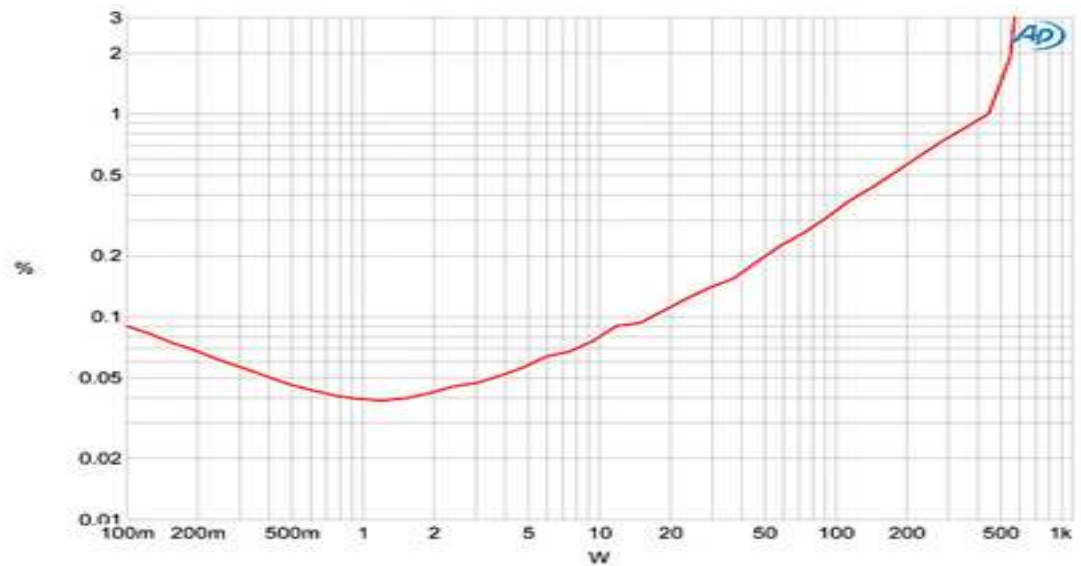


Fig.7 Ypsilon Aelius, C3g input tube, distortion (%) vs 1kHz continuous output power into 2 ohms.

Fig.8 shows how the Aelius's THD+N changed with frequency at a level where I could be sure I was looking at actual distortion: 5V, which is equivalent to just over 3W into 8 ohms. The distortion is respectably low between 100Hz and 5kHz, even into 2 ohms (red trace). It rises at low frequencies, presumably due to the onset of saturation in the coupling transformer's core, as well as in the top octaves, but not to any alarming level into the higher impedances.

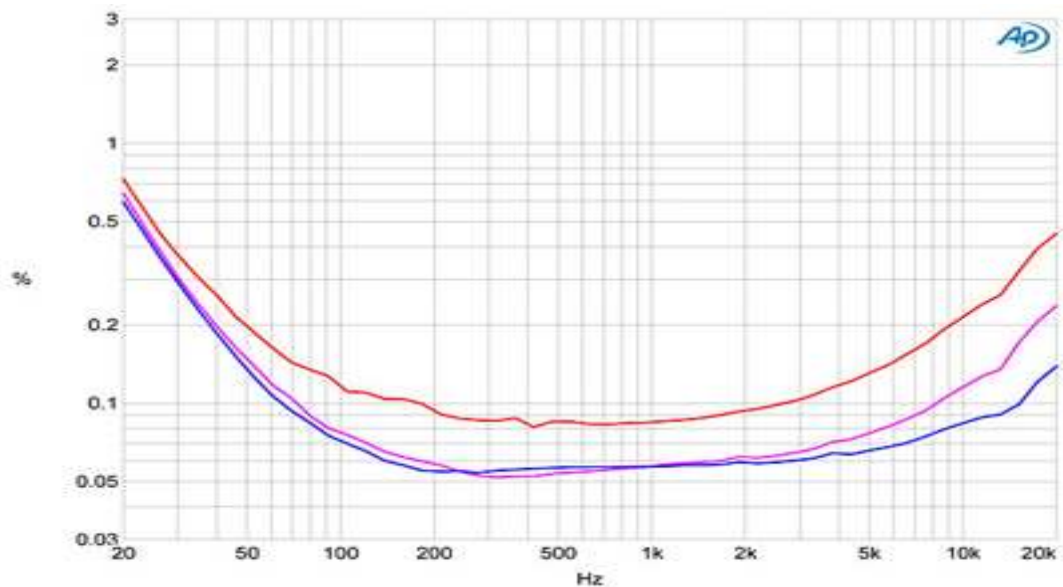


Fig.8 Ypsilon Aelius, C3g input tube, THD+N (%) vs frequency at 2.83V into: 8 ohms (blue), 4 ohms (magenta), 2 ohms (red).

Perhaps more important, the nature of the distortion is almost entirely second harmonic (fig.9), which tends to be subjectively innocuous, with the third harmonic more than 20dB lower in level (fig.10). Figs. 5–10 were taken with the C3g tube. Fig.11 repeats the spectral analysis of fig.10, but with the C3g replaced by the 6C45. This is not as linear a tube as the C3g, the second harmonic increasing in level by 8dB, though the third harmonic lies at the same -81dB (0.009%). It's possible that this increased level of second-harmonic distortion also contributed to the feeling of warmth in the sound with this tube.

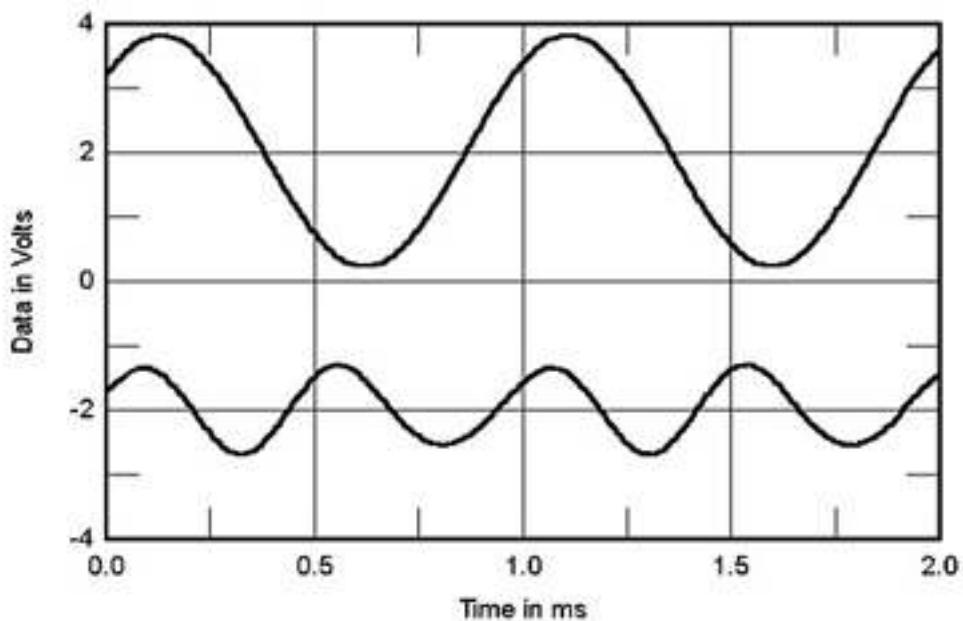


Fig.9 Ypsilon Aelius, C3g input tube, 1kHz waveform at 22W into 8 ohms, 0.154% THD+N (top); distortion and noise waveform with fundamental notched out (bottom, not to scale).

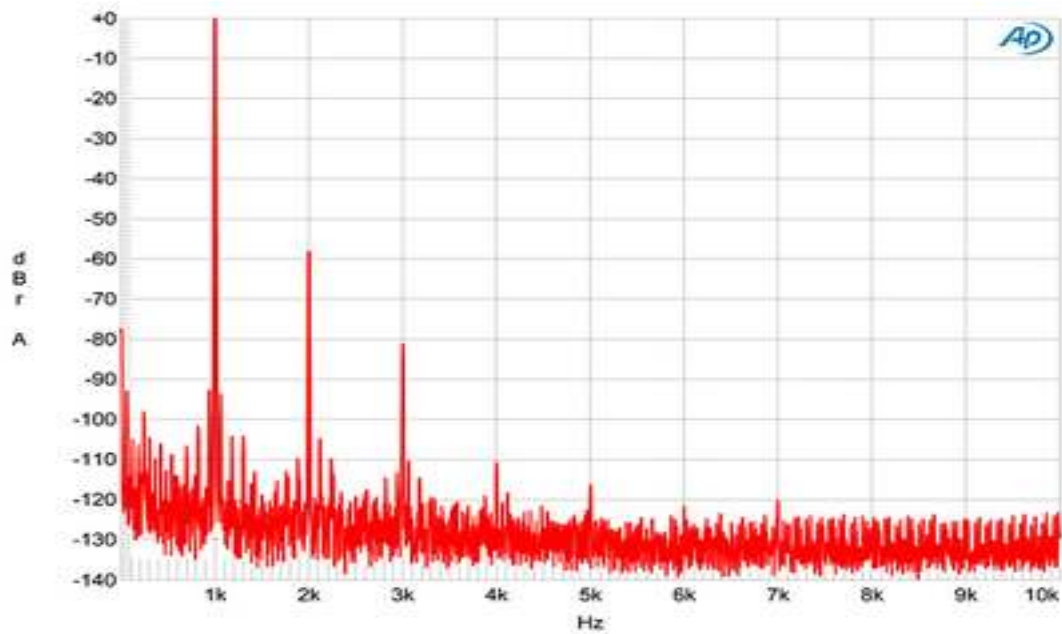


Fig.10 Ypsilon Aelius, C3g input tube, spectrum of 1kHz sinewave, DC–10kHz, at 15W into 8 ohms (linear frequency scale).

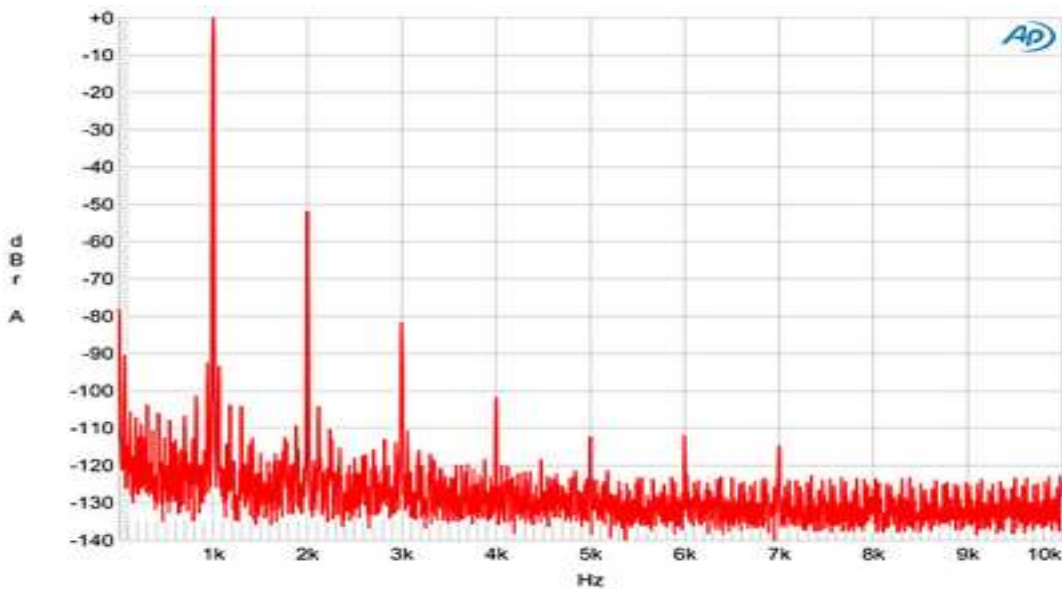


Fig.11 Ypsilon Aelius, 6C45 input tube, spectrum of 1kHz sinewave, DC–10kHz, at 15W into 8 ohms (linear frequency scale).

Finally, the increasing amount of distortion at the top of the audioband gives rise to a 1kHz difference product noticeably high in level under the worst-case condition of an equal mix of 19 and 20kHz tones, which is just below visible clipping on the 'scope into 4 ohms (fig.12). But the higher-order intermodulation products in this graph are only moderately high in level, and the midrange is commendably clean.

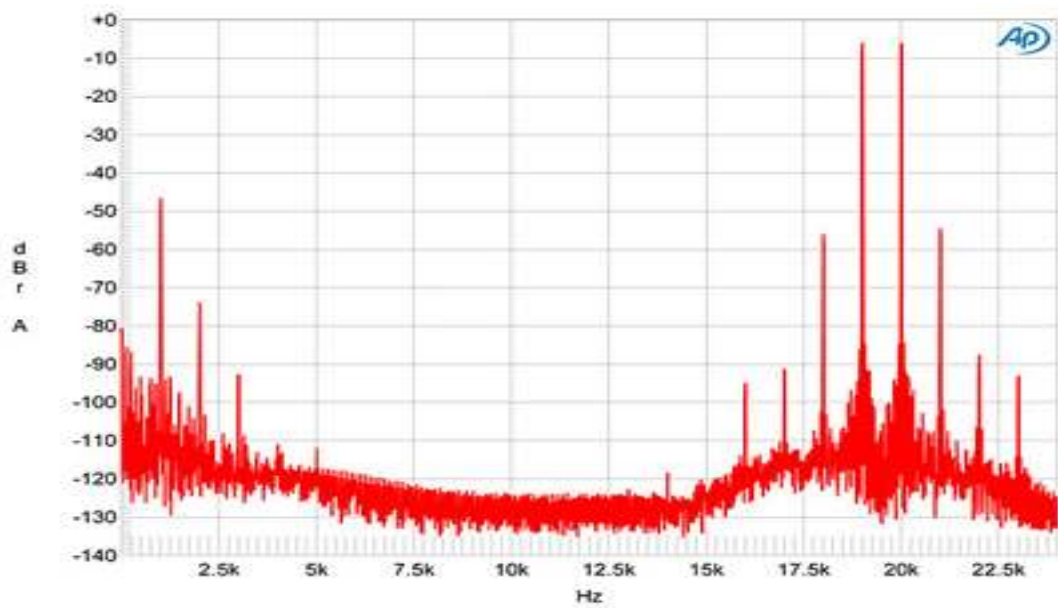


Fig.12 Ypsilon Aelius, C3g input tube, HF intermodulation spectrum, DC–24kHz, 19+20kHz at 200W peak into 4 ohms (linear frequency scale).

Ypsilon's Aelius is a most unusual amplifier, offering measured performance that in many ways is typical of a classic tube amplifier, but with an ability to drive low impedances usually associated with solid-state designs. Its sound quality will very much depend on the input tube fitted. Like MF, I preferred the NOS Siemens C3g.—**John Atkinson**