Linear Tube Audio ZOTL40 Mk. II Power Amplifier

Tube Magic without Tube Euphonics

Dick Olsher

Kudos to Linear Tube Audio's Mark Schneider for continuing to market David Berning's amplifier designs. Berning's patented ZOTL circuit obviates the need for a conventional audio transformer to couple the tube output stage to the loudspeaker. In this regard, the ZOTL amplifiers can be considered output-tranformerless (OTL) designs. The ZOTL40 power amplifier was commissioned and licensed directly from Berning and is proudly hand-built with premium components in Washington, D.C. It should be noted that the Mk. II version reviewed here represents an advance over the original product. It is now shipped with Russian reissue Genalex KT77 beam power and preamp tubes and includes a few other component changes as well (see Tech Talk sidebar).

The front panel is adorned with a volume control, a Japanese ALPS Blue Velvet pot. On the back panel one set of RCA inputs is connected to this control. The other two sets of inputs, (XLR and RCA) bypass the volume control, though it should be mentioned that the XLR jack is also wired single-ended with pin 2 hot. Prioritizing the amp for direct input is perfectly fine with me. The ALPS pot is OK sonically, but is outclassed by a high-quality volume control such as my Experience Music autoformer. The latter allowed the ZOTL40 to sing with remarkably smooth and grainless textures. In fact, it didn't take me long to realize that this was the smoothest-sounding ZOTL design I've auditioned to date. A new feature is the mono-stereo switch on the back panel. It allows for mono operation with the left and right channels bridged together. (See the owner's manual for detailed instructions.) Power output almost doubles in mono operation, but of course in that case you would need another ZOTL40 for a stereo hookup.

The input voltage gain stage consists of a 12AX7 connected as a differential input. It is followed by a 12AU7 dual-triode configured as a phase-splitter. The push-pull output stage is operated in Class AB and is biased by an autobias circuit. Hence, there are no bias pots to fiddle with. This amp is plug-and-play. Tube high voltage is delayed after the amp is powered on and the heaters are warming up. Don't be surprised by an occasional burst of static when the high-voltage ramps up; it's perfectly normal and only lasts a few seconds. I'm not sure if the stock Russian reissue Genalex Gold Lion KT77 is an exact copy of the original design, but sonically it's a different animal. Since I'm fortunate enough to have on hand a stash of vintage British KT77s, I was able to roll them in and concluded after a couple of listening tests that they are superior to the Russian versions, which lacked the textural sweetness and smoothness of a vintage KT77. Not to worry, another good option is the Russian reissue Mullard EL34, which perfectly captures the classic warmth of EL34 pentode sound.

I've recently spent quality time with the Audio Research D70 Mk. 2 stereo amp, in my estimation one of the great amps from the 1980s, and one that embodies that classic ARC "high definition" sound. The D70's warm and vivid midrange coupled with an expansive soundstage definitely push most of my buttons. It serves as a reminder of the sort of tube sound pretty much forgotten by modern designers. No, it isn't perfect at the frequency extremes, and resolution of low-level detail isn't on par with current designs, but it reaffirms why I signed up for tube amplification so many years ago. Now imagine the

Specs & Pricing

Type: Push-pull, Class AB
Output power: 46Wpc @ 8 ohms, 51Wpc @ 4 ohms
Tube complement: Two 12AX7, two 12AU7, four KT77
Sensitivity: 1.2V
Input impedance: 50k ohms
Output impedance: 1.6 ohms
Dimensions: 9" x 8.5" x 14.5"
Weight: 9.7 lbs.
Price: $5800

LINEAR TUBE AUDIO
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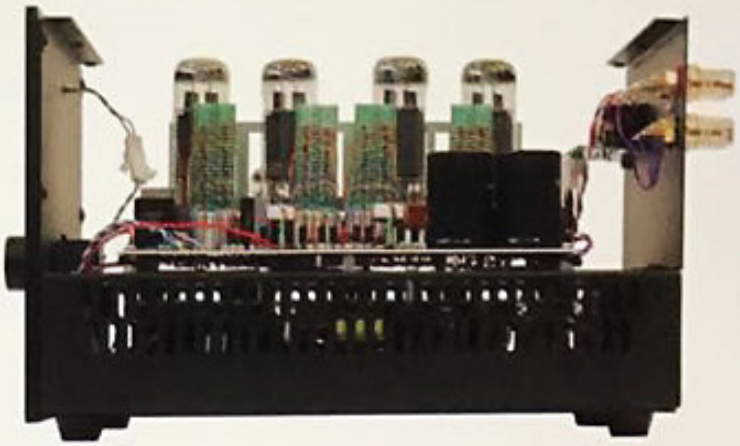
ASSOCIATED EQUIPMENT
Speakers: Basszilla Platinum Edition Mk2 (DIY)
Analog source: Kuzma Reference turntable and Stogi Reference 313 VTA tonearm, Clearaudio da Vinci V2 mc
Digital sources: MacBook Pro laptop running Amarra V3.04 software, April Music Eximus DP1 DAC, Mod-Wright modified Sony XA-5400ES SACD player
Preamplifiers: Nouveau Flamingo (DIY), Brown Audio Labs SP-1B, Experience Music autoformer volume control
Cables: FMS Nexus-2, Wireworld, and Kimber KCAG interconnects, Kimber KCAG speaker cable
A/C Power: Monarchy Audio AC-Regenerator, Sound Application power line conditioners



ZOTL40 displacing the ARC in my reference system and guess what happened? In a nutshell, midrange coloration vanished, transient resolution improved, the treble range opened up, and bass line precision kicked in.

Over the past decade or so I've been addicted to collecting vintage turntables, mainly linear-tracking types. By a recent count my collection stands at eight tables. After experimenting with several analog front ends, there was no doubt in my mind that the ZOTL40 was a model of tonal neutrality, a rare happening amongst tube amplifiers. That's not to say that it always sounded neutral. It basically took on the colorations of whatever I threw at it, much like a sonic chameleon. It never masked the character of any front-end component.

As with the Berning ZH-230, transient speed at the point of attack was superb. My first tube amplifier some 50 years ago, the Dynaco ST-70, was wildly popular and went on to outsell all other tube amplifiers. Using it as a prime example of a conventional transformer-coupled tube amp, I can assert that in general an output transformer's limited bandwidth rounds off the leading transient edge making textures more liquid than the real thing. Of course, not all output transformers are created equal, but no conventional tube amp in my experience has matched the speed of a good OTL. Sweet, mellow, and overly liquid is how I remember the ST-70. It probably covered up a multitude of front-end sins in those days and made the listening experience a lot more fun. The ZOTL40 on the other hand offered a much more realistic sonic presentation. It always retained its innate tube character with just the right touch of harmonic lushness while maintaining speed and transient control. To put it into perspective, this is one of those amplifiers that I could listen to all day. (Reproduction of the treble range, and in particular violin overtones, is grain-free and effortless and does much to enhance long-term listenability.)

There was much discussion in the 1970s about soundstage transparency, the ability to access the inner recesses of the stage as a function of stage depth and width. That's probably because back then so few power amps possessed that ability. The state of the art has advanced drastically since then, and many power amps now offer transparency on tap. I don't recall using the term veiling in a long time and don't plan to use it in the context of the ZOTL40. With a respectable front end, it was easy to pinpoint individual image outlines within the confines of a spacious soundstage. Massed voices were easy to resolve with excellent spatial separation.

Rhythmic drive was aided by a well-defined bass range with excellent pitch definition. The amp's output impedance

Tech Talk

In many respects the ZOTL40 is similar to the ZH-230 amplifier I reviewed in Issue 210. One obvious difference is the switch from TV sweep tubes—which David Berning has used in many of his designs—to audio tubes, specifically the EL34 power pentode. According to Berning, sweep tubes such as the ZH-230's 33JV6 really shine when they are used with screen drive in triode mode at high plate voltages since both high-power output and efficiency can be had in such a configuration. The Berning Quad Z does exactly that, but neither the ZH-230 nor the ZOTL40 use the output tubes that way. The attraction of the 33JV6, says David, was its availability as inexpensive and good quality new old stock (NOS). He concedes that a disadvantage for the sweep tubes is that they may not be available in all countries under the same type number, or available as replacements from many vendors. The EL34, on the other hand, is readily available and has quite a following, though locating great-sounding new production is not so easy, while NOS is hard to find and quite expensive.

Another significant change was to lower the operating frequency of the ZOTL40's impedance converter to 250kHz from the 500kHz used in the ZH-230. Berning has been phasing in this change on many of his newer designs because he wants to increase the frequency at which the switching power supply is operated from 70kHz to the same frequency as the ZOTL. And since it is not practical to operate the power supply at 500kHz for efficiency reasons, the common frequency was set to 250kHz. The benefit is that when the power supply and the ZOTL operate at the same frequency, noise from intermodulation between harmonics of 70kHz and the ZOTL frequency is eliminated.

is given as 1.6 ohms and did not give any trouble in the context of the Basszilla DIY loudspeaker, though I imagine that the highish output impedance could reduce bass weight with some low-impedance loudspeakers. A feedback loop from the output stage to the 12AX7 input tube is used to maintain output impedance at a reasonable level. The manual mentions the possibility of substituting a lower gain 5751 for the 12AX7. I haven't tried that, but I suspect that it would slightly increase the output impedance and reduce sensitivity.

I've left the best for last. My gut-level reaction to a particular audio component is driven by its dynamics, its ability to coax the full spectrum of emotional nuance from a given recording. It starts with microdynamic nuances, and these the ZOTL40 was able to convincingly bring back to life. It didn't shy away from giving full scope of expression to macrodynamics, either. When the occasion demanded, each orchestral climax was reproduced with plenty of startle factor. But keep in mind that the ZOTL40 is nominally a 40Wpc amplifier and should therefore ideally be matched with speakers of at least 88dB sensitivity, unless you're happy to listen in a small room at low-volume levels.

It's hard to believe that it has already been 20 years since David Berning was granted the ZOTL patent. The good news is that it is as relevant today as it was back then. The technology still delivers a substantial dose of tube magic while avoiding the pitfalls of tube euphonics. Finally, here is a ZOTL amp based on the readily available EL34 power tube. OK, so tube life has always been advertised as extending into the many thousands of hours, but even so, it's nice to no longer have to worry about scrounging around for TV sweep tubes. Easy to listen to and fully capable of releasing the music's drama and tension, the ZOTL40 is worthy of an enthusiastic two-thumbs-up recommendation. I expect it to reside in my listening room for a very long time. Be sure to audition it if you're in the market for a medium-powered tube amplifier. tas