

Lamm Industries ML1 monoblock power amplifier

Jonathan Scull, May 2000

The last Lamm product I had my hands on was a pair of M1.1 monoblocks (see Vol.18 No.4, Vol.22 No.7). I liked those hybrid tube/solid-state amps quite a lot.



Since then, Lamm has weathered the vicissitudes of the audio business and has soldiered on to produce a full range of tube and hybrid electronics. They've also coaxed very respectable sound from recalcitrant rooms at diverse audio shows—a *real* miracle, I can tell you. In fact, Vladimir Shushurin, Lamm's president and director of engineering, told me they'd achieved *excellent* results at last year's Moscow show with a pair of [JMLab Utopia](#) loudspeakers, receiving an award for "Best Sound." Thus it was that those devilish tiny triodes lit their filaments behind mine beady eyes, and the next thing you know...

Circuit topology and build

Visually, Lamm's 90W ML1 monoblock is a blend of contemporary form-follows-function styling with several retro-chic touches. Two huge transformers dominate the rear, and the densely potted power transformer is thick as a brick. A pair of 6C33C-B triode tubes sit mid-deck and slightly offset to the left in front of the output transformer, with two more tubes—a 12AX7 and a 12BH7—before them. Top deck right resembles a panel from a Cold War-era bomber: a vertical array of two old-fashioned circular meters with three flick-switches below. Three minutes to target...

The ML1 is hand-built with parts of the finest quality: Dale metal-film resistors; Caddock power film resistors; PRC wire-wound resistors; Bourns multi-turn potentiometers; Electrocube and Roederstein film capacitors; high-frequency switching-grade Cornell Dubilier and United Chemi-Con electrolytic capacitors; Hammond chokes; gold-plated Neutrik XLR connectors; and military-grade "low-noise, long-life" vacuum tubes. The toroidal power transformer has no mechanical contact with the transformer cover or the chassis, and is suspended in a resonance-absorbing "encapsulant."

The porky 6C33C-B is a robust, high-current output tube with, according to Shushurin, a very low internal impedance of about 80 ohms. "It's like a transistor!" he enthused. "You know, most typical audio power tubes have 300 or 400 ohms internal impedance!" (It's amazing what we all get excited about.) As he explained, this permits the use of an output transformer with a low turns ratio and extended frequency response, plus "dramatically reduced" leakage inductance.

Despite its Bomber Command meters, the ML1 is 21st Century under the skin. The 12AX7 input tube carries a Wilson current mirror based on Motorola transistors. The second voltage-gain stage, the 12BH7, is hitched to the driver/buffer stage—a quartet of high-frequency, high-voltage Hitachi MOSFETs, which means the ML1 is actually a hybrid design. "Extremely linear!" declares Dir. Eng. Shushurin. We're looking at low loop-negative feedback and about 12 or 14W in class-A before the switchover to A/B.

With a few flips of switches, the meters let the fastidious audiophile monitor all of the ML1's important operating parameters. Keep a sharp eye out during run-in. Monitor incoming mains voltage, adjust idle current, bias voltage, and balance with a small screwdriver thoughtfully provided for the task at hand. I had to tweak the idle current for one channel, but otherwise the ML1s were unconditionally stable. Lamm claims the 6C33s are good for five to six years of music five to seven hours a day! No guilt—remember, the 6C33 triode arrived in the West with a Soviet MiG 25 pilot defecting to Japan; it was in the radar's power supply. "Robust" doesn't *begin* to describe it...

Input is single-ended on an XLR jack, duplicated on a gold-plated RCA. Around back are three pairs of binding posts for 2, 4, and 8 ohm speakers, plus a multi-voltage IEC mains input socket and grounding post. Power on drops you into a two-minute warmup mode, during which the tube filaments come up to snuff before the plate voltage is applied. (Low thermal shock lengthens tube life.) Afterward, a relay clacks and you're loaded for bear. Fuses can be found on the AC line and on the plates of

the power tubes, and there's an auto-reset thermal fuse if things get a little hot under the hood, which never happened *chez* Scull.

Setup issues

The ML1s went about their musical business with a certain and deliberate noneditorial purity. As a result, the front-end had to be *just so* or the sound could turn unpleasant. When I listened to Milt Jackson and Wes Montgomery on *Bags Meets Wes!* (DCC GXS-1093), Milt's vibes sounded shivering, shimmering, and beautiful—crystalline-clear as light through a prism. Riding far right, the spit of "Philly" Joe Jones cymbal was better rendered by the dCS 972/Elgar combo when fed with the Accuphase DP-75V's S/PDIF output or AES/EBU by the Forsell Air Bearing transport.

Nevertheless, the ML1s needed—actually, demanded—that certain touch of lushness and sweetness the Accuphase so easily evoked. That's how I wound up listening to digital mostly via the DP-75V 24/192 single-box upsampler/CD player, and that's what led to some of the best analog sound I've heard in a while...but I'm getting ahead of myself.

As mentioned, our JMLab Utopias were Lamm Approved as a good match for the ML1s. But while the midrange and highs were fine, I had to really work to get the bass just right. You need legs for the Big Musical Moments that many of us are so fond of conjuring up in our homes: wires, preamplifier, source components—all had to be spot-on *perfect* for the best overall sound *and* the tightest bass. I wound up at the top of the bubble on the analog outputs of the Accuphase DP-75V ([footnote 1](#)), and the Insider on the Forsell Air Force One ([footnote 2](#)), BAT VK-P10 phono stage, and BAT VK-50SE preamplifier.

XLO The Limited speaker cable tethered the Utopias, with all Synergistic Research Designer's Reference Active Shielding/Transmission Line interconnect and DR Squared on the power. And I had to play with the distribution and angle of the ASC Studio Traps and Argent RoomLenses that populate our listening room. Work for it, buddy.

Two by 90

The Lamm ML1s impressed me immediately with their sense of refinement. Theirs was, however, an essentially *different* sound from that of the Accuphase M2000 monoblocks, the last amps I described in that way (February 2000, Vol.23 No.2). Let's start with "Use Me," from Patricia Barber's *Companion* (Premonition/Blue Note 5 22963 2).

Notes: "There's a musical presence that is, in its total and utter clarity, the very be-all and end-all of these amps." As Barber's voice manifested itself in our listening room, she sounded a bit more cool (yet more subtle and complete) than other warmer, illuminated-from-within presentations we've enjoyed. I'm thinking of the sexy-as-the-dickens McIntosh MC2000, for example, or the big VTL Wotans. Understand, this is no criticism; rather, the overall mien of the Lamm ML1 is one of subtlety and refinement. It's positively Nagra-like in how it sticks to the straight and narrow, adhering to the ultimate paradigm of neutrality. As with the Nagra VPAs, I found this stringent *lack* of editorial voice almost a signature in itself. It all depends on how you look at it. Is the glass half full or half empty? And more important—you gonna finish that?

Listening to the Jacques Loussier Trio's terrific recording of Satie's *Gymnopédies Gnessiennes* (Telarc CD-83431) was just incredible. I felt very close to the music, despite the cool, transparent neutrality of the sound. Notes: "It's so very open and quick, especially on top—sparkly clean and crystal-clear, not etched in any way. A sophisticated presentation with bags of unforced detail, neither sweet nor hard."

In fact, the ML1s sounded linear across the board, very extended, and *very* demanding of associated equipment, as noted. Of course, that's a backward-arriving compliment; the ML1s were, in fact, ruthlessly revealing in that regard. Yet the midrange always sounded clear—*unpolluted*, transparent and airy. The highs too were pellucid, clear, shimmering, extended, anything but warm or euphonic. If you yearn for Ye Olde Tyme Toobe Sounde, you're headed for a fall with the ML1.

There was, however, always something subtle, gentle, and expressive to be culled from the fabric of the music. In fact, while the Lamms were in the system, I often had the impression of listening close to master-tape sound; very rewarding on some levels. The ML1s delivered pomp and bombast when required, but it's safe to say they were also Masters of the Small Scale. Listening to Mischa Maisky on *Cellissimo* (DG 439 863-2) bowing his instrument, I enjoyed the most open, clear midrange I can remember hearing in ages, one that skated perfectly on the edge of fullness of tone and fast, leading-edge energy. I had the uncanny sense that Maisky's cello sounded just as it would in person. Listening to his breathing and the rosinny scrape of the bow below brought me so *close* to the performance that it took my breath away.

Listening to the superb "Gymnopedie No.3" by John Williams on *The Guitarist* (Sony Classical SK 60586), I jabbed at my long-suffering laptop: "It's ambient beyond my ability to express! Beautifully focused music as well as soundstage imaging." I suppose that's what you're looking for at this lofty price level: beautifully focused *music*—the ineffable, the inspiring, those turns of phrase and expressiveness that give me, for one, the *sheevers*.

Footnote 1: TARA Labs The One cable worked sonically and didn't pull the '75V off its Big Rock/Air Mass stand, as the stiff Synergistic DR cable does.—Jonathan Scull

Footnote 2: On XLO Signature phono cable; as usual, bearing and arm updates in the works for the Spothheim SpJ/La Luce turntable.—Jonathan Scull

So while the ML1s could play loud, they were really all about subtlety, nuance, and gesture. Still, curiously, when it came to *classical* music, they played Mahler, Stravinsky, and Brahms to very satisfying levels of volume and dynamics with good bass

control. But they were less able, it seemed, to keep up with the deep, driving bass beat of Peter Kruder's *Peace Orchestra* (G-Stone G-CD 004) (footnote 3).

Given intelligent use of the volume control, the ML1s gave their all in the nether regions. A good sign: At lower volumes I was struck by how the bass sounded powerful and linear, and went *deep*. Up to medium-loud levels the ML1s maintained their poise, but cranked beyond their capabilities the distortion in the bass became manifest, easy on the ears though it may have been.

Turn the gain down a skootch *et tout va bien*. Despite their purity of presentation, the plummy bottom end at *fff* levels could become a bit too much. A certain lack of control and fattening of tone and texture accompanied a loss of defining, leading-edge information. But back it down and the bass gathered itself into a much tighter, all-of-a-piece construction.

How did this translate into "normal" listening on the Utopias? Notes: "The opening bass solo on 'Use Me' on *Companion* is full and luscious—not bad for 90W!" Even binding-post burners like "Afro-Left," from Leftfield's *Leftism* (Hard Hands/Columbia CK 67231), sounded rich and satisfying in the Dynamics & Impact department, supported by a punchy bass line. I just couldn't turn it up *quite* as loud and raucous as both K-10 and I like it sometimes. And again, though I can't begin to imagine why, classical was less of a problem. Bizet's rousing *Carmen Suite* No.2 (Bernstein/NYP, Sony SMK 63081) was, according to my effulgent notes, "a trip and a half! The room-defining bass on this joyous old warhorse is wonderful, deep, satisfying, and dynamic."

Where analog reigns supreme

As a result of the ML1's pickiness with associated components and the heavy demands it placed on the digital front-end, of course I *had* to try analog. Now *that* was an ear-opener. Freaked me out, I can tell you.

I stayed with the BAT '50SE and added the VK-P-10 phono stage, recently supercharged with 1.5m of Synergistic DR Active Shielding. The ML1s were at their relaxed best with classical vinyl of almost every kind. I was freshly charmed by a favorite old London disc (CS 6225) featuring Debussy's *Images pour orchestre*, Stravinsky's *Symphonies for Wind Instruments*, and Ravel's *Pavane pour une infante défunte* by K-10's favorite, Ernest Ansermet *et* L'Orchestre de la Suisse Romande. The scope, swell, the *bell*, the full tonal palette, the naturalness and sense of actual music played in a concert space—a heady experience. The soundstage wasn't as 3-D wraparound as some amps manage—of course, that depends on the recording—but the ML1s placed me in the audience somewhere between the front and middle rows, say G or H. But the high level of transparency seemed to allow me to get closer to the music in another way.

I nearly had a coronary listening to the Duke's *Ellington Indigo* (Columbia six-eye CS 8053). It sounded airy, beautifully constructed, delicate, nuanced, and finally warm in a musical way through that utterly transparent midrange and treble. It was just terrific, and hit me in that special way that you've all experienced: a vocal or instrument finds its voice within the space of your listening room and the boundaries between you and the music disappear. Notes: "When the Burnished Horns from Heaven come in, you'll know why you're chasing the high-end dream."

There followed something of a vinyl orgy, as I pulled out LP after LP. There was a natural tendency to reach for the best with the Lamms; I nearly died listening to the second movement of Beethoven's String Quartet 9 in C, Op.59 (Columbia MS 6187, another treasured original six-eye) with the ever-accomplished Budapest Quartet. I was struck by the perfection of the plucked cello, the breathlessness and emotion that lay between the notes, the trippy-close quality of feeling without *question* that I was sitting in a small salon with the Budapest right before me!

I'm a lucky SOB. *All* audiophiles are. Here it was, a Sunday night in late winter: cold, wet, and not very conducive to schlepping out to live music. I further abused my laptop: "But what could be more meaningful *musically* than this?" Then I spun one of my favorite Haydn Piano Trios, No.6 in F by the Beaux Arts Trio (Philips 9500 325, LP). As I sat pensive before the elegant music, I noted: "The ML1s are for the Discerning Listener. Having struggled with every detail of the front-end, having tuned the living daylights out of cartridge and 'table, you're rewarded with the best vinyl has to offer."

While I've always thought this recording a touch analytic, I found it now transparent beyond reproach. The sound of the musicians moving about in their chairs struck me as never before. Such small details, suddenly so evident, raised something of the feeling of participation one has at live events. I still noted the familiar, slightly hot, and analytic top-end, yet it didn't betray the music at all. It became part of the larger gestalt of the sound cascading over me in the Ribbon Chair. Delightful. It was hard to stop listening that night; albums littered the floor as, one after another, I spun old favorites to savor them anew. Quite an evening.

Footnote 3: I've received a lot of passionate and positive e-mail (with *one* negative) regarding Kruder & Dorfmeister and other drum'n'bass, dance, or electronica recordings I've used recently in my reviews. Besides a big Approved stamp, reader Miguel Sanches of Lisbon, Portugal informs me that Kruder and Dorfmeister are actually from Vienna, not Berlin. I stand corrected. Can I have my passport back now?—Jonathan Scull

Final thoughts

The Lamm ML1s sounded balanced, wide-band, utterly transparent, and quite refined. I enjoyed very fine bass on the Utopias at Vigorous Volume Levels...for 90 tube watts. But I'd look for a speaker that didn't need its (reflex-loaded) woofer quite so tightly

grabbed as the Utopias ([footnote 4](#)). I did audition the Lamms on [Acarian Systems Alón Circes](#), whose sealed-box woofers sounded satisfyingly tight, if not quite as richly detailed as the fast-moving, lightweight sandwich-technology woofers of the [JMLab Utopias](#).

Bitches? I have a few. The amp's top deck could be stiffened up or damped a bit. And despite their good sound, costly amps such as these need better binding posts than those gold-plated brass jobbies with the red and black plastic caps! Given the lavish hand-crafting and best-quality parts, I'm inclined to believe Vladimir Shushurin when he explains that they sounded best. But holy moly, do they look *cheesy*.

Partnering electronics are very important for best results; I've heard Lamm's line-level L1, and while I didn't have one on hand during the review, my recollection of its sound tells me it should make a perfect match for the ML1s.

In any case, I think it's safe to say that Shushurin meant exactly what he built with the ML1. It's an expression of musical purity that brings him—and will perhaps bring you—closer to the angels.

Sidebar 1: Specifications

Description: Class-A/AB tube monoblock power amplifier. Tube complement: two 6C33C-B, one 12AX7WA/7025, one 12BH7A. Two multi-function meters for bias and balance controls. Inputs: RCA/XLR. Power output: 90Wpc into 8, 4, or 2 ohms, 20Hz-20kHz, (19.5, 16.5, 13.5dBW, respectively). Frequency response at 1W: 20Hz-20kHz, -0.3dB; 4Hz-82kHz, -3dB. Total harmonic distortion: 0.1% at 1W/1kHz, 2.5% at 90W/1kHz. Maximum intermodulation distortion, 60Hz-7kHz, 4:1 SMPTE: <5% into 8, 4, or 2 ohms. Damping factor: 7 at 8 ohms. Input impedance: 41k ohms shunted by 470pF. Input sensitivity: 1.2V RMS, $\pm 2\%$ for 80W into 8, 4, or 2 ohms. Voltage gain: 21.2dB $\pm 2\%$ or 26.5dB ± 0.2 dB, switch-selectable.

Dimensions: 16" W by 8?" H by 21" D. Weight: 70 lbs net.

Serial numbers of units reviewed: D10025, D10026.

Price: \$19,980/pair. Approximate number of dealers: 8.

Manufacturer: Lamm Industries, 2621 E. 24th St., Brooklyn, NY 11235. Tel: (718) 368-0181. Fax: (718) 368-0140. Web: www.lammindustries.com.

Sidebar 2: Associated Equipment

Analog source: Forsell Air Force One turntable and tonearm, Clearaudio Insider cartridge.

Digital source: [dCS 972](#) D/D converter and [Elgar](#) D/A processor at 24/192, [Accuphase DP-75V](#) CD player, Forsell Air Reference CD transport.

Preamplifiers: BAT VK-50SE/VK-P10, [Mark Levinson No.32 Reference](#).

Power amplifiers: [Linn Klimax Solo 500](#) monos, Forsell Statement, Accuphase M2000.

Loudspeakers: [JMLab Utopia](#).

Cables: Interconnects: Synergistic Designer's Reference Active Shielding. Speaker: XLO The Limited. Digital: XLO The Limited AES/EBU. AC: Synergistic Designer's Reference Master Couplers².

Accessories: ASC Studio Traps, Argent RoomLenses, API Power Wedge Ultra 116 and Ultra Enhancers, Signal Guard platforms, Black Diamond Racing shelves and cones, Nordost Pulsar Points, Bright Star Air Mass and Big Rock combo, PolyCrystal amp stand, equipment racks, cones, and cable towers.—**Jonathan Scull**

Sidebar 3: Measurements

With its twin triple-nippled power tubes, Lamm's ML1 looks both intriguing and industrial. It was also reassuring to find that, following its transcontinental trip to my lab, the meters on the sample I was measuring indicated that its operating parameters of bias, balance, and plate idle current were all healthy: no further adjustment needed. I let it cook for an hour at one-third full power into 8 ohms—the top plate and transformer covers were merely warm to the touch—before I took any measurements.

Getting the essentials out of the way: The amplifier was non-inverting, and its A-weighted noise floor was very low, at -99.8dB (ref. 1W into 8 ohms). This rose to -77.2dB with an unweighted wideband (10Hz-500kHz) measurement window, which is still low. The ML1's input impedance at 1kHz was a highish 42k ohms, while its output impedance varied according to the output transformer tap used. As expected, the 8 ohm tap featured the highest source impedance: 1.15 ohms at 1kHz, rising a little at the frequency extremes. The impedance was 0.62 ohms from the 4 ohm tap, this dropping to 0.4 ohms from the 2 ohm tap.

While higher than you get with a good solid-state design, the ML1's source impedances are on the low side for a tube design, a tribute to that unusual 6C33C-B tube's low internal impedance. Any modification of the amplifier's frequency response due to the interaction between its source impedance and the impedance of the speaker will thus be relatively mild.

This can be seen in figs.1 and 2, which show the small-signal frequency response from the 8 and 4 ohm taps, respectively. Even using the 8 ohm tap (fig.1), the response variation with our dummy speaker load is less than ± 1 dB, this dropping to ± 0.4 dB from the 4 ohm tap (fig.2). The extreme high frequencies roll off gently, being just 0.2dB down at 20kHz. But note the slight blip at 150kHz in the 8 ohm trace, which indicates a well-suppressed parasitic mode of some sort from this tap. This blip could not be seen in the 4 or 2 ohm response graphs, and a 10kHz squarewave taken from the 2 ohm tap (fig.3) was textbook-perfect, the slight rounding of the leading edges corresponding to the slight response rolloff at 20kHz. (Ignore the LSB toggling in this graph, which is an artifact of the digital 'scope I used.)

Footnote 4: [Jacques Mahul](#), *le patron* of JMLab/Focal, recently purred, "Jahn-ah-tan, you are *steel* in love with your Utopias?" Yes, Jacques, I am *steel* in love...—**Jonathan Scull**

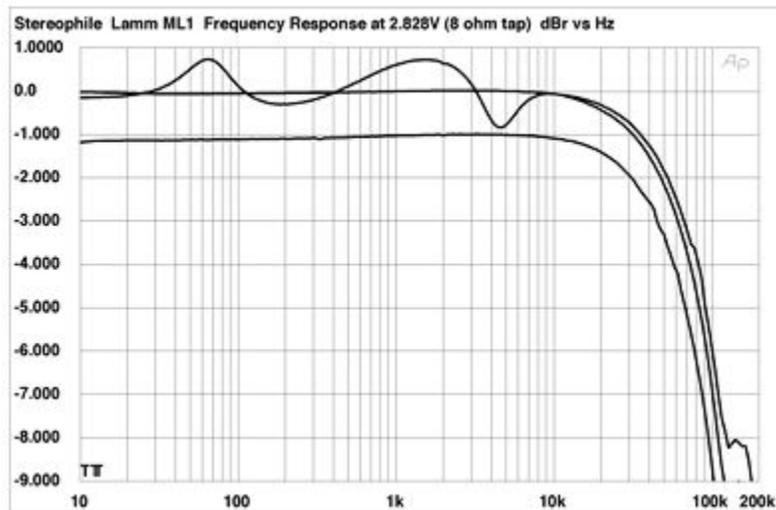


Fig.1 Lamm ML1, 8 ohm tap, frequency response at (from top to bottom at 1kHz): 2.828V into simulated loudspeaker load, 1W into 8 ohms, 2W into 4 ohms (1dB/vertical div.).

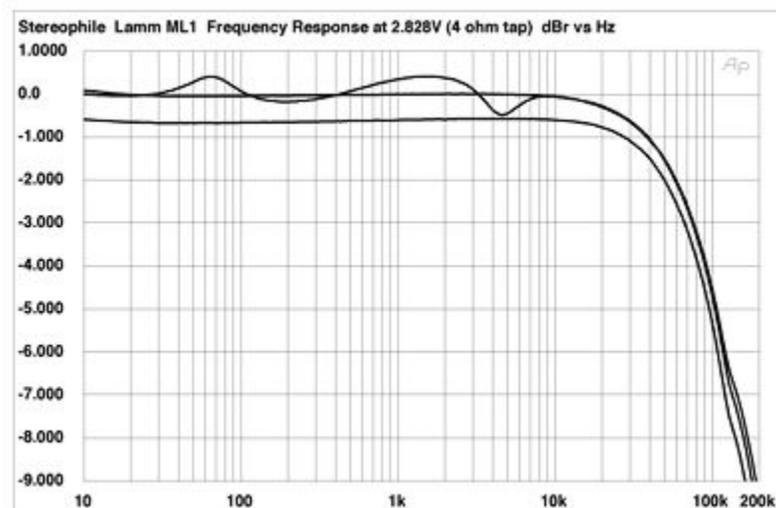


Fig.2 Lamm ML1, 4 ohm tap, frequency response at (from top to bottom at 1kHz): 2.828V into simulated loudspeaker load, 1W into 8 ohms, 2W into 4 ohms (1dB/vertical div.).

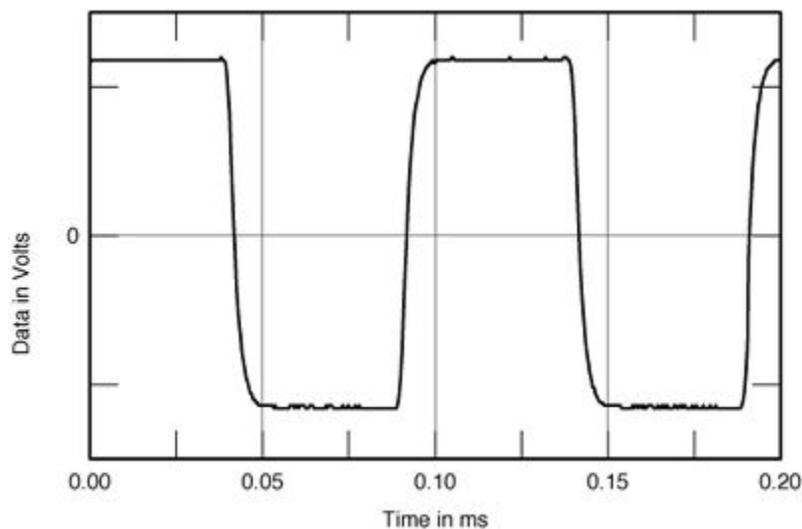


Fig.3 Lamm ML1, 2 ohm tap, small-signal 10kHz squarewave into 8 ohms.

Fig.4 shows how the Lamm's small-signal THD+noise percentage varied with frequency. The 4 ohm tap was used for this graph; the results from the 8 and 2 ohm graphs are similar. The amplifier is less linear at low frequencies and into lower impedances, but throughout the important midband the harmonic distortion content is impressively low for a design with minimal loop negative feedback. And as can be seen from fig.5, the distortion at low levels into kind loads is predominantly the benign third harmonic.

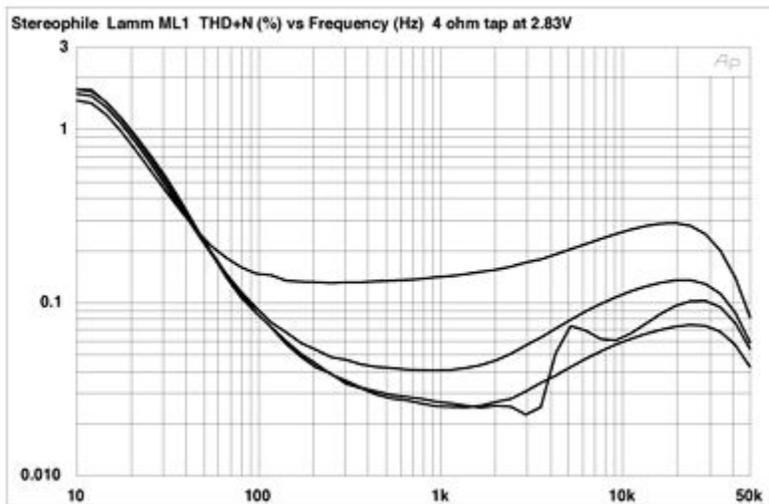


Fig.4 Lamm ML1, 4 ohm tap, THD+noise (%) vs frequency at (from top to bottom at 6kHz): 4W into 2 ohms, 2W into 4 ohms, 2.83V into simulated loudspeaker load, 1W into 8 ohms.

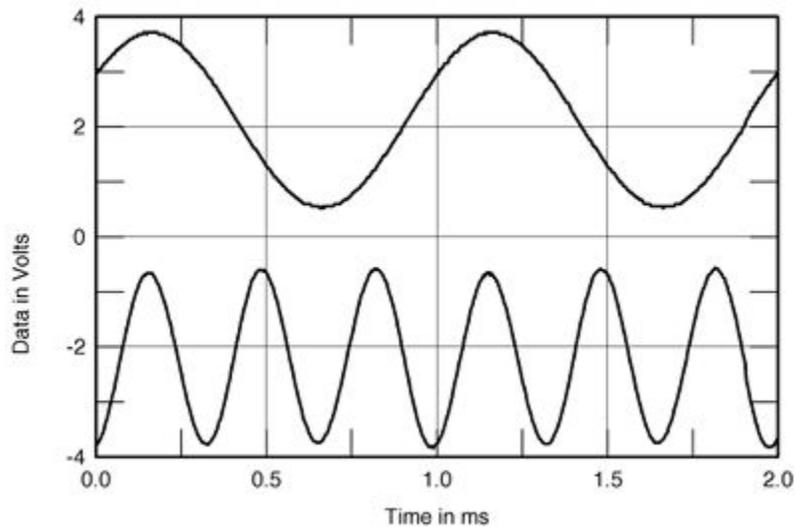


Fig.5 Lamm ML1, 1kHz waveform at 5W into 4 ohms (top), distortion and noise waveform with fundamental notched out (bottom, not to scale).

Fig.6 shows the spectrum of a 1kHz tone under roughly the same test conditions used to take fig.5. Again, the third harmonic is the highest in level, with the low odd orders predominant. However, if you look at fig.7, which was taken at a significantly higher power level, higher powers and lower load impedances both raise the level of the odd harmonics and introduce even-order distortion. The same is true at lower frequencies (fig.8), which I am sure correlates with J-10's noting that the amplifier had a "plummy"-sounding bass.

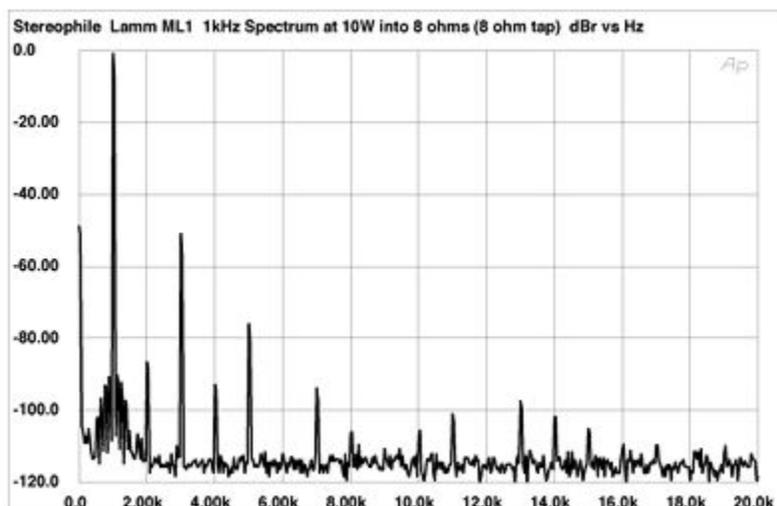


Fig.6 Lamm ML1, spectrum of 1kHz sinewave, DC-20kHz, at 10W into 8 ohms, 8 ohm tap (linear frequency scale).

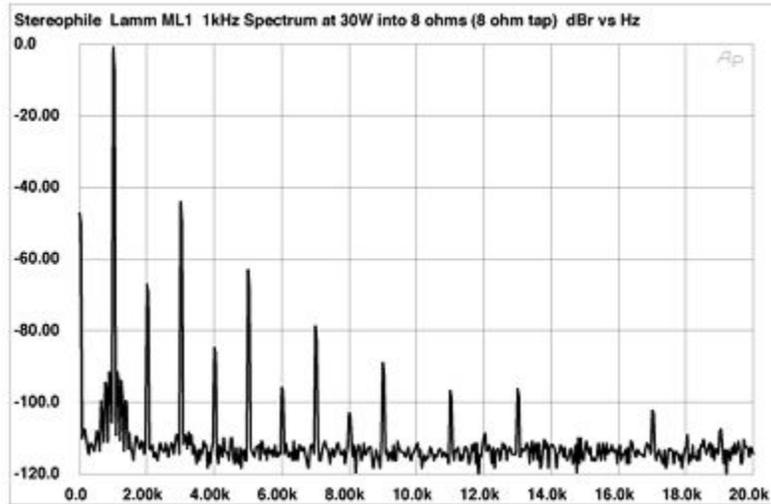


Fig.7 Lamm ML1, spectrum of 1kHz sinewave, DC-20kHz, at 30W into 8 ohms, 8 ohm tap (linear frequency scale).

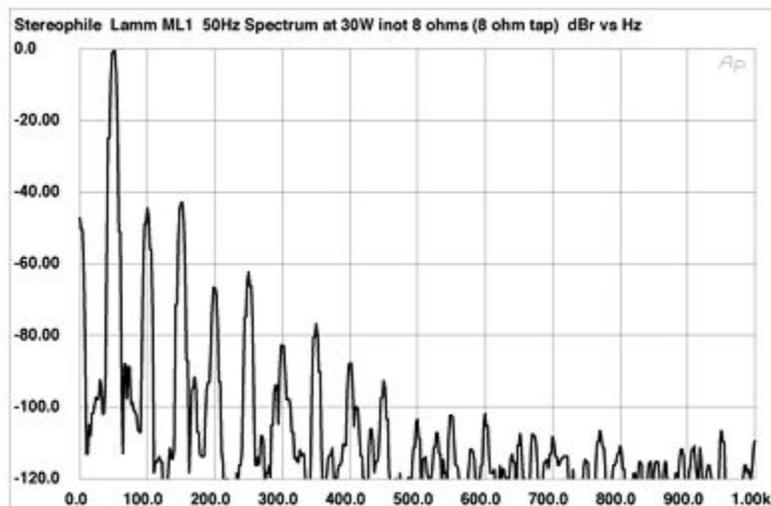


Fig.8 Lamm ML1, spectrum of 50Hz sinewave, DC-1kHz, at 30W into 8 ohms, 8 ohm tap (linear frequency scale). Despite the highish harmonic distortion at high power levels, the intermodulation was low, at least regarding the level of the low-frequency difference product. Fig.9 was taken from the 8 ohm tap at 28W into 8 ohms, which was just below the visible clipping point with the very demanding 19+20kHz test signal. The 1kHz product lies at a low -60dB (0.1%), but the high-frequency second-order products are higher in level, at -46dB (0.5%).

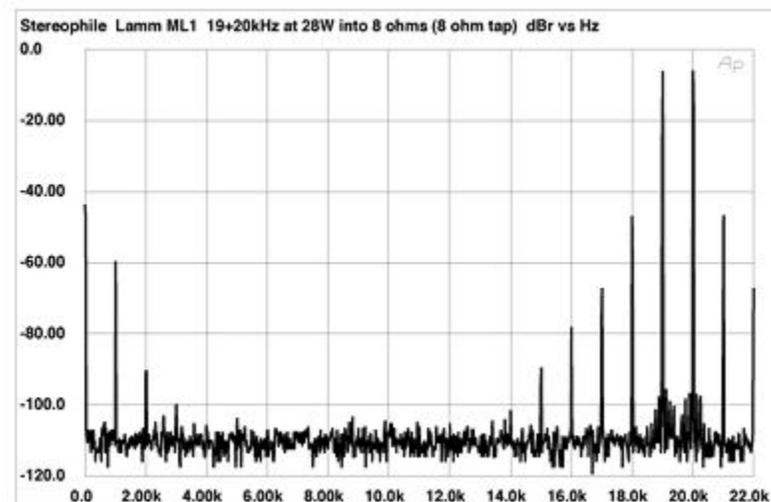


Fig.9 Lamm ML1, HF intermodulation spectrum, DC-22kHz, 19+20kHz at 28W into 8 ohms, 8 ohm tap (linear frequency scale). As is usual with a design featuring low loop negative feedback, the ML1 was most linear at low levels: typically, less than 1W, which is where it will operate most of the time with most music program and speakers. But as you can see from fig.10, which

shows how the distortion changes with increasing continuous output power, it gets less and less linear as the output power increases. The manufacturer's output power of 90W is specified at 2.5% distortion. Fig.10, taken from the 4 ohm tap, is typical and shows that the amplifier actually meets that spec at 3% THD. At our usual 1% THD+N clipping point, the maximum output power with a transformer-matched load was 60W (17.8dBW). This is still a useful output rating.

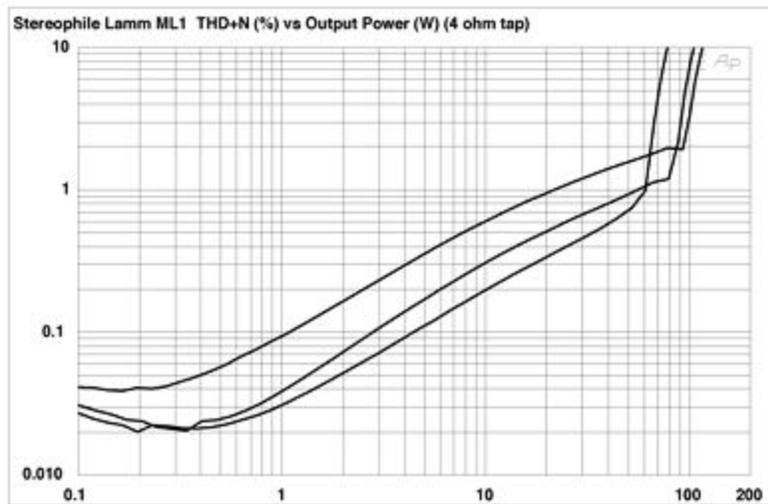


Fig.10 Lamm ML1, distortion (%) vs continuous output power into (from bottom to top at 2kHz): 4 ohms, 8 ohms, 2 ohms (4 ohm tap).

Looking at the Lamm's output power capability using not a continuous tone but a pulsed 1kHz tone with a low duty cycle (10 cycles on, 40 cycles off) proved interesting. With this signal, which more closely approximates a music signal, the amplifier appeared more powerful. Around 70W was available into a transformer-matched load for 1% THD+N, but at the more relaxed 3% figure, this increased dramatically, to around 107W. And as can be seen from fig.11, 135W was available into a load half the rated output tap. This graph was taken from the 4 ohm tap, and again the linear increase in distortion with increasing frequency can be seen, as can the increased distortion into lower impedances. As I noted above, this is typical of a design with low loop feedback. And as we have also found with such designs, the ML1 actually becomes *more* linear at very high powers, before the signal then clips for real.—**John Atkinson**

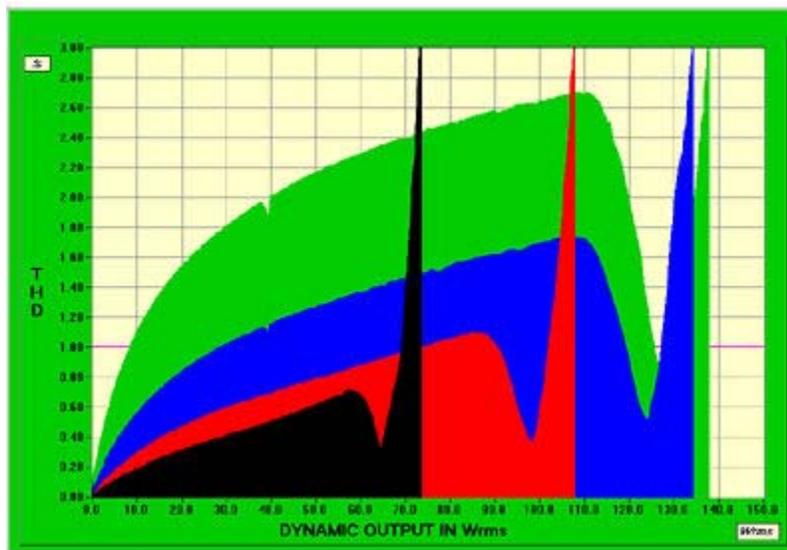


Fig.11 Lamm ML1, distortion (%) vs 1kHz burst output power into: 8 ohms (black trace), 4 ohms (red), 2 ohms (blue), 1 ohm (green).