Pass Xs Preamp and Xs 300 Mono Power Amplifiers

Major New Challenges to the State of the Art

Anthony H. Cordesman

This is a case where I need to begin a review by reminding the reader that the name of this magazine is *The Absolute Sound,* not the *Cost-Effective Sound.* Both products I'm reviewing—the Pass Xs preamp and Pass Xs 300 power amplifier—are efforts to provide that absolute sound without compromise in either quality or price. They are new top-of-the-line components that push the state of art in audio to its limits, and they are priced accordingly. The Pass Xs Preamp sells for $38,000, and the Pass Xs 300 mono power amplifiers sell for $85,000 a pair.

As might be expected from Pass Labs' history, both components meet their goal. At the risk of eliminating any suspense from this review, they are the two best-sounding examples of a preamp and power amp I have yet heard. The kind of gear most audiophiles dream about—which only the truly lucky can afford—and that redefine the perceptions of reviewers during the all-too-brief time they pass through their systems.

A Case Study in Searching for the Limits to the High End

There is, however, a broader purpose to this review than simply praising the Xs preamp and Xs 300 amps. I've been reviewing Pass Labs components for years, and Nelson Pass' amplifier designs since the peak of high-end audio's popularity during the early Fillmore Administration. I use a Pass XP-30 preamp and a pair of Pass XA-160.5 Class A mono amplifiers in my reference system. Reviewing the Xs preamp and the Xs 300 mono amps gave me the opportunity to put the merits of two true new assaults on state of the art in perspective. It allowed me to focus on the level of improvement you actually get from designs with a total cost of $123,000, when my reference XP-30 preamp and XA-160.5 mono amplifiers cost $38,500, and other truly excellent Pass components like the XP-10 preamp and XP-150.5 stereo amp cost a total of $10,750, and the superb INT-150 integrated amplifier a mere $7150.

The answers to these questions aren't simple, and they are discouraging to audiophiles on much tougher budgets. Every Pass preamp and power amplifier I've heard has been remarkably neutral, worked easily with a wide range of front-end components and loudspeakers, was free of any solid-state coloration, and was transparent and neutral in sound quality. You begin with truly musical components, and they get better and better. Moreover—as is the case with every other top manufacturer of high-end preamps and amps—the level of improvement in sound quality relative to price is a matter of steadily diminishing returns. You have to pay more and more for less and less improvement.

I wouldn't be a high-end-audio reviewer or an audiophile, however, if I had an accountant's objectivity in measuring the incremental benefits from investing in top-of-the-line equipment. Like car freaks, wine snobs, and stamp perforation-edge perfectionists, my goals are not to be cost-effective, but to go to the limits of the sound quality I can afford—and all too often beyond. Real audiophiles pursue the limits of the high end for its own sake. We share a hobby or "sport" that largely ignores the reality of diminishing returns with each additional dollar spent. Success or "winning" consists of getting the best possible musical experience within a given personal budget. If you want to be cost-effective investing in Pass Labs equipment, buy the INT-150 and read TAS simply for your dreams.

The Pass Xs Preamp

So let me begin with the Pass Xs preamp, and try to explain why I soon came to feel the level of sonic improvement was both real and worth it to audiophiles who can afford it. Let me also set the stage by noting that virtually all high-end manufacturers tend to voice their equipment to a consistent standard. That standard tends to evolve with time and becomes steadily more realistic and musically enjoyable, but years of reviewing have taught me that given manufacturers and designers have consistent biases in the sonic nuances they voice into their equipment.

Equipment that measures "flat" using steady-state sinewaves into a fixed load does not sound flat reproducing complex musical signals into real-world loudspeakers. Some manufacturers voice for a slight bass boost, some add a slight boost for midrange or treble detail. Some voice for a more dynamic sound or more detail. Some voice for the warm and forgiving. I'm in the camp that says preamps and amplifiers can't affect tempo or rhythm—and modern digital electronics and the best turntables are incredibly accurate in this domain—but a slight upper midrange rise can give the music more apparent life.

This voicing of electronics also affects soundstage width, imaging size, and back-to-front realism and perspective. Some manufacturers voice for a wide, more front-of-the-hall soundstage. Some seem to play with imaging, and a few seem to play with depth. Centerfill is another related issue, and one I suspect we understate in reviews because—like depth—it is usually dominated by the recordings, speaker, and room setup.

To me, the best electronics have as little of this characteristic voicing as possible. I'm a mid-hall listener, unless I'm reviewing; I listen almost exclusively to acoustic music and small jazz groups, classical groups, and soloists, rather than band, orchestra, opera, etc. With a library of music that involves thousands of mediocre to excellent recordings going from the 1930s to the present, I don't want someone else's biases to give me apparent "insights" into part of my recordings, and mask or color the majority of the rest.

This is one reason that I minimize references to the sound of individual recordings in my reviews. My concern is sound using a musical library, and far too often I find that a sudden "insight" into the music on a given recording usually proves to be a warning of a broader problem in listening to a full range of music. I have enough problems dealing with the voicing in my recordings, the sharper colorations in front-end components, and the unavoidable problems in matching even the best speakers to a given room and listening position.

SPECS & PRICING

Pass Xs Preamp
Max output: 22V
Output impedance: 20 ohms main balanced per leg; 50 ohms aux balanced per leg; 120 ohms single-ended RCA, either
Noise floor: -122dB ref to 5V
Distortion: .001% 1kHz 5V
Frequency response: -1dB@1Hz and 100kHz
Channel separation: Greater than 110dB
Residual broadband noise: Less than 25mV
Max gain: 10dB
Volume control: .5dB steps
Power consumptions: 55W
Dimensions: 19" x 6.25" x 14"
Weight: 80 lbs.
Price: $38,000

Pass Xs 300 Mono Amplifier
Gain: 26dB
Power output: 300W into 8 ohms, 600W into 4 ohms
Input Impedance: 200k ohms bal, 100k ohms single-ended
Power consumption: 1000W
Number of chassis: Two per amplifier channel
Dimensions: 19" x 11.5" x 27.5", each chassis
Weight: 168 lbs. (power supply), 130 lbs. (amplifier)
Price: $85,000

PASS LABORATORIES INC.
13395 New Airport Rd.,
Suite G
Auburn, CA 95602
(530) 367-3960
passlabs.com

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At a different level, attention to electronic and physical noise and hum also varies, although any such problems have become far less audible over time. Like most audiophiles today, I want and expect my music to come out of a "black hole" of silence. I now find even a trace of electronic hum, noise, and hiss annoying—particularly with solo instruments in the quiet of the night. Some of my friends—particularly audiophiles who prefer the tube classics of the 1950s and 1960s—will listen gladly through such problems.

Moreover, the more I review, the more I come to distrust what I have come to regard as "trick" electronics. Preamps that minimize features to the point they don't even have a balance—to me an "imaging" or "soundstage" control—or enough XLR and RCA inputs and the equivalent of a tape loop; preamps and amplifiers that are remarkably sensitive to given cables and loads; underpowered amplifiers that work well only with some music on a handful of speakers; and particularly amplifiers whose wattage rating are not matched by high current, extension into the deep bass, and the ability to tightly control a wide range of speakers.

These criteria are why I now use Pass Labs preamps and amps in my reference system, why I use and have used equipment from other manufacturers, and why I praise the electronics I review when they deserve it. Overall balance and lack of coloration or voicing, and lack of equipment noise and interaction problems, are the reasons that I have used the Pass XP-10, XP-20, and XP-30 preamps as references in the past. Each has proved to be progressively better—as have the preamps I've used as references from other manufacturers.

I have wondered each time whether the new Pass preamp was really going to be all that much better than its predecessor. As with most of the top high-end manufacturers I've worked with in recent years, I've never heard any Pass equipment that did not provide excellent sound by most standards—regardless of price. I've also found the improvement to be progressively smaller and harder to describe. The fact is that most high-end preamps and amplifiers today are notable successes regardless of price, and the ones that have the least apparent voicing present more and more problems in describing the sonic differences.

The Xs preamp is, however, definitely better that the XP-30, and even more of a challenge to other manufacturers. Its price tag is an issue, but the Xs is better in every respect, and not just in sound quality. It has better ergonomics: The display is larger, and the volume and balance settings are more obvious; it has a polarity button that can make a real difference in sound quality; and the steps in the volume and balance controls seem more precise. It is a large two-chassis unit, rather than a stack of slimmer units—three in the case of the XP-30—which makes hookup easier. Although having an easy choice between XLR and RCA inputs is a strength of almost all Pass designs, the Xs interfaces perfectly with the Pass XP-25 phono preamp. It also retains the ability to independently adjust the outputs for bi-amping—a key feature with more complex systems.

As you might expect, the Xs also pushes the limits of its components and circuit design well beyond the capabilities of the Pass XP-30 preamp I use as a reference (along with the EMM Labs Pre-2 preamp). The noise floor is an incredibly low -122dBV. The Xs retains the features of the XP-30, but has more output and can swing enough voltage to drive a balanced follower output at 150 watts rather than 80 watts. There are three advanced power supplies, and they drive what are the equivalent of dual-mono, gold-plated ceramic circuit boards.

When I asked Nelson Pass to describe the design activity that led to the Xs Preamp's sound quality and price, he replied as follows: "Wayne [Colburn] was given an unlimited budget to do whatever he wanted: 'This is your chance to go all out, Wayne. We aren't calling this Xs for nothing.' And so the approach is more like obsessive attention to detail armed with lots of money.

"Gold Megtron and ceramic circuit boards, hyper-selected and matched NOS FETs, crazy regulation and isolation, fabulous relays and switches, bigger display, more expensive parts and more voltage, more bias current, and still *more* voltage and bias current. 'I want to be able to drive Magicos directly with this, Wayne!'

"There are a couple tricks I can't talk about, such as how he got this great performance out of the volume controls, or the bias regulation of the output circuits, but most of the technology is *excessively* straightforward.

"Starting with two prototypes that measured very well, the last year has been spent tweaking them in tandem with a totally subjective approach—probably more listening time than any product we've ever done. Back and forth. More time, attention, work, imagination, and money is what we put into these products."

I also asked Wayne—the lead designer on the Xs Preamp—to summarize his view of the impact of the design improvements in the Xs and how making them improved sound quality, and he provided the following background:

"This preamp is the sum of a lot of small things, from the first one I worked on at Threshold (the Forte 44), to all the small circuit refinements over the XP-30 and the group of people involved in testing and listening. It was also fun to do, especially when finished. It is DC-coupled as well. The XP-30 used custom caps, but no cap at all is better. It provides better bass and extended resolution throughout the full range of music. I feel the servo-system I came up with works better than previous configurations I have seen or tried.

"The use of the optimized circuit-board materials has subtle effects. Sonically, it seems to lower the noise floor ever so slightly and give a bit of top-end extension. I also love the way solder works on the ceramic circuit boards and their gold-plating. I am not sure being rated for 280 degrees C does much, but it can't hurt. The main board uses a new-to-us Panasonic material designed for high-speed computer routers, and the power supply has a high temperature board with heavy copper plating. There are thus a total of four different types of circuit board materials in the Xs.

"The new gain modules also use higher-power Toshiba devices for the cascode portion of the circuit and the pre-driver stage, allowing for more bias, which gave a bit more clarity and space in the sound. Two separate circuit boards for the power supply made for a marked improvement in instrument placement and bass control. The measured crosstalk is also better. The output stage runs twice the bias and sets itself automatically, so it is very stable and comes to its best operating point quickly. I think this makes for a better power amplifier interface."

I found in comparing the Xs preamp with the XP-30 that Wayne met all of his goals in improving sound quality and other improvements, as well. The XP-30 is a truly great preamp, but the Xs preamp is a better preamp at every level. It provided an audible margin of musical realism that was progressively more audible as speaker quality improved over a broad range of recordings with a variety of different front-end components and power amplifiers. (I used my Wilson Alexias and Legacy Aeris speakers, an aging pair of Spendor BC-1s, a pair of older Electrovoice horn speakers, and a friend's Quad 2905s—a friend crazy enough to actually bring his speakers to my listening room.)

Could I hear more realistic musical energy and dynamics at every level from my best recordings? Yes. Was there more musical life? Yes. Did I hear more soundstage detail with the recordings that really have one? Yes. Was there even more freedom from even a touch of upper-midrange hardness without softening strings, solo piano, or woodwinds? Yes, again. Was there slightly more electronic silence? Yes, although at an almost sub-audible level compared to the XP-30—and at only slight improvements over my memory of the sound of the XP-10 and XP-20.

The already exceptional highs of the XP-30 were even more natural. Bass definition was slightly improved in the mid and upper bass, along with the transition to the lower midrange. Male and female voice were equally excellent and somewhat more open and natural. Complex organ passages were a bit cleaner, and so were complex orchestral dynamics. I've never found recordings of large jazz bands to quite live up to the live listening experience, but the Xs preamp sometimes almost forced me to pay close attention to just how creative some passages of big band music can be.

This is an ideal preamp if you want to get the very best sound from your best LPs and for testing the limits of high-definition digital downloads. More importantly, it is a preamp that allows you to fully appreciate both the fun the Modern Jazz Quartet could have with the right music, and the subtleties of the best recordings of Bach's most complex choral music.

I did keep trying to pin down exactly why the Xs preamp sounded better than the XP-30, and I kept finding that the improvements in the Xs were limited and not confined to any one area. They did, however, make the Xs consistently more musically natural and involving.

At a given point, however, describing the improvements in transparency and neutrality becomes an exercise similar to trying to write a long essay on different shades of red. You can try to make the prose exciting, but you really can't describe the color red.

As for trying to rank or quantify such improvements, I ultimately found myself reacting to such efforts in the same way that I do to attempts to precisely rate wines from 1 to 100 with difference scored down to the last digit. Saying one bottle ranks a 91 and the other ranks a 92 implies you can really measure such difference consistently. Throwing references to the taste of wild raspberries, forest mushrooms, and oak trees, doesn't help. (Query: Would a wine snob really know an edible forest mushroom from a poisonous one? How many oak tress and wild raspberries has he actually eaten?) Each level of improvement in Pass Labs or other preamps is audible, but if you begin with excellent overall sound quality, trying to quantify the level of subjective improvement is simply impossible.

The Pass Xs 300 Mono Amplifier

As you may already expect, I had much the same experience with the Xs 300 mono amplifiers. The differences, were, however, more dramatic because I was comparing amps with such different power levels. The Xs 300 mono amps were not only better sounding in every respect than the XA-160.5s, but they had nearly twice the power: 300 watts into 8 ohms, 600 watts into 4 ohms, and 48 amps worth of peak output current. In contrast, the XA-160.5s deliver 160 watts into 8 ohms, 320 watts into 4 ohms, and 36 amps of peak output current.

I had originally chosen the Pass XA-160.5 Class A mono amplifiers over the more powerful Pass Labs X600.5 and other outstanding amps that were then available from other manufacturers that were not Class A because the overall mix of trade-offs was audibly worth it with the system and speakers I had at the time. I knew from long experience that this would mean a slight trade-off in the most exciting and detailed aspects of musical dynamics, but I felt it more than made up for this in other aspects of sound quality—particularly in lower-midrange realism and warmth, and in putting an end to any trace of edge in the upper midrange.

In the case of the Xs 300, however, the increase in power really makes a difference in both apparent musical "speed" and detail, especially in high-level dynamic peaks with top modern speaker designs like the Wilson Alexia. It was apparent with the sound from the woofers and other drivers on my Legacy

Aeris, even though they have the equivalent of built-in amplified subwoofers. It helped improve the resolution of musical energy and dynamics, from microdynamics to the highest-level peaks, which good speakers like the Quad 2905s can resolve without distorting. Good as the XA-160.5s are, the Xs 300s made them seem just slightly polite and forgiving in contrast.

The Xs 300s do involve a major increase in size and weight. Each mono amp has a separate power-supply and gain unit; each unit is 19" x 11.5" x 27.5". The gain unit weighs 168 pounds and the power supply 130 pounds; both consume some 1000 watts of AC. This may pose placement problems, but the styling and new meters are both restrained and visually impressive.

The Xs 300s are the kind of components that make a real visual statement to other audiophiles. That really shouldn't matter. However, if you do happen to be an authoritarian leader and high-end audiophile who is seeking to intimidate other high-end authoritarians—and to do so with style and dignity—these are the amps for you, *and they match the Xs preamp*!

At the same time, as Nelson Pass makes it clear in the Pass literature on the Xs 300s, they are not an exercise in size for size's sake or in specmanship. He stresses the harmonic structure of the Xs 300's transfer curve and its ability to reproduce the quality and integrity of live music. He also responded to my request for background on how the changes in design affected sound quality by stating that "we had been working on the Xs amplifier design for several years, and the big hardware aspect of it was nicely covered, but the progress stalled when we found that a simply bigger version of what we had been doing wasn't enough of a breakthrough in sound. Then a couple of years ago my batch of custom SIT transistors arrived, and we started to listen to the first prototypes of little 10 watt amplifiers using them. The transistors had a unique character, and while the SIT amplifier was not at all adequate to our needs, it still showed us what we were looking for. I remember remarking that 'whatever the hell that has, we need to find a way to bottle it!'

"I began a comprehensive *objective* analysis of the SIT amp and began applying some new approaches to elicit some of those same qualities from the existing Xs amp circuit. Initially we used the SIT amps as a benchmark, but quickly began expanding the performance envelope for much greater power and control and much less distortion. While we retained most of the signature in the subtle relationships between the lower-order harmonics, it was not quite the same—it was better.

"While every part of the amplifier is important, playing with developmental tube and SIT designs showed that it is the character of the power output stage itself is most influential in shaping the sound of the amplifier. This is not a radically new idea—the output stage does the most work, generally has the most distortion, and is the interface to the complex variable and reactive load which is a loudspeaker. In the end, we found that adjusting the values for push-pull Class A biasing, and also the amount of single-ended bias in the output stage, gave us a major improvement. There are also two new and proprietary circuit techniques, one having to do with a form of local feedback around the middle stage (stage 2 of the 3), and the other fundamentally altering the use of the constant current sources that are used to contribute to the bias of Class A push-pull output stage and mold its sonic footprint."

Nelson notes in the instruction book for the Xs 300 that his previous designs for Pass Labs led him to go from the single-ended/push pull Aleph Series, to single-end bias in balanced output stages in the early XA Series, to balanced push-pull/single-ended Class A in the XA.5 Series, to finally making massive increases in the output stages of the Xs with a 10-fold increase in the bias current provided by constant current sources. This expanded the single-ended power range by a factor of 100, and brought the Xs Series to something far closer to pure single-ended Class A. The output stages eliminate even trim capacitors, have a 100kHz open-loop bandwidth with only limited feedback, and the circuit is DC-coupled.

He also notes that the Xs Series of power amps makes improvements in the drive stages and devices—using Toshiba MOSFETs and new forms of local feedback. Input impedance has been raised to 200k ohms in the balanced input, with minimal capacitance. Virtually any preamp will drive the Xs, and sensitivity to input cables is minimal.

Like the Xs preamp, the end result is a pair of amps I'd love to be able to afford and own—perhaps Pass will let me use one of my children as a hostage and loan me a pair. The Xs 300s are superbly musical with any kind of solo voice and instruments, depending on the recording. That added level of detail and dynamic realism is less forgiving of recording and front-end limits than the XA-160.5s—particularly any that are slightly bright or have an upper-midrange edge.

Going back to its ability to deliver immense levels of power and energy at real-world listening levels, the Xs 300 has enough power in the bass to drive my listening room—hell, my whole house—to vibration on those few recordings that really get down to the deepest bass. It can easily handle the electronic room compensation of my Wilson Alexias down below 25Hz (get out your copies of Rutter's *Requiem*, the Fennell and Dallas Wind symphony recording of *Pomp and Pipes*, or the Jean Guillou organ recording of Moussorgsky's *Pictures at an Exhibition*). Control, detail, and apparent speed are all improved for the lower bass into the bottom edge of the midrange.

It is the overall realism of the music in the lower to upper midrange, however, that is the area of clearest improvement. In a head-to-head comparison with the Pass XA-160.5s, and the excellent AVM SA8 power amp, the Xs 300s did as much as any amplifier I have yet heard to get the most musical detail and realism out of the full range of my recordings. Low-level musical and soundstage detail were particularly impressive. So was the purity of really good recordings of solo violin and piano, as well as soprano voice.

I was also struck by the fact the Xs 300s made two other improvements over the XA-160.5 and other Pass amps I've auditioned, which I had heard to a lesser degree in comparing the Xs preamp to the XP-30. The soundstage is not only more detailed, but also more open and wide, and apparent depth is more realistic when the recording permits. The mid- and upper-bass are also more detailed and lifelike, again when the recording permits.

The Xs 300 is the first Class A amplifier I have heard that does not even slightly soften upper-midrange and upper-octave dynamics. The end result is musically realistic and involving at every level. No aspect of music or sound quality stands out from

another because none has to. This is an almost perfectly balanced set of incremental but very real improvements over the other amplifiers I've auditioned in my system, and it is an overall level of improvement my audiophile friends heard and commented upon without any prompting from me.

As a result, there is a natural synergy between the Xs preamp and the Xs 300 mono amplifiers. To go back to my earlier comments about the way manufacturers voice their electronics, the two are complementary in their improvements, and the sheer neutrality of their voicing ensures that improvements in the sound quality of one does not mask those in the other.

Summing Up

I should stress that the margin of superiority that the Xs preamp and Xs 300 amplifiers had over my reference XP-30 and XA-160.5 was limited, and was dependent on the quality of the recording, my front end, speakers, and cables. But hell, I'm an audiophile and that margin of superiority is really hard to resist. There are reasons why Nelson Pass warns in the manual for the Xs preamp that "I can only say that if you are on a restricted budget, you might be wise to avoid borrowing one of these." That same warning applies to the Xs 300s, and even more to listening to both.

But, I'd temper Nelson's warning just a bit. I've heard a lot of truly superb systems and gear over the years that were well beyond my budget. I've never regretted such experiences, for they have always taught me something about setup, sound, and music, and even when I've had to return gear on loan I've gone back to my reference system able to understand it and enjoy it more than before.

As has been the case with every bit of really good gear I've listened to—regardless of whether I could afford it—I have truly enjoyed my time with the Xs preamp and amplifiers, and done so without regret. Moreover, I know from personal experience you can get truly outstanding performance out of far less expensive Pass Labs preamps and amplifiers. I never come away without learning enough to make slight improvements in the way I place my speakers and listening position, in choosing interconnects and cartridges, in how I set up my tonearm and turntable, and in selecting front-end components. Oddly enough, I also find myself rethinking my ratings of the sound quality of both my older LPs and high-resolution recordings and downloads. Being an audiophile does not have to be a passive sport. Every time you learn from listening to other components, you can act on those lessons.

Finally, if you do ignore Nelson's warning and somehow become addicted to the Xs preamp, the Xs 300, or both—and if find you desperately need a solution that goes beyond intelligent restraint—I have one that works every time: Just win the lottery. You deserve an Xs preamp and a pair of Xs 300s! tas