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## EQUIPMENT REPORT



# Definitely a "Keeper"

## LAMM Industries M1.2 Reference Power Amplifier

Dick Olsher

One of the most frequent inquiries I've received over the years has to do with amplifier recommendations for a particular speaker, and as the laws of probability would have it, typically for a speaker model I've never auditioned. I wish I could simply point to a safe bet, an amplifier that would guarantee satisfactory performance. There is no lack of amplifier endorsements in the audiophile press. Unfortunately, most amplifier reviews are conducted within a very narrow context of a single loudspeaker in a specific room, making it difficult to extrapolate findings to other applications. Factors such as room size, loudspeaker sensitivity, speaker impedance magnitude and phase, and ultimately musical tastes need to be taken into account. The truth is that there is no universal amplifier that can be certified to deliver satisfactory results in all cases. However, having said that, I would point to the LAMM M1.2 Reference as most likely to win the coveted appellation of "universal amplifier."

How can I be sure about that, you ask? Well, the M1.2 combines a triplet of desirable characteristics in a single chassis. First, it can deliver large peak currents into a reactive

load over a wide range of load impedances while maintaining Class A operation. I was recently reminded of the work of Eric Benjamin (Dolby Labs) in the early 1990s on the amplifier-loudspeaker interface. Peak power dissipation was always found to exceed the dissipation calculated on the basis of the loudspeaker's impedance minimum. The reactive nature (inductive or capacitive) of the load lowers its effective nominal resistance, and depending on the signal type, the typical effect was on the order of 150-to-200%. In other words, a 4-ohm-nominal-impedance box loudspeaker with an impedance minimum of 2 ohms in the lower midrange could present an effective resistance of 1 ohm over that frequency range.

Designer Vladimir Lamm, who is equally at home with tube and solid-state circuitry, decided to incorporate a load-selector switch (located on the back panel) into the output stage of the M1.2. Whereas tube amps commonly feature output transformer taps to closely match the load impedance, almost all solid-state designs lack an output transformer and are directly coupled to the load. If the operating point is optimized for an 8-ohm load, the amp may still safely

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operate into much lower impedances without blowing up, but according to Vladimir, its sound-quality will be compromised. Frequency and power bandwidth may change together with the distortion spectrum as the load impedance departs from 8 ohms. Hence, the harmonic character of the amp is typically linked to the load's impedance magnitude. Many solid-state Class A designs are just that into an 8-ohm load but slip into class AB operation into lower impedances. Lamm's solution for the M1.2 Reference and M2.2 amplifiers is to maintain pure Class A operation (without any tricks)—not only into high impedance speakers, but also into lower load impedances. This is accomplished via the load-selector switch, which allows the end user to select the optimum operating point for a particular loudspeaker. The impedance range is divided into two regions: HIGH being defined from 16 to about 8 or 7 ohms, and LOW from 7 or 6 ohms to 1 ohm. Once the switch is set, the output-stage supply voltage and idle current are modified to match the selected impedance range. What if your speaker is rated at a nominal impedance 6 ohms, right at the dividing line of the selector switch? In this situation, and in general, it is recommended that you experiment by listening to both switch positions to determine which sounds best with your speakers. It is perfectly safe to set this amplifier for an 8-ohm operation, while it is loaded with a much lower impedance. The odds are high, however, that best sound will be obtained with the switch position that most closely overlaps the midrange impedance of your speaker.

The second characteristic which elevates this amp towards universality is its low output impedance, being on the order of 0.1 ohm—considerably lower than that of most tube amps, which typically don't spec any better than about 1 ohm. In addition to enhancing an amplifier's damping factor, low output impedance minimizes frequency-response deviations due to interactions with the speaker impedance. The amp's source impedance acts as a voltage divider in concert with the speaker. A uniform speaker impedance would negate this effect. The problem is that, in almost all cases, the speaker impedance varies considerably with frequency. Whenever the load impedance is much greater than the amp's source impedance, the effect is minor. But when the two approach each other in magnitude, the effect becomes significant. The end result is an alteration of the speaker's frequency response. A classic case in point was my recent experience with the Final Sound 1000i ESL. Its impedance magnitude varies from about 30 ohms in the bass to about 1 ohm in the extreme treble. An ESL, being inherently a capacitive load, begins to look like a short circuit at high frequencies. Several amplifiers in the house severely rolled off the highs, and I'm talking about 3 to 6dB deviations at 20 kHz. In contrast, the M1.2's performance was absolutely commendable, maintaining a wide-open bandwidth. An amp's source impedance is typically controlled via global negative feedback and/or paralleling several output devices. Here the output stage is made up of six pairs of complementary MOSFET power transistors. No negative feedback is used around the output stage or globally from output to input. A small amount of negative feedback (6

to 7dB) is applied from the output of the driver stage to the input stage.

And finally, by virtue of including a tube in the signal path (a 6922 dual triode) this amp is much easier to integrate into a system than a typical pure solid-state design. In this day of all-digital front ends, I believe that at least one tube is necessary to infuse life into the soundstage, which would otherwise very likely sound as sterile as a mule. Some of the most disappointing high-end rigs I've auditioned over the years were driven by pure solid-state amplification. Of course, there have been exceptions to the rule, but in general it would be much safer to recommend a hybrid amplifier such as the Lamm for such applications.

High-speed unity-gain buffers designed for video applications are used at the input. The first gain stage is a differential cascode circuit consisting of a pair of P-channel J-FETs whose drain outputs drive the emitters of a pair of PNP transistors. Thus, both unbalanced and balanced inputs are accommodated. The second voltage gain stage uses a 6922 vacuum tube in a topology similar to a mu-follower. Even though the output impedance of this stage is fairly low, on the order of several kilohms, Lamm did not deem it sufficiently low enough to drive the input capacitance of the output stage. Therefore, a driver stage is used, which consists of an NPN bipolar transistor loaded by an NPN-transistor current source. As with other hybrid designs, protection from large output swings is required during startup, since the solid-state stages are in full operation while the tube stage is still warming up. In the M1.2 Reference, an output speaker-relay remains open long enough for the amplifier to reach stability. This relay also opens if the AC line voltage drops below a set threshold level or if there is excessive DC at the amplifier output. Once the output relay triggers for these reasons, the output stage's idling current is cut back to zero. A soft-start circuit is also provided. A resistor in series with the power transformer's primary reduces in-rush current when the amplifier is powered up; after a suitable delay, the resistor is bypassed by another relay.

Most of the circuitry is mounted on a large PC board. High-quality passive components are used throughout, including Dale metal-film and PRC wire-wound resistors, Electrocube and Roederstein film capacitors, and Cornell Dubilier switching-grade electrolytic capacitors. On the underside of the sub-chassis are a pair of 56,000-microfarad/63V main filter capacitors, a power-supply, a system control board, and the power transformer. The transformer, a Plitron 900 VA toroidal unit, is isolated in a metal sub-enclosure.

Let me start with the bass range. Bass control and pitch definition were exceptional—as good as they get in my experience. The Lamm consistently exercised iron-fisted control over bass lines. It conquered the ubiquitous bass-reflex loading, notorious for lacking in transient crispness, without so much as a whimper. And it wasn't just a case of punch and authority. Jazz acoustic bass was remarkably tuneful, harmonically rich, and dynamically expressive. Relative to its pure solid-state competitors, its sonic character was warmer and slightly more liquid, and with the sort of full-

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blooded harmonic richness tubes are noted for, thanks in great measure to a lower midrange infused with life-giving warmth. Harmonic colors were reproduced with convincing fidelity, including soprano voice and violin. That I'm sure was a direct consequence of its smooth, distortion-free, mid and treble range. There was absolutely no grit or upper-octave brightness.

The Lamm spent quality time with several of my favorite speakers, including the Esoteric MG-20, the Final Sound 1000i, and the Venture Audio Excellence III (reviewed in the previous issue). My initial impression was in the context of the MG-20, and at first blush I was a bit disappointed. Relative to the Silicon Arts Design ZL-120 monoblock amplifier, which complements this speaker so magically, soundstage transparency was diminished. The impression of slight veiling was only an issue with the MG-20. In the context of the Venture Audio Excellence III mated with James Bongiorno's Ambrosia preamplifier, I preferred using balanced over unbalanced inputs for precisely the resultant slight enhancement in soundstage transparency. But even using the unbalanced inputs there was ample immediacy. There was no doubt, however, that the Lamm had reached its performance zenith while driving the Final Sound 1000i. It was a coupling fit for sonic heaven! The M1.2 Reference was instrumental in coaxing the most extended treble out of the 1000i. And it, more than any other amplifier on hand, made the 1000i sing in breathtaking fashion.

One of its strongest suits was remarkable transient speed of attack, combined with sublime control of transient decay. This very likely accounted for its natural retrieval of low-level information. There was plenty of detail, but it was presented without even a hint of assertiveness or exaggerated sibilance. Also impressive was the amp's ability to dig deep into a recording's noise floor to elucidate reverberant information. Multi-track recording tricks such as vocal overdubbing were readily resolvable as were instrumental harmonies in complex passages. Dynamic nuances responsible for imprinting feelings onto musical lines were reproduced intact, with the tension and drama of the real thing. There were enough dynamic reserve and current drive to propel even moderate-sensitivity speakers cleanly and securely over the music's entire loudness spectrum. Depth of stage and palpability of image outlines (with help from the Bybee Speaker Bullets) were superb and approached the best of the best in tube amplification.

The Lamm M1.2 Reference represents without a doubt a rare breed of amplifier that combines brawn and finesse in a single chassis. And to top it off, it is a superbly engineered real-world product that is a pleasure to use. Its siren song of suave harmonic textures, tight bass control, articulate transients, kinetic drive, and essential tonal neutrality is musically most persuasive. There's enough tube magic under the hood to infuse the midrange with invigorating warmth and spaciousness that most solid-state amplifiers simply cannot capture. I for one find its performance level worthy of the Reference appellation, and in view of its compatibility with a wide range of speaker loads, plan to use it as such in many future reviews. This one is a keeper! **TAS**

## MANUFACTURER COMMENTS

### Lamm M1.2

We would like to thank Dick Olsher and the TAS team for an in-depth review of our M1.2 Reference power amplifier. Mr. Olsher explores at length the engineering aspects of the design - and he does so with finesse and clarity. He is equally at ease conveying complex concepts as well as listening impressions to the reader. His technical explanations flow naturally into the description of sound qualities, and serve as a foundation to his conclusion that a naturally sounding amplifier has to be firmly grounded in good engineering and yet possess intangible qualities that technology alone cannot account for.

Vladimir Lamm  
Lamm Industries, Inc.

## SPECS & PRICING

Rated output power (high impedance setting): **110W into 8 ohms at <0.3% THD**

Rated output power (low impedance setting): **110W into 4 ohms at <0.5% THD**

Frequency response: **4Hz-155kHz, +0/-3dB**

Signal/noise ratio: **89dB, A-weighted (typically 96dB)**

Input sensitivity: **761mV RMS +2% for 110W into 8 ohms (high impedance setting); 538mV RMS +2% for 220W into 2 ohms (low impedance setting)**

Input impedance: **41k ohms shunted by 470pF**

Output impedance: **(20Hz-20kHz): typically 0.082 ohms +0.007/-0.002 Ohm**

Dimensions: **17" x 8.25" x 19.5" (add 2.8" depth for front and rear handles)**

Weight: **68.5 lbs.**

Price: **\$22,290/pr.**

ASSOCIATED EQUIPMENT  
Kuzma Reference turntable; Graham Engineering 2.2 tonearm; Grado Reference phono cartridge; Air Tight ATE-2 phonostage; Esoteric SA-60 SACD player; Altmann Micro Machines Attraction DAC; Concert Fidelity CF-080 line preamplifier; Air Tight ATC-2 line preamplifier; Spread Spectrum Technologies Ambrosia preamplifier; Silicon Arts Design ZL-120 mono block amplifiers, Son of Ampzilla 2000 stereo amplifier; TEAC Esoteric MG-20 loudspeaker; Final Sound 1000i electrostatic loudspeaker; Venture Audio Excellence III loudspeaker; Bybee Speaker Bullets; Acrotec 6N and 8N copper, Kimber Select KS-1030, Kimber KCAG interconnects; Fadel Art Streamflex Plus, Acrotec 8N copper speaker cable

### LAMM INDUSTRIES, INC.

2621 East 24th Street

Brooklyn, NY 11235

(718) 368-0181

lammindustries.com

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