

AUDIO HEAVEN... Quebec Style! The Tenor Audio Classic 75 Amplifier

I consider myself a pretty serious audiophile. I think that I might always have been one; even prior to the past forty years of my conscious submersion in the fine art of music reproduction. So, while the music certainly is the priority, I must also confess my dedication to the high-end audio paraphernalia and its optimized use. I've traveled the road of tubes, vinyl, high-speed tape, dynamic and electrostatic speakers, solid state, digital, passive components, room treatments, more cables and tweaks than I care to remember, AC conditioning, single-ended triodes, high resolution digital et. al. And now, finally, I'm standing at this audiophiles' version of Heaven's Gates... the OTL (Output-Transformer-Less) amplifier!

Some of you are bound to disagree with this characterization and that's fine with me. You may never have heard what I have experienced. Or, maybe you've heard something that's even better, beyond my gates. Many years have taught me that there is always something better... or there soon will be.

The Canadian province of Quebec is unusual in many ways. For starters, they prefer the French language there, a cultural rarity on the North American continent. In many respects the Quebecois are also more style conscious and eat better food than the rest of us, at least in this part of the world. And then there is *Le Son*. Few places can boast of a more intense interest in sound reproduction, including a thriving cottage audio industry, than Quebec. The local provincial government has even stepped in with financial support at times. I became aware of this audio hotbed when, among many other well known locally produced high-end audio products, I first noticed the Oracle turntable, the Classe electronics and, of course, my much loved Verity Audio loudspeakers, which were my first taste of true audio heaven Quebec-style. To this I can now add the astounding, and absolutely breathtaking, Tenor Audio OTL-amplifiers.

OTL-amplifiers generally have suffered an undeservedly poor reputation, at least it is not warranted in recent times (the history of OTL's is said to go back all the way to the 1920's). Several decades ago perhaps, during the mid-1950's through the late 1970's, earlier generations of modern-day OTL's had some problems with reliability, stability and speaker compatibility (speakers were notoriously inefficient then, and OTLs were not suitable amplification for them). But, such difficulties are now long past. Components and speakers are so much better today and the OTL design concept is consequently resurging. The early New York Audio Laboratories' Futtermans have been succeeded by Ralph Karsten's outstanding Atma-Sphere designs and by entries from Croft of the UK and Graaf from Italy, among others. Tenor Audio of Canada is a relative newcomer to this illustrious group of artisans in the finest of audio crafts, and what an auspicious debut it is!

Tenor Audio is the brainchild of three Montrealers, Robert Lamarre (also known for his Lammhorn horn speakers), Francois Lemay and the designer-extraordinaire Michel Vanden Broeck. The latter is responsible for the design of the Tenor Classic 75 amplifiers that have now replaced the Lamms in my room. Let me explain this early on; while I still feel that the Lamm ML2 is the best single-ended triode amplifier I've heard, it is no match for the Tenor in several, for me critical, areas. The same goes for the unbelievably cost-effective and better-than-they-have-the-right-to-be Aloia solid-state amplifiers that I have fondly waxed about in recent issues of UA. It simply boils down to this; I've just never experienced anything like what these OTL-amplifiers can do. Call it heads-over-heels infatuation. In building my reference system, I have diligently followed a strict credo: Whatever sounds best to my ears (after exhaustive comparisons) stays. This is my way of assuring that my reference is evolving into an ever-refined producer of music in my home. Nowadays, there are relatively few changes (unfortunately!) and they occur less frequently (thankfully!). However, one way or another I now have to bite that bullet again. These amplifiers will remain in my listening room.

Michel Vanden Broeck is a transplanted Belgian electronics engineer who started building single-ended tube amplifiers at the early age of 14. He found a good teacher in an aging audio engineer who taught him many of the finer points, and he was an eager student. For a while he had his own shop in Belgium modifying tube amplifiers for musicians. After landing in Canada in 1988, Michel got involved in the professional side of audio. This eventually led him to work on designing navigation systems for airports, providing a valuable experience in RF and Microwave technology which he has since been able to transfer to his consumer audio designs. He also started building custom ordered preamplifiers and push-pull amplifiers on the side. He's had a long-standing interest in OTL designs and when he was asked by a customer to build an OTL amplifier it gave him a welcomed opportunity to immerse himself in this technology. He quickly became convinced that regulation would play an important role in his OTL designs and he utilized a proprietary regulation circuitry that he had previously created for push-pull application. As we shall see below, this is a crucial element in the success of Michel's OTL designs.

Vacuum tubes are generally considered excellent amplifying devices. They have wide bandwidth with relatively low distortion and thus require little, if any, feedback. Traditional tube amplifier design holds that an output transformer is needed to convert lower speaker impedances to a more suitable load and to decouple a speaker from these thermionic devices. Otherwise the speaker could be severely damaged if something goes wrong with, for instance, an output tube. Likewise, it is also recognized that such an output transformer puts a lot of passive "conductive metal" between the amplifying device (the tube), and the transducer (the speaker) and that this invariably has a negative effect on the signal and thus the sound reproduced. Even in the finest single-ended or push-pull designs the output transformer is a weak link.

Today's better speakers tend to have steady load impedances in the range of 4 to 8 Ohms or a little higher. Rarely do you find full-range speakers that dip down much below 4 Ohm (smaller monitors that are asked to produce extended low frequencies can sometimes dip down to the 2-3 Ohm level). Since OTL amplifiers prefer relatively even impedance curves and don't like to see very low impedances this now makes the OTL a very viable alternative for the purist, especially if his speaker presents such an even load to the amplifier over the applicable frequency range.

So, the OTL-type amplifier can be said to be a "pure" tube amplifier, producing the sound without the limitations of an output transformer.

What can one expect from this "pure" tube amplifier? Well, if properly designed, many audiophiles feel that this is the most refined amplifying device extant. It is capable of exquisite refinement, great beauty and delicacy. This is perhaps better recognized internationally than in North America. Both in Europe and Japan there have been thriving interests in OTL's, as well as for single-ended triodes, for decades.

The Tenor Classic 75 integrated OTL amplifier that is now chained to my listening room, with little hope of escape, is a powerful and technically advanced design. It produces the best sound that I have hitherto heard here or elsewhere. Big statement, indeed, and meant to be exactly that. It has delivered such a substantial improvement over my fabulous and venerable Lamm ML 2 that my choice is fairly easy. While not inexpensive at \$18,600 for the pair of Tenor monoblocks, it is considerably less than one would have to pay for a pair of Lamm ML 2's. In addition, of course, the Tenors are much more powerful, and thus able to handle speakers of lower efficiency than the Lamms can credibly do. A good thing for a reviewer!

My review pair of Tenor 75's came straight from the 2001 CES exhibit so they were well burnt-in. I'll never forget my initial listening session with them! With incredible clarity and dynamic vividness they presented the familiar music with such beauty and natural immediacy that it stunned me. After a while I started, as I typically prefer to do, to try to analyze the sound against my immediately preceding reference. I'm one of those reviewers who really believe in early impressions of

differences between equipment and I find that I rarely change them later on (caveat: This, of course, presupposes that the equipment is well “aged” before the initial listening).

What I first noticed after inserting the Tenors in my reference system was deductive in nature, and entirely new to me; a unique absence of what I like to refer to as the “halo” around instruments and voices. In my forty years in this hobby I’ve always heard “halo”-effects to varying degrees, but I’ve never experienced the purity of the complete absence of the “halo”. Let me try to explain this: Even with the finest equipment that money can buy I have always felt that an individual musical image has somewhat diffuse edges surrounding it. Also during very concentrated listening it is hard to identify the exact outline of an instrument or a voice. Obviously, instruments radiate their sound, but this is not the effect that I’m referring to. I’m talking about a general diffusion of sonic images. It varies in extent depending on the quality of the components involved, but it has always been there for me. This diffusion, or “halo”, however insignificant it may be in an outstanding system, robs the soundspace of definition and dynamics and this has an unfortunate negative effect on its perceived transparency and clarity.

The sudden, and unexpected, absence of the “halo” was both exciting and stunning, and I knew that there must be a reason for it. Within the hour I was on the phone with the Tenor people to see if they could shed some light on my experience. “It is the result of being able to stabilize and fixate the amplifier’s operating point,” I was told. “If an amplifier’s operating point is drifting, even slightly, you end up with diffusion of the image. Our design uses extensive regulation which steadies the operating point regardless of output power variations” (see Technical Highlights). To my ears, this “clarifying” effect produced by the Tenor OTL-amplifiers puts them in a league all of their own. No other amplifier that I’ve heard can reduce the “halo” to this degree, or even eliminate it entirely. The reason I’m making such a big deal out of this aspect of the Tenors is that I’ve just never experienced it before. Nor, dare I say, have you.

Further listening to the Tenors revealed more elements of excellence. Frequency extremes are rendered with exemplary extension and naturalness. High frequencies are absolutely clear and grain free and the bass is impactful, yet nuanced and vibrant. The stunning clarity of these amplifiers produces a soundspace of extraordinary proportions and accuracy. It’s more open with better acoustics than I’ve ever experienced. Small localization clues become quite obvious and help to produce a “you-are-there” sense that is utterly compelling. Frequent readers will know how much I enjoy the excellent “*beyond the Missouri Sky*” Charlie Haden and Pat Metheny recording, especially the “Message to a Friend” cut. This recording is exquisitely detailed with all kinds of ambient clues in spite of the larger-than-life instrumental images. For instance, at the one-minute time mark there is a turning of a page in the sheet music. On most systems it might be fairly difficult to hear this at all, and virtually impossible to hear in which direction the page is turned. Not so with the Tenors in my system.

Dynamic shading, which is so critical for a natural sound, is right on; giving instruments and voices an unmistakable natural tone. Interestingly, Michel Vanden Broeck has independently developed some of the same theories that have so successfully guided Vladimir Shushurin of Lamm. Both maintain that there is a very intricate relationship between distortions and frequency/amplitude that permit the human brain to perceive and interpret the sound as natural. Michel believes that harmonics can either mask or enhance distortions and he has developed the theory that a good balance in harmonic distribution will give maximum neutrality and transparency with absence of coloration (see Technical Highlights). Judging from these amplifiers there is no doubt that he’s on the right track here.

Another somewhat surprising aspect of the Tenor amplifiers is their amazing stability. OTL detractors have always told me that such amplifiers are prone to great instability with sometime dramatic expressions and fiery results as tubes fail. This is not the case with the Tenors at all. It seems that the extensive regulation of the power supply makes the Tenors virtually immune to AC fluctuations. Once the bias has been set and stabilized it remains very stable and require little, if any, maintenance.

I've always had to struggle with this aspect of my single-ended triodes because of my variable AC supply here in southern Connecticut. So, this is a welcome and gratifying experience.

The Tenors do run hot but their silent and effective fans, with attached filtration system, keeps temperatures under control and undoubtedly extend tube life. Tube biasing is very simple and monitored through a built-in meter with individual trim pots for each 6C33C-B output tube. There is selector switch for these tubes on the top cover as well as a fine-tune pot for DC offset. On the low, elegantly curved wood front panel there are two knobs; one is a stepped volume pot and the other is an input selector for the four inputs (of which one is "direct" and bypasses the volume pot by the flip of a toggle switch under the selector). Beneath the volume pot there is a toggle switch to mute the outputs. The back panel has four single-ended inputs (RCA) and a balanced input as well as a main fuse holder. The AC cable is detachable.

So here I am, at the threshold of audio heaven with the gates thrown open. Who would have thought that an OTL-amplifier from Canada would bring me to this point? I'd expected it to be something more dramatically different. The Tenor design is based on sophisticated technical application of good engineering that have been meticulously executed. The result is a product of very unusual merit.

Without any question; these are unique amplifiers. Their strengths are so obvious and profound that it becomes very difficult to critique. Most of the time listening to them I was just sitting there in awe, spellbound, with my critical faculties temporarily suspended. And so it remains today. Never have I heard familiar music like this! I can't find anything wrong with these amplifiers at all, except perhaps that I can't easily afford them. And yet, I'll propose to you that in the typical high-end world of diminishing returns on investment, they represent good value for money. They do very specific things for music reproduction that I thought not to be possible. And, in that they are truly unique. How do you put a price on this for an audiophile?

Me gushing? Nah...it's Springtime and I'm in love with a Tenor!

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Output-Transformer-Less (OTL) Power Amplifier; Designer: Michel Vanden Broeck; Power output: 75W into 16 and 8 Ohms or 55W into 4 Ohms; Class A Power: 40W; Dynamic Headroom: 6dB; Frequency response: 3Hz to 155KHz (-3dB); Input sensitivity: 700Mv RMS for full power; Damping factor: Typically 20 re: 8 Ohms and 10 re: 4 Ohms (from 20Hz-20KHz); S/N ratio: -100 dB A; Input impedance: 40 KOhm; Output impedance: 0.4 Ohms; Input tubes (pairs): 12AX7A, 6H6P, 6H30P; Output tubes: 4 x 6C33C-B; Weight: 70 Lbs. Dimensions (inches): 17.25Wx23Dx11H. Warranty Amplifier/Tubes: 3/1 years; Price: \$18,600 per pair.

TECHNICAL HIGHLIGHTS

On the surface, the Tenor Classic 75 OTL-amplifier might appear to be a traditional design. But this is far from being the case. While its heritage might be clear and traceable, the sophisticated and careful application of its technology is in many respects new. In this technical sidebar I'll specifically zero in on two of its many virtues; its clarity of image and its harmonic integrity and richness.

OTL-amplifier topology basically stem from two principal versions. They are either based on the brilliant Julius Futterman's single-ended designs starting from the mid-1950's with subsequent refinements by Technics and others, or the so called "Circlotron" balanced design developed by A.M. Wiggins.

The Tenor amplifier is fundamentally a Circlotron design, with an unusual input stage (actually two separate stages with a controlling local feedback loop) and utilizing two additional stages, including a regulated special driver stage permitting the use of some negative feedback (14 dB in two local and two global circuits) resulting in lower output impedance (down to 4 Ohm), and a fully regulated DC-coupled output stage. The advanced design of the driver stage with its extensive regulation (there are actually a total of 10 stages, or points, of regulation in this amplifier, but no servo loops) is the reason that the Tenor can operate with fixed operating point stability. If there were no regulation the operating point (plate current in relationship to plate voltage and bias voltage) would tend to drift with the plate voltage fluctuations causing the audio image to “bleed” (i.e. the “halo”-effect mentioned in the review) and become diffuse. Expressed differently, a stable operating point eliminates, or dramatically reduces, the modulation of that point and thus avoids some type of dynamic distortion that creates the “halo”-effect. A consequence of the stable operating point is also that the DC offset drift can be easily controlled and is more predictable. Another subjective impression of a stable operating point is one of great dynamic speed, which is the result of much less dynamic compression. This obviously aids the transparency and sense of clarity of the amplifier.

Transparency is also the result of good distribution of harmonics according to Michel Vanden Broeck. He has studied psychoacoustics, and how humans perceive sound, extensively. He took a special interest in how distortion affects the way music is interpreted by the brain (much like Vladimir Shushurin has done). Michel learned how harmonics could either mask or actually enhance distortions. He believes that there is an optimal relationship between harmonics, especially the second and third harmonics (this assumes that subsequent harmonics diminish gradually). The Tenor design is able to maintain a minimum 6 dB gap between the second and third harmonic and to keep that original relationship stable through the application of local feedback. To achieve this he had to carefully choose the tubes used, the circuitry topology and the operating point. There is also local feedback between the amplifiers second stage and the input stage and this reduces the distortion and helps to control the bandwidth precisely.

Finally a word about the output tubes, the 6C33C-B, which is much debated for reliability reasons but remains a firm favorite among OTL devotees, both hobbyists and Pros. This tube was chosen because it is easily available and relatively inexpensive. To protect the tubes and to improve their reliability as well as extend their life, a current limiter is connected in series to protect the filaments. This current limiter reduces the in-rush current from 7 Amps to 3.5 Amps and thus prolonging the tubes life. To re-tube a pair of Tenor amplifiers is estimated to cost \$350 and includes a one-year tube warranty. The expected lifetime of the 6C33C-B's is around 3,000 hours while the smaller input and driver tubes will last for about 8,000 hours. The Tenor design appears to be a very reliable design.