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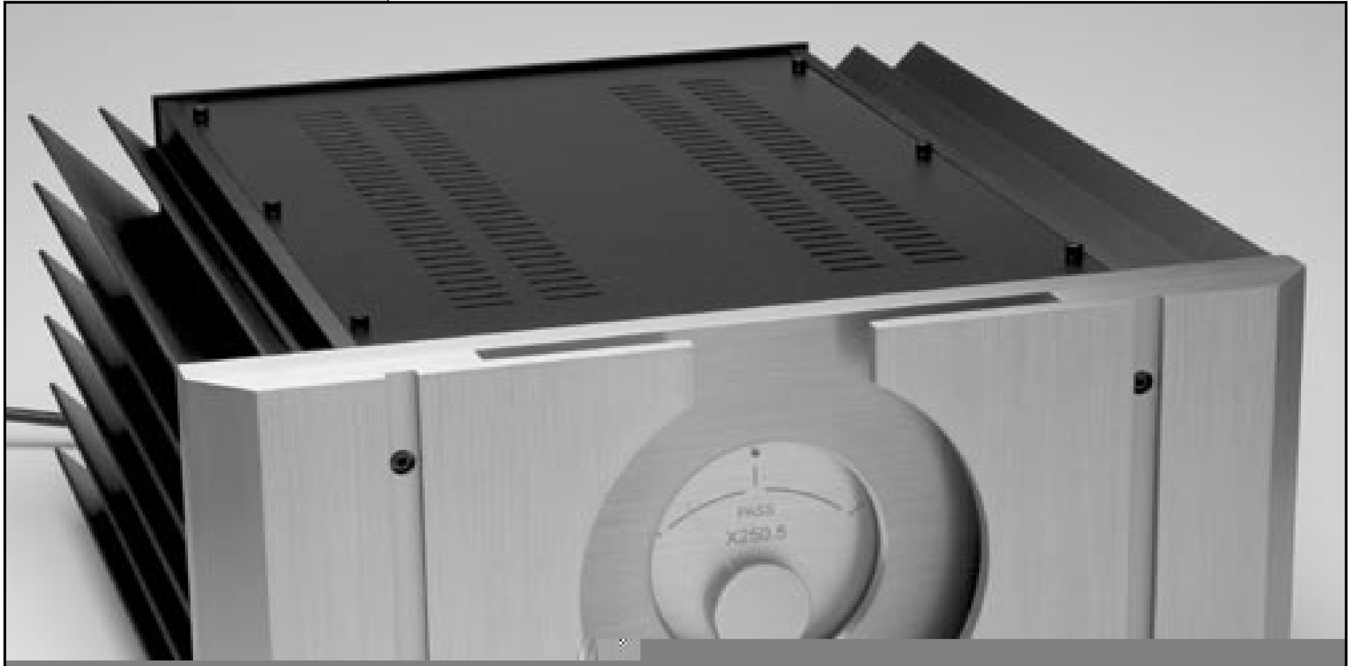

May 17, 2006

The Pass Laboratories Ê X250.5 stereo amplifier embodies the design technology and refinements of the òXó series amplifiers including extensions of the patented Supersymmetry Ê circuit. Additionally selected refinements of the XA series amplifiers have been incorporated into the X250.5 to significantly improve this products sonic performance in comparison to itõs immediate predecessor, the Pass Laboratories Ê X250.

The Supersymmetry Ê circuit topology was granted a U.S. patent in 1994, and was the result of 19 years of effort by legendary analog designer and company founder Nelson Pass. The amplifier uses highly matched components in a classically simple single ended Class A circuit. The amplifier contains only two simple stages: the first is a balanced Class A gain stage. Its output drives a bank of high power devices operated as followers.

These are inherently low distortion types of circuits, but their performance is significantly improved when operated as balanced devices. Distortion and noise identical to both halves of a balanced circuit can be made to disappear at the output, and in a well-matched symmetric circuit, most of the distortion and noise is identical.

Pass Laboratories Supersymmetry Ê enhances this effect by providing a connection between the two halves of the balanced circuit that further perfects the match of common mode artifacts. Any distortion and noise not already identical to the two halves is made more identical by a factor of about 10. The result of this perfected match is improved noise cancellation at the output of the amplifier. From a listeners standpoint this results in a more accurate presentation of the soundstage and better resolution of low level detail.

Unlike feedback techniques where the goal is to correct for the distortion by feeding a gain stage an inversely distorted signal, Supersymmetry Ê seeks merely to create perfect matching between the two halves of an otherwise well matched circuit.

Matched balanced power circuitry typically sees a distortion and noise reduction of about 90% (20 dB) through a balanced connection without any additional effort. The Supersymmetry Ê circuit delivers another 90% reduction, so that the X series has about 1/100 of the distortion of a conventionally simple and otherwise identical amplifier. Distortion and noise can still be seen at the output of one half of the circuit, but since it is virtually identical on the other half, these undesirable artifacts largely go away at the speaker terminals. This gives good measured performance, and because a simple circuit produces it, also sounds quiet excellent.

Previously these kinds of simple Class A circuits have been popular for their sound quality in low power amplifiers, but have not found application at high power levels due to excessive distortion and low efficiency. Supersymmetry Ê overcomes this barrier, delivering the sweetness, staging, and detail of very simple circuitry up to kilowatt power levels and beyond.

The X.5 Series amplifiers have the tremendous dynamic range (>140 dB) to do justice to the high-resolution digital recordings of the 21st Century and the elegance to retrieve the micro dynamics offered by the most sensitive loudspeakers. The simple but powerful circuitry moves easily from total silence to explosive transient and back to silence without a trace and without information loss. Very unlike conventional high power amplifiers, they provide this level of power with a subtlety befitting some of the better tube amplifiers. This performance is consistence across the audio spectrum and the amplifiers are unconditionally stable into all speaker loads.

So relax and enjoy your amplifier. Call us if you ever have a problem or question. You are welcome to ask questions or offer comments. Thank you for buying our product.

You can position this amplifier most anywhere you wish, but it requires adequate ventilation. We do not recommend placing it in enclosed cabinets or small closets without means for air to circulate freely. Stacking these power amplifiers directly upon each other is not recommended for the same reason. This amplifier typically idles at slightly less than 350 watts, most of which dissipates as heat across the heatsinks. As a point of reference, these heatsinks should never become too hot to touch for several seconds.

Let's talk about AC power requirements. This amplifier draws about 3 amps (continuous rms) at 120 volts out of the wall during normal operation, and this power draw reflects mostly the idle current that we run through the output stage. If you are driving a low impedance load, you will draw more power than this, but this will not be typical.

The amplifier's voltage and current rating are indicated on the rear panel. It will be 240 volts, 220 volts, 120 volts or 100 volts, all with an appropriate rear mounted resetable circuit breaker. The frequency rating of the AC line source in all instances will be 50 to 60 Hz. Please verify that the amplifiers indicated voltage requirements are consistent with the line voltage supplied at your location.

The Pass Laboratories Ê X250.5 is provided with a conventional IEC detachable AC line cord, which is rated at 15 amps. The safety ground is attached to the chassis in the conventional approved manner. The AC power input to the amplifier runs through a RF filter, which removes high frequency noise coming into and going out of the amplifier power supply.

Under no circumstances should you defeat the ground connection of the power cord. For your safety, the chassis of the amplifier should be earth grounded. Signal ground is isolated from chassis, safety ground, to reduce the incidence of ground loop noise. The presence of a safety ground will not degrade the audio signal chain.

You may substitute an aftermarket detachable IEC 320 style power cord of your choosing; provided it is rated for at least 15 amps and it meets all legal requirements and has been approved by the local testing authority for such things.

Looking at the rear panel you will see the IEC 320 AC power cord receptacle, a thermal magnetic breaker switch, two pairs of output connectors, a pair of binding post connectors for remote turn-on, one RCA input connector and one XLR balanced input connector.

Make sure that the breaker switch is off (down). Plug the AC cord into the back of the amplifier, and then into the wall. Then turn the breaker switch on (up). The lights in your house will blink when the power supply charges the capacitors; this is normal. This magnetic breaker switch is not to be used as a safety disconnect during servicing and is not a substitute for unplugging the power cord.

On the front panel, the òStandbyó LED indicator should be glowing blue, indicating that the power is on. The òPoweró LED should not be on. If the òPoweró LED is on, donõt get excited, just use the front panel stand-by button to go into stand-by mode, with the òStandbyó LED on and the òPower ò LED off.

OK, so the amplifier is sitting there in stand-by mode with just the single blue LED lit. No speaker connected, as yet. You can go ahead and connect the source and speakers. Some speaker cables are very difficult to work with due to physical size and construction, make sure the speaker connections do not short together. It is recommended that you connect the speaker ends of these cables first.

Some powered subwoofers require an audio signal ground reference and their makers may suggest that a black speaker terminal is where this voltage reference might be found. On complementary designs, which would be typical of all power amps produced by Pass Laboratories Ê, this is an incorrect and unsafe assumption. On all Pass Laboratories Ê power amplifiers a reference of 0 volts will be found only at pin 1 of the XLR input or at the shell of the RCA input.
Reference connections for these devices require special consideration when used with our product. If you have such a device, and wish to use it with our product, please contact our Foresthill, California factory for specific instructions.... you have been warned.

The amplifier can be driven single-end or balanced, if driving the amplifier single-ended, leave the supplied jumper in place (between pins 1 & 3 on the XLR). Your amplifier will operate without the jumper in place, but performance will be significantly diminished. You must choose either XLR or RCA inputs it is not advised to try and run both concurrently.

Now that the source component is connected, make sure there is no signal coming from it, probably by turning the volume all the way down.

With the speakers connected, push the front panel button to activate the amplifier. The òPowero LED will come on.

Do everybody a favor and try not to have shorted output cables. It happens accidentally all the time, and the amplifier is designed to survive, mostly.

Of course it's always possible that something could go wrong. If so, don't get excited, just relax. It's really aggravating when something like this doesn't work, we understand, but it will get fixed. We go to a lot of trouble to make products reliable, and the failure rate of our amplifiers is very low. This is small comfort to the few, but take it easy and give us a call if you have problems.

People are often interested in how long it takes for these amplifiers to break in. Perhaps a more salient question is how long does it take them to reach their sonic best after turn on. It takes about an hour for them to fully warm up, and this is where we adjust them first. Then we adjust them again and again over a couple of days, keeping the bias and offset in the sweet spot. Our environment is about 23 degrees Centigrade and the heat sinks will rise approximately 25 degrees C. above that, for an average on heat sink temperature of 48 degrees C. Sonically they are at their best when the heatsinks are approximately 50 degrees C.

In your setup the temperature may vary a bit due to line voltage variations and ventilation, but this is not a big deal. You should be able to put your hands on the heat sinks without discomfort for 10 seconds or so. It is normal for the heasink temperature to vary side-to-side and front to back.

The amplifier has a thermal cutout that will disconnect AC power if the temperature exceeds 75 degrees Centigrade. This should never occur in real life.

You can remotely operate the stand-by mode by applying 12 volts DC to the single pair of binding post connectors on the rear of the amplifier. The positive of the 12 volts DC goes to the red connector. This connection has an actual operating range of about 9 volts to 15 volts at a current draw of approximately 5.0mA. This switching will override the front panel button, so if you want the front panel button to operate, leave the rear connection open.

The Pass Laboratories Ê X250.5 is optimized for loads nominally rated at 4 ohms and above. You can run the amplifiers into a lower nominal impedance without difficulty, and we are not aware of a speaker on the market that presents unusual difficulty with these amplifiers.

The X.5 series amplifiers do not care particularly about the reactivity of the load. Reactive loads typically will have slightly less distortion at a given voltage/current level than resistive loads, but will make the amplifier run a little hotter. The X.5 circuit was designed to be quite happy driving electrostatic and other difficult speakers.

When driving transformer-coupled loads directly, as in some electrostatic and ribbon designs, some attention must be paid to the DC character of the situation. If the transformer primary is being driven raw with no protection from DC and your source has DC voltage, or in cases where the small offset of the power amplifier is still too much, you may create distortion in the transformer and get less than optimal performance from it. Generally this is not the case with transformer-coupled loudspeakers, but it does occasionally surface. In these cases, take special care that the source does not contain a differential DC component, and confirm the differential DC offset of the pre-amplifier is sufficiently low. This differential voltage is easily adjusted by a qualified technician armed with the appropriate service documents.

We have a general recommendation about interconnects, which is that they should cost less than the amplifier, and be flexible enough to work with. We have tried a lot of products and most of them work well, but as a practical matter we cannot make blanket recommendations.

The amplifier is not sensitive to source interconnects or ground loops. It is also not sensitive to radio frequency pickup, which allows some flexibility in choosing source interconnects without shields, though shields are always in good taste.

We prefer speaker cables that are thick and short. Silver and copper are the preferred metals. If you find any cable made of gold, please gift us a couple hundred meters.

Fortunately the amplifier is not sensitive to the capacitive/inductive character of some of the specialty speaker cables, so feel free to experiment.

We have found that about 90 per cent of bad sounding cables are in reality bad sounding connections, and we recommend that special attention be paid to cleanliness of contact surfaces and proper fit.

Speaker cables should be firmly tightened down at the speaker output terminals, but do not use a wrench. These connectors will not withstand unrealistic foot-lbs of torque. Hand tightening without excessive force is plenty.

So how long will this hardware last? It is our experience that, barring abuse or the odd failure of a component, the first things to go will be the power supply capacitors, and from experience, they will last 15 to 20 years before needing replacement. Fortunately these components die gracefully; typically with years of warning and are easily replaced. After that, the longevity will depend on the number of operating thermal cycles, but we can attest to having had amplifiers operating in the field in excess of 20 years with no particular mortality except capacitors. We donõt have good information beyond that. More to the point, we would suggest that you not worry about it. This is a conservatively built industrial design, not a tweaky tube circuit run on the brink of failure. If it breaks, we will simply get it fixed, so sleep well.

All figures obtained after a 1 hour warmup, with regulated 120 VAC power line. See manual notes about AC power line regulation.

Gain	30 dB
Freq. Response	-3 dB at 1Hz, -3 dB at 100 kHz
Power Output	250 watts @ 1% THD, 1 kHz, 8 ohms
Maximum Output Voltage	plus, minus 60 volts
Maximum Output Current	plus, minus 20 amps
Input Impedance	22 kohm balanced, 12 kohm single-ended
Damping factor	250 ref 8 ohms nominal
Slew rate	plus, minus 50 V/uS
Output Noise	400 uV unweighted 20-20 kHz
Balanced CMRR	-60 dB @ 1 kHz (input common mode rejection ratio)
DC offset	< 100 mV differential
Power Consumption	350 watts idle, 1000 watts max.
Temperature	25 degrees C. above ambient at idle.
Dimensions	19óW x 22óD x 9.5óH
Weight	110 Lbs.

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Please check with the factory-authorized distributor in the country you are purchasing this product for specific warranty information.

All Pass Laboratories products purchased from an authorized Pass Laboratories dealer in North America are covered by a transferable, limited 3-year warranty. This warrantee includes all parts and labor charges incurred at the repair facility in addition to return shipping to the domestic customer, exclusive of subsequent damages. Damage due to physical abuse is specifically not covered under this warranty.

For this warranty to apply the customer is responsible for returning the product unmodified to the factory within the warranty period. The customer assumes all responsibility for shipping and insurance to the factory or a factory specified repair facility. The conditions and stipulations of this Pass Laboratories warranty only applies to units sold new in North America.

Non-North America customers should consult with their original Pass Labs dealer or distributor for warrantee repair instruction prior to contacting the factory or shipping product for repair.

Non-North American product must be returned to the country of origin for warrantee service. Foreign distributors are only required to offer warranty service on Pass Laboratories product that they have imported.

Please note: Conditions of warranty service and customer rights for product purchased outside the United States may vary depending upon the distributor and local laws. Please check with your local distributor for specific rights and details.

Any modifications to Pass Laboratories products that have not received written factory approval nullify all claims and void the warrantee. Should a modified product be returned to the factory for repair the owner will be required to pay all necessary charges for the repair in addition to those charges required to return the product to it's original configuration.

In the case of safety issues, no product shall be returned to the customer without those safety issues being corrected to the most recent accepted standards.

Removal or alteration of original Pass Labs serial numbers voids the factory warranty. Product with altered or missing serial numbers will be suspected as counterfeit product.

Pass Laboratories will not repair or in any way indemnify any counterfeit or cloned product.

Pass Laboratories does not offer products in voltages intended for international markets either to authorized Pass Labs dealers or to third parties located in the United States or Canada.

Electrical devices should not be used near water (as per example, near a bathtub, washbasin, kitchen sink, laundry tub, wet basement or swimming pool). Care should be taken such that objects do not have the opportunity to fall, and that liquid is never spilled onto or into the device enclosure through openings.

An electrical device must be connected to a mains power source in strict accordance with the supplied product owner's manual. Please verify that the AC mains voltage specified in the product manual matches those requirements indicated on the unit and the AC voltage provided to your location by the power company.

Adequate precautions should be taken so that the grounding provisions built into an electrical product are never defeated.

Pass Laboratories provides a power supply cord that meets all legislated requirements for the market in which the product was originally sold. If you choose to substitute an after-market product we urge you to choose one that is fully safety rated by the necessary local authority.

Power supply cords should be routed so that they are not likely to be walked on, abraded, or pinched by items placed on or against them, paying particular attention to cords where they enter plugs or exit from a device. Never under any circumstance insert a cut or damaged power cord into a mains power socket.

Cables should never be connected / disconnected with equipment powered up. Failure to heed this warning may damage or destroy equipment.

Power-amplifiers run hot, but you should be able to place your hands on them without discomfort. You must allow for this heat in installation, by providing for free air circulation around the product. Electronics should not be subjected to sources of excessive radiant heat. Excessive heat can shorten the life of the product and may cause the electronics to self-protect and shut down.

To reduce the risk of fire, electrical shock or other injuries, the user should not attempt to service the device beyond that which is described in the operating instructions. All other servicing must be referred to qualified service personnel.

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