

MOSCODE 401HR INSTRUCTION MANUAL



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MOSCODE 401HR INSTRUCTION MANUAL



Moscode 401HR Tube Hybrid Stereo Amplifier

Introduction

by George Kaye



Thank you for purchasing the Moscode 401HR stereo amplifier -- the embodiment of more than 20 years of circuit design -- and dedicated to the late, great Harvey "Dr. Gizmo" Rosenberg, a man of widely expanded horizons. (Thus, the HR!)* Since you are now part of the Moscode family, I've included a reprint at the end of this manual of Harvey's introductory remarks in the *original* Moscode manual. Please be sure and follow all his suggestions closely...

Back in 1984, while manufacturing the New York Audio Lab's Futterman OTL amplifier, I developed the first hybrid TUBE/MOSFET power amplifiers on the market using TUBE driver stages and MOSFET power output devices. They were the Moscode 300 and 600, which led to a series of memorable Moscode products made in conjunction with New York Audio Lab's Harvey Rosenberg.

The 401HR is a "true hybrid" amplifier. Some solid-state designs "feature" a single stage of tube amplification tacked on before the power amp. That's the same as running a tube preamp with a solid-state power amp; you're still listening to a solid-state power amp. While it may warm the sound up, this approach doesn't take full advantage of tubes' strongest suit. We have optimized tube and solid-state circuitry for what each does best and have combined them into a simple, elegant circuit utilizing a TUBE driver stage mated to the reliable, powerful MOSFET's.

*One other thing -- Some say the HR stands for "Harvey Resolution". You be the judge.

Welcome to the Moscode Family,

*George Kaye
President
Moscode Corporation*

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Safety

Important Safety Instructions

Please read this manual before setting up your 401HR

- Follow all warnings and cautions in this manual.
- Do not expose to moisture, rain or water.
- Do not "lift" ground and defeat the safety of a properly grounded circuit.
- Do not place power cord where it can be dislodged or damaged by footfalls.
- Best practice: turn amplifier off before making or breaking signal connections.
- While input connections can be made with the rear panel input switch set to mute the safest method is to turn the amplifier off.
- Unplug during lightning storms or when not used for long periods of time.
- Service must be carried out by Moscode Corp. or an authorized agent.
- Clean with a soft, dry cloth.

CAUTION - HEAT WARNING: The Moscode 401HR will produce heat under normal operating conditions. To maintain proper operation of your amplifier(s):

- If possible, do NOT install your amplifier(s) in an enclosed space.
 - If there is no other choice, install a quiet fan to remove heat.
- It is best to allow 3" of clearance on the top and 2" of clearance on each side to help disperse heat. Each amplifier should be placed on a separate shelf with space above and to the sides. DO NOT STACK amplifiers.
- DO NOT place amplifier(s) directly on carpeting. Carpeting restricts the flow of air from the bottom and causes the amplifier to heat up prematurely.

CAUTION: The power line should remain protected for no more than 20 amps, or the maximum rating of the outlet.

WARNING! Lethal Voltages Are Present Inside Amplifier • Always Disconnect From Power Source and Wait 10 Minutes to Allow Power Supplies to Discharge Before Replacing Any Internal Fuses

Setup

(Now is a good time to read and follow Harvey's original introduction on page 24.)

Carefully unpack your amplifier and position for use observing all safety precautions listed above. **Please save the box** in case there's a need to ship your 401HR for any reason.

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Tube Installation

To install or change tubes, simply flip the faceplate down by pulling the top edge toward you. The faceplate is hinged at the bottom. Grip each tube firmly and place over the correct tube socket, being sure to line up the tube's pins with the socket pins. Push the pins into the socket and apply downward pressure while moving the tube in a gentle circular motion to seat it in its socket. The circuit board will flex as you bear down; this is normal as the boards are mounted with anti-resonance elastomer. Close the front panel by pushing all the way up and in. It will click into place and activate the power interlock.

Tip: You'll find the Tube Guide printed on the front panel of the amplifier chassis when the faceplate is down.

If your 401HR came with a pair of 6H30Pi and a pair of 6FQ7, use the 6H30 for the outside pair of sockets, V101 and V201. Insert the 6FQ7 into the inside pair, V102 and V202.

Operating Modes

The Moscode 401HR features two modes of operation: Stereo and Vertical Biamp. In stereo, the left channel carries the left signal, the right channel the right signal. (Page 5)

For the ultimate Moscode Music Experience, hook up *two* Moscode 401HRs and vertically biamp them to your speakers, using one channel for low frequencies, the other for high frequencies of the same amplifier. (Page 6)

The Importance of Speaker Phase

It's important to maintain correct relative phase. That means hooking plus to plus (red-to-red), negative to negative (black-to-black). When one speaker is out of phase (red-to-black), the sound becomes confused and diffuse, with significant loss of bass frequencies. This happens because one driver moves in the opposite direction of the others -- when the rest "push" it "pulls".

In general, red (plus) binding posts on the speaker should be connected to the plus connector of the amplifier. There is one exception to the Red-to-Red Rule. Some preamps *invert* absolute phase. To compensate for this, just reverse the + and - connections at *either* the amplifier or the speaker terminals, **but not both**.

NOTE: Arrange the power cords so they run separately from signal-carrying interconnect. If you must cross them, do so at 90 degrees with at least an inch of space between them.

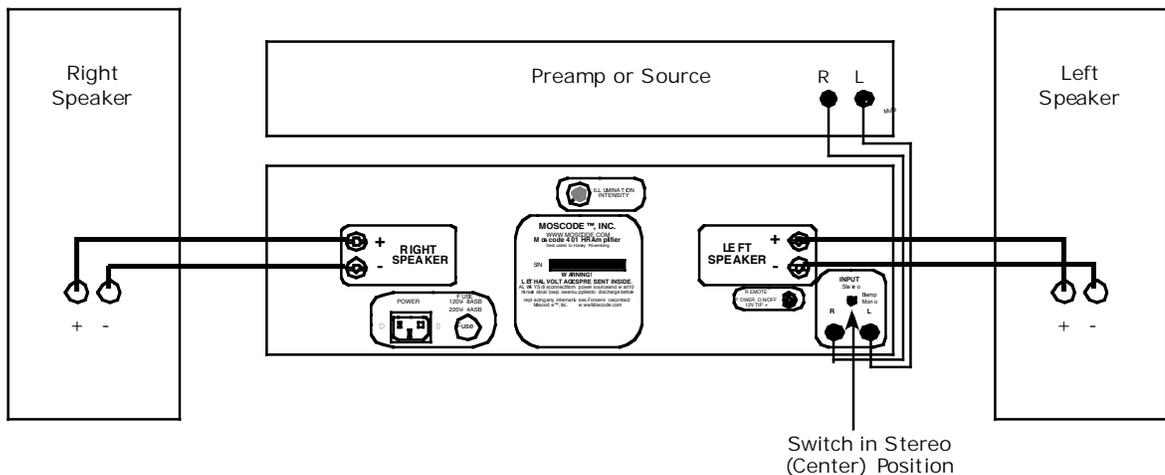
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Stereo

- Set the input switch to STEREO.
- Connect the right channel interconnect from the right channel output of your preamplifier or source to the right channel amplifier input.
- Connect the left channel interconnect from the left output of your source to the left channel input.
- Connect the left speaker to the left output binding posts.
- Connect the right speaker to the right output binding posts.

Stereo Hookup I Illustration



Stereo Biwire

Biwiring means running *two separate speaker cable pairs per channel*. You can further refine the sound using the best cables for the frequency range the driver covers. In this case, the crossover in the speaker routes the signal to the correct drivers. Additionally biwiring relieves the signal to the upper frequencies from current-draining low frequency demands.

To bi-wire, speakers must have biwiring connectors; at least two sets of binding posts per speaker.

- Remove any links between bass and treble driver binding posts at the speaker.
- Connect the left channel of your preamp or source to left input of the amplifier.
- Connect the right channel to the right input.

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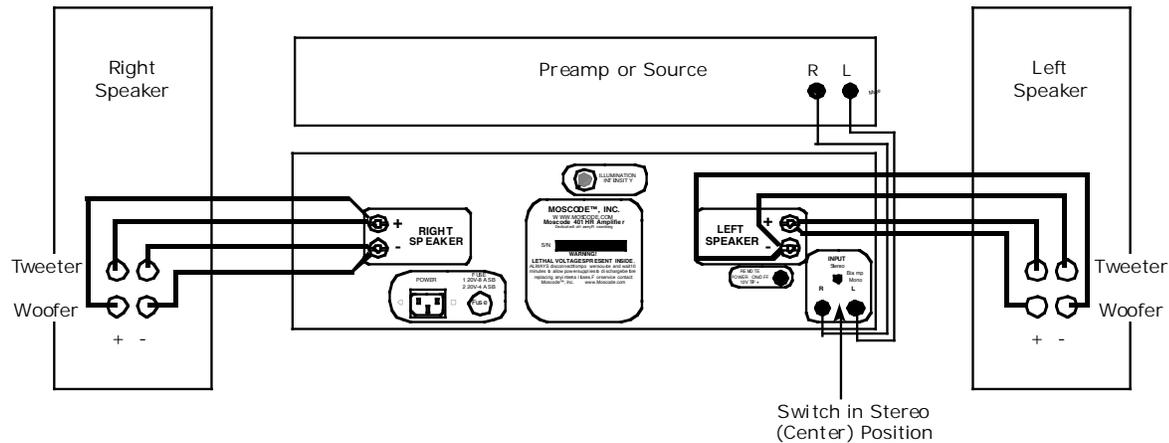


- Connect the cable between the left amplifier binding posts and the speaker's left treble driver binding posts.
- Connect *another* speaker cable between the left output and the left low frequency driver's binding posts.
- Repeat for the right channel.

CAUTION! Remove all jumpers between the low and high frequency driver binding posts on the speaker for biwiring. Improper hookup can result in a short to the amplifier.

Please observe all hookup instructions to the letter.

Stereo Bi-Wire Hookup Illustration



Vertical Stereo Biamp

Set the INPUT switch to BIAMP on the rear panel to optimize the 401HR for two amplifiers, a stereo amp for the left channel, and a second stereo amp for right channel. Vertical bi-amp mode feeds the same input to *both* channels, with one channel used for low frequency drivers, the other for the high frequency drivers. The crossover within the speaker routes the signal to the correct driver.

The advantages are many:

- Two channels of amplification means increased power for each speaker.
- Coherent/related signal information is grouped together in same chassis.
 - Low and high frequencies more closely related in one mono channel than a stereo pair.
 - Independent power supplies for each channel.

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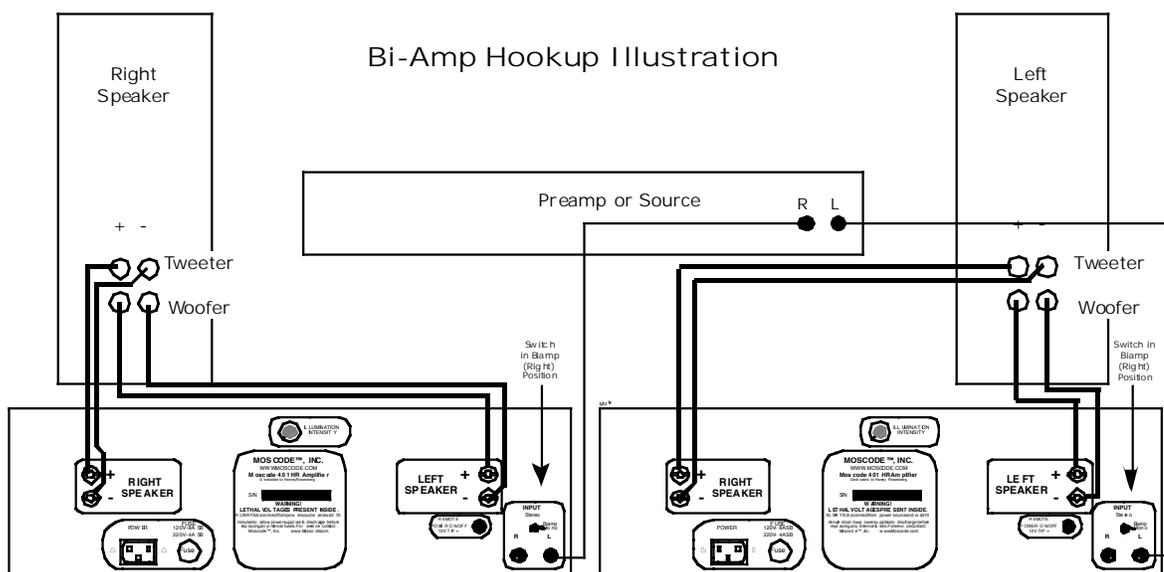


- Any possible negative inter-channel reaction between two power amps in the same box (stereo) sharing common parts is minimized.
- Separate amplifiers means greater stereo separation and imaging.
- Placing each amplifier near its speaker shortens cable length.
- Unused input functions as a pass-through circuit for powered subs or super tweeters.
- Drivers optimized for frequency range covered.
- Tune your system by using different tube types to optimize the sound. Install medium- μ tubes in the bass channels, for example, to get a little more bass slam.

Connecting Vertical Stereo Biamp

You'll need two Moscode 401HR amplifiers, and biwirable speakers.

- Remove any links between bass and treble driver binding posts at the speaker.
- Move the Input Switch above the inputs to BIAMP to tie both inputs together.
- Connect the left channel of your preamp or source to either of the two input jacks on the left amplifier.
- Connect the right channel to either of the two inputs on the right amplifier.
- Connect one of the amplifier output binding posts to the treble driver binding posts of the speaker.
- Connect the other channel to the bass or woofer drivers of your speaker.



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Operation

Initial Power On

After securing all connections to the signal source and speakers, connect the power cord to the IEC power connector on the back panel next to the fuse. Plug the other end into the AC wall outlet and you're ready to enjoy your Moscode. Push in the round button on the front panel to turn your Moscode 401HR on.

The Moscode Logo Status Indicator/ Hi-Temp

The Moscode 401HR features a cool edge-lit glass insert in the faceplate. When the amplifier is powered, the logo is softly illuminated indicating power is present. During warm-up, the logo's illumination varies intensity during 3-second intervals while the amplifier remains muted. Once stabilized for operation the muting circuit releases and the Moscode logo stays on brightly. You may adjust the logo intensity with a control on the back panel, top dead center.

If the amplifier overheats, the amplifier's thermal sensors turn the amplifier off, and the logo **GLOWS BRIGHT RED**. Simply wait for the amplifier to cool off. It will restart when the heat-sink temperature drops to a safe level. This may indicate that ventilation is inadequate.

Power Up Sequence

Powering up your Moscode 401HR just requires a push on the large button on the front panel. (Alternately the 12 volt remote trigger input may be used to turn you amp on.) There will be an initial click of the amplifier's Soft Start and Warm-Up Muting Delay circuits. Soft Start limits the input current for the first few seconds to reduce stress on the tubes and power supply. After about 5 seconds, you'll hear another click and full power is applied to the amplifier. You'll notice the Moscode logo blinking, and when it stops, you're ready to go.

Note: If you are using the 12 volt Remote Power-On feature the front panel button should be left in the off position (out). If left on the amplifier won't respond to the remote power off command.

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More about your 401HR Stereo Amplifier

Edison Price 5-Way Music Binding Posts

Edison Price Music Posts offer superior signal transfer characteristics. Their sound is a result of their high-purity Oxygen Free Copper (OFC) construction with no plating of any kind. *The binding posts attach directly to the output stage circuit board to further maximize signal transfer for superior low-level resolution.*

CAUTION! Pure copper binding posts are relatively soft. **DO NOT OVERTIGHTEN** the knurled speaker terminal caps as you will strip the threads or even bend the post. A machined slot at the top of the knurled cap accommodates a large-blade screwdriver or coin with which to torque down on a connection. *Go easy... don't overdo it.*

TIP: If heavy speaker cables slip out from the thumb-tightened binding post caps, make a support to take the strain off the cables -- *do not* overtighten the caps.

Cleaning Your Music Posts

Over time, copper reacts with pollutants in the air and oxidizes, inhibiting the transfer function. I recommend cleaning and remaking your speaker connections at least once a year, if not more often. Clean and brighten contact surfaces with emery cloth or sandpaper of 400 grit or finer. Simply clean the threads with a wire brush. The result is better sound every time.

Other Ways of Connecting Speaker Cable

1. **Bare wire.** Wrap a hook-shaped bundle of bare wires around the binding posts and finger-tighten caps. Bare wire is the least desirable as any loose strands can bridge the posts and short the output. This can blow fuses or damage the output stage. If you must use bare wire, be sure to solder the strands of each wire bundle together at the ends to reduce the chance of a short circuit. *Not recommended.*
2. **Bare wire through binding post slots.** See item #1 above. This is even more likely to cause short circuits. *Not recommended.*
3. **Banana Plugs.** The EP Posts accepts a standard 1/8" banana plug, either as separate plugs or as a 2-pin assembly with 3/4" spacing. The better the banana plug, the better the transfer function, the better the sound.

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4. **Spade Lugs.** The Music Posts accepts standard spade lugs with ¼" opening. Simply loosen the knurled terminal caps, slide the spade lugs under, and finger-tighten.

5. **Combination Banana Plug and Spade Lugs.** The Music Post will take a combination of spade lug *and* banana plugs for easy biwiring.

Power Matters

The Moscode 401HR is equipped with a standard 15A IEC power connector and a heavy-duty 14-gauge power cord. Our power cord provides excellent performance, but we encourage you to further tune the sound with aftermarket power cords. Don't use cord of less than 14-gauge as it will compromise performance.

The Moscode 401HR features a grounded chassis through the ground wire of the power cord. This may result in hum depending on the grounding scheme of the rest of your system. A 3-to-2-wire adapter may eliminate hum, *but do not run your system with a cheater plug*. Use the information you learn by trying it on different components as a guide to tracking down the source of the problem. Moscode Corp. will not be responsible for compromised safety or accidents when using a ground-lifting cheater plug.

There are many safe alternatives that I can recommend, and they'll appear soon on moscode.com. In the meantime, feel free to contact me personally with any questions regarding grounding of your 401HR and we'll solve any problem you have together.

While ultimate performance calls for dedicated wiring, the Moscode 401HR will perform flawlessly on standard house wiring. Here are some tips to improve the performance of any audio system.

Keep all power connector contacts clean. Use 400 grit sandpaper or finer to remove dirt and oxidation from contact blades. Power amplifiers make large peak power demands of your house wiring. Peak current draw can be five times higher or higher than the average current drawn. Since power losses go up with the square of the current, inadequate power can cause voltage and power drops just when the amplifier needs it most. This shows up as uncontrolled bass or premature clipping. (I hate when that happens!) Moscode suggests that if possible you wire all AC power outlets with oversized wire to minimize resistive loss in the house wiring.

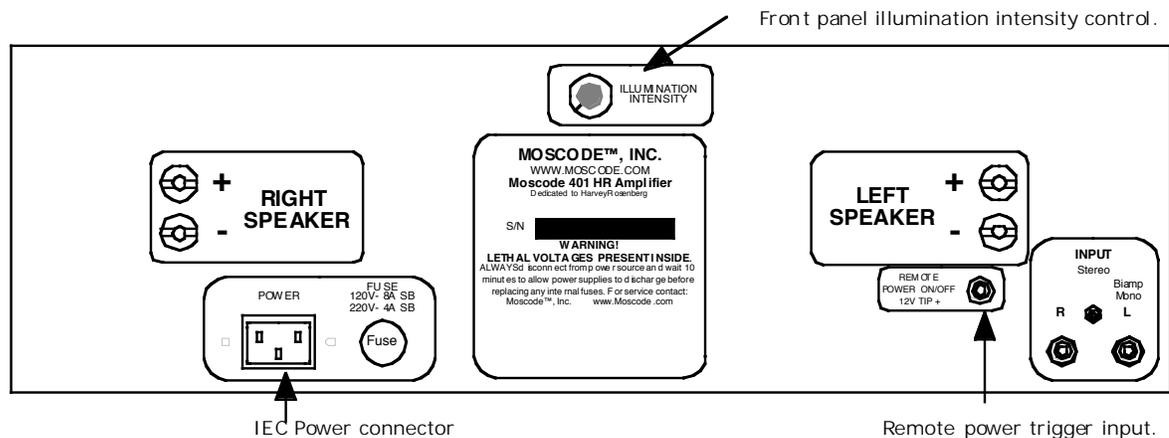
CAUTION: The power line should remain protected for no more than 20 amps, or the maximum rating of the outlet.

CAUTION: Power Fuse: For 120V use 10A Slow Blow, for 220V use 5A Slow Blow

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WARNING! Lethal Voltages Present Inside Amplifier • Always Disconnect From Power Source and Wait 10 Minutes to Allow Power Supplies to Discharge Before Replacing Any Internal Fuses



Remote Control Power

The Moscode 401HR is equipped with a 12 volt remote power trigger that uses a standard 3.5mm (1/8") 2-conductor plug, tip positive. Reversing polarity may damage the amplifier. The presence of power signal will turn the amplifier on regardless of the position of the front power switch. However, the front power switch must be in the off position for the amplifier to power down in the absence of a 12 volt control signal.

Output Servo

The Moscode 401HR's Servo Control Circuit eliminates DC (Direct Current) at the output of the amplifier. To guarantee the operation of the servo doesn't adversely affect the sound of the amplifier, the time constant for the servo is set long; about five minutes. Therefore, there are probably several hundred millivolts of DC at the output when the amplifier un-mutes, but decreases to a negligible level and stays put as long as the amplifier is powered on. This in *no* way harms your speakers.

Maintenance

We recommend keeping the tubes and faceplate tidy using any good quality glass cleaner and a lint- and scratch-free cloth. The cover and faceplate can be also be wiped down with a damp rag and a mild cleaner to remove fingerprints. Take care not to scratch the faceplate or cover, *and be very careful to not spill cleaning fluid into the amplifier. To be totally safe, disconnect the power cord before cleaning.*

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Break-in and Tube Maintenance

The 401HR needs around 25 hours to open up, and a good 100 hours on the clock before performing its best. Keeping the 401HR at peak performance just means keeping the Music Posts clean and periodically changing the low-cost small-signal tube pairs, of which you can choose from many types. [See tube type list on inside front panel of the 401HR.] All tubes and support circuitry are shock-mounted with an elastomer compound that minimizes microphonic effects. It's perfectly normal for the circuit board to *give* a little when installing or changing tubes.

Tubes and Tuning

The 401HR will function using a wide range of front-end driver tubes. Just flip down the power-interlocked front panel for access. There's no need to turn the 401HR off the as it will power down the instant you lower the panel. Power returns when you snap the front panel back in place.

For those who want to experiment, fine-tune your system's sound by *changing the outer pair of tubes first*; they provide the voltage gain and make the most sonic difference. I developed an Auto Filament Switcher that detects center-tapped filament tubes like 12AU7s and switches instantly from a 2- to a 3-wire filament circuit. Having such wide range of tubes to choose from means you'll never worry about finding great tubes for years to come.

CAUTION: The outside pair of tubes -- voltage gain -- must always operate at the same filament voltage, as must the inside pair. DO NOT MIX FILAMENT VOLTAGE TYPES WITHIN TUBES PAIRS.

CAUTION: Tubes become hot during operation. The 401HR gives those tubes a break with a soft start circuit for a controlled warm-up of about 45 seconds. That allows the tubes to warm and stabilize before engaging the output, lowering stress on the tubes and other components... including you!

Tip: You'll find the Tube Guide printed on the front panel of the amplifier chassis when the faceplate is down.

Tubes and Gain

The first stage of amplification has no negative feedback around the circuit, so the actual gain of the tubes affects the overall gain of the amplifier. There's about 3dB difference between low- and medium-mu tubes. (The numbers are approximate; they vary with type

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and manufacturer.) Using low-mu tubes, the overall gain of the amplifier is 30dB, with medium-mu tubes about 33dB.

Tubes and Sound

In general, the following tubes--6GU7, 6FQ7, 12AU7, 12BH7, 7730, 5814 and 6H30Pi-- are low-mu (low gain) types. When using these tubes your 401HR will operate using *lower negative feedback and gain*. The sound will be smoother and less aggressive with more forward imaging.

The 6922/6DJ8 is a medium-mu tube, so negative feedback and overall gain will be higher. This makes for generally tighter bass and a more forward high frequency response. The soundstage will most likely appear to be deeper.

Tubes used in positions V102 & V202 -- the inside pair -- have *less effect* on the sound. Tubes in positions V101 & V201 -- the outside pair -- have *a much greater effect* on the sound doing the voltage gain.

CAUTION: Do not use 6H30Pi tubes in V102 and V202 -- the inside pair. This is a follower circuit, and the 6H30Pi has a tendency to oscillate when used this way.

Tubes and Magic

The Moscode 401HR has all the best musical qualities you'd expect from an audiophile amplifier: deep, tightly controlled bass; open, layered, textured midrange; extended, open, sweet sounding highs, presented in a stable, realistic soundstage.

The front-end tubes keep the 401HR honest; it sounds fantastic playing all types of music with 200Wpc covering the big musical moments, acoustic or otherwise. Like most tube gear, female vocals are really special, *very* attractive. Thanks to the 401HR's hybrid topology, electric and most importantly (to a bass player like me) *acoustic* bass comes through with an amazing sense of realism. There's dimension and weight to each bass stroke, not the one-note wonder produced by some all-tube/transformer-coupled amplifiers. The 401HR serves up music with the realism that makes you forget you're listening to reproduced sound.

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The Circuit

Tubes, Transistors and Getting Exactly What You Want from Both

I've always designed using the best characteristics of tubes and transistors in one package for the best bang per audiophile buck. The 401HR delivers an articulate, life-like, dynamic, musical 200Wpc using a class-A tube driver stage coupled to MOSFET power outputs. It's a low-feedback, dual-mono, dual-regulated design on hard-wired elastomer-mount circuit boards.

Tube Driver Stage

Tubes are best for voltage amplification as they're naturally high-voltage devices that act in a linear fashion. The input stage is a simple class-A triode voltage amplifier that's "open-loop" with no negative feedback, the same as in many preamplifiers. I use a passively regulated, ultra-quiet tube filament supply, as passive regulation is quieter than standard 3-terminal filament regulators. They allow for a big, airy soundstage, and exceptional low-level detail.

Then I sum the output of the first-stage with negative feedback from the output, and that feeds the second stage voltage amplifier/cathode follower circuit which is capacitively coupled to the MOSFET power module. This straightforward two-stage design provides the voltage swing needed for the 401HR's robust 200Wpc.

MOSFET Output Stage

MOSFETs behave like tubes because they're high-impedance devices. Tubes can drive them directly *without* a "helper" transistor, so the circuit is simpler. *In audio design, less is still and forever more.* The 401's MOSFET output stage is a "follower" circuit, *i.e.*, the output signals closely follow the input.

Followers add or amplify *current* rather than *voltage*, although there's a slight voltage loss in all follower stages. We compensate for that with a feedback loop around the second stage driver *and* the power output stages. This way there's only one "pole point" in the feedback loop, ensuring stable operation, and allowing for the elimination of an output coil/resistor network. An optically coupled floating-bias circuit keeps the MOSFETs properly biased, and two large Solen/Châteauroux film capacitors (Moscode Maxi Caps) bypass the main electrolytics (a whopping 176,000 mF of storage capacitance) yielding a sweeter top end.

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Output Transformers, MOSFETs, and the Rule of Ten

I've always loved tube sound, but I have problems with all-tube amplifiers with output transformers. Transformers need a lot of iron for good, tight bass at higher power levels, which means more wire, that means more stray inductance and capacitance, and *that* interferes with the transfer function of the output transformer at high frequencies. They exhibit phase shift within the limits of the audio band.

I believe most transformers obscure musical detail because of the unavoidable compromises of high power tube output transformers. Transformers send the audio signal through an enormous amount of wire, hundreds, or even thousands of feet. Additionally, magnetic cores also exhibit non-linear behavior like hysteresis and saturation at power extremes that color the sound.

MOSFETs aren't perfect either, but their errors tend to be power-related (harmonic distortion) and not frequency response or phase shift issues because of stray capacitance and inductance. However, THD is easily to control with a little feedback.

In all design matters, I follow my Rule of Ten. Make the circuit work well to 10 times the highest or lowest frequencies it will handle. MOSFETs will go down to DC; capacitive coupling to the output stage controls the low frequency limits of the amplifier, in our case, optimized for 1/10 the lowest frequency passed. MOSFETs high frequency limits are controlled by their inherent capacitance within and around the devices' circuit. But the limits are way over 200kHz, or 10 times 20kHz, the top of the audio band.

Power Supply

You *need* a robust power supply because large demands in the bass frequencies create ripples in the power supply of poorly regulated amplifiers. The ripples modulate the audio signal in other stages, usually resulting in a thick, hazy, unstable soundstage and poorly controlled bass. The supply should behave as if it has *infinite* power reserves. We accomplish this with voltage regulation. Regulation keeps a constant supply voltage regardless of power line fluctuations (within normal limits) and circuit demands, so the driver tubes operate in a consistent electrical environment. When your fridge switches on, your speakers will never know it.

Voltage regulation eliminates interaction between the driver and power output stages. Each stage takes its power from a "virtual" independent source created with local voltage regulation. A separate high voltage transformer isolates the driver stage from any output power demands. *When dynamic material does make big power demands, the voltage at each individual stage of regulation is the same as at idle.* With unregulated supplies, the

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voltage drops as power demands rise, leading to subsonic pulsing as the supply tracks the varying power demands and line fluctuations.

As a result, there's no need for any type of power conditioning on the 401HR. A well-designed power supply doesn't *need* any help. The 401HR stores a huge amount of energy, 88,000mF of capacitance per channel to drive any speaker with ease. There are dual-mono supplies for each of the two output stages, so power demands on one channel won't affect the other. Dual-mono double-regulated high-voltage DC power supplies yield over 120dB of channel-to-channel power supply isolation.

Aside from star grounding for best ground noise suppression, the 401HR has quiet, heavy-duty power transformers specified for 50Hz rather than 60HZ to get more iron into the power supply. That's the build quality we apply to every operating part of the 401HR.

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Troubleshooting Chart

WARNING! Lethal Voltages Are Present Inside Amplifier • Always Disconnect From Power Source and Wait 10 Minutes to Allow Power Supplies to Discharge Before Replacing Any Internal Fuses

Symptom	Possible Cause	Remedy
Dead - Logo not lit	Power cord disconnected	Check power cord and connect to AC line.
	Blown rear panel power fuse	Disconnect amplifier from AC line, check fuse, then replace power fuse with same value fuse if necessary CAUTION! Do this only once If fuse blows within 10 seconds refer to Moscode Corp for service.
	Blown control transformer fuse located on main circuit board inside	Disconnect amplifier from AC line, check fuse, then replace power fuse with same value fuse if necessary CAUTION! Do this only once. If fuse blows within 10 seconds refer to Moscode Corp for service.
Moscode logo on front panel lit but amplifier does not turn on with front panel push button switch.	Front panel not fully closed.	Close front panel fully to insure interlock engages.
Moscode logo on front panel lit but amplifier does not turn on with remote trigger.	Remote trigger cable not connected to receiver or preamp.	Verify that the remote trigger cable is connected to both amplifier and the source.
	Remote trigger out of receiver or preamp is incorrect voltage.	Remote trigger in requires 4-20V DC to turn amplifier on. If the output of the source remote trigger is not within range the amplifier will not turn on.
	Remote trigger out of receiver or preamp is incorrect polarity.	Remote trigger in requires positive (+) tip on connector. Reverse connections to plug if incorrect.
Moscode logo on front panel is RED .	Amplifier overheated.	Allow amplifier to cool down. Improve airflow around amplifier, remove any obstructions to airflow.
	Amplifier overheated because speaker's impedance too low.	Allow amplifier to cool down. Improve airflow around amplifier, remove any obstructions to airflow.
	Amplifier overheated due to short at the output.	Allow amplifier to cool down Be sure speaker cables and connectors are not shorting via loose strands or touching connectors.

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No sound from one or both channels.	Input Mode switch on back panel is set to Mute.	Verify that Input Mode selection switch is in correct position.
	Input from preamp not connected.	Check input connections.
	Speaker cables not connected to amplifier or speakers.	Check speaker connections.
	Blown channel fuses on power modules.	Verify that the channel fuses have not blown. If they have, replace with the correct type and value fuse. Check the speaker and connections to the speaker for that channel. Verify there is no short in the connections or the speaker.
	No output from one channel of the preamp or source.	Confirm by reversing the L & R input connections. If the sound comes from the other channel the preamp or source is at fault.
	One amplifier channel dead.	Confirm this is the case by reversing the L & R speaker connections. If the sound goes to the other speaker the amplifier may be at fault. Check preamp as above.
	Blown high voltage transformer fuse located on main circuit board inside.	Disconnect amplifier from AC line, check fuse, then replace power fuse with same value fuse if necessary. CAUTION! Do this only once. If fuse blows within 10 seconds refer to Moscode Corp for service.
Sound Comes Out of Incorrect Speaker Channel.	Receiver or Preamp Channel Output Connected to an Incorrect Channel on Amplifier.	Verify that the preamp output channel is properly connected to the corresponding channel on the amplifier.
		Verify that the channel on the amplifier goes to the correct speaker.
No stereo image, sounds like mono.	Input mode switch set to biamp mode.	Set input mode switch to stereo.
Either no bass or no treble when used in Biamp mode.	Speaker cable to tweeters or woofers disconnected.	Check speaker connections.
	Input Mode Selection switch on back panel set to Stereo.	Set to input mode switch to Biamp.
Imaging sounds like it comes from inside your head, weak bass.	Speaker phasing incorrect.	Be sure speaker cables are properly connected and consistently wired channel to channel.

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Lack of impact (Subjective)	May be caused by incorrect absolute polarity of a component in the audio chain inverting polarity.	Try reversing the speaker + & - connections at the speaker only. Be sure both speakers are wired consistently with each other. The Moscode M401HR does NOT reverse polarity.
Distorted or weak sound from one or both channels.	Blown channel fuses.	Check speaker cables and connections for shorts and clear shorts Replace fuses on output modules with 10A fast blow.
	MOSFET or internal component failure.	After checking other causes listed refer to authorized service center or Moscode Corp.
	Bad tube(s).	Swap tube to same position in other channel. If distortion comes from other channel, tube is at fault. Replace tube.

Fuse Replacement

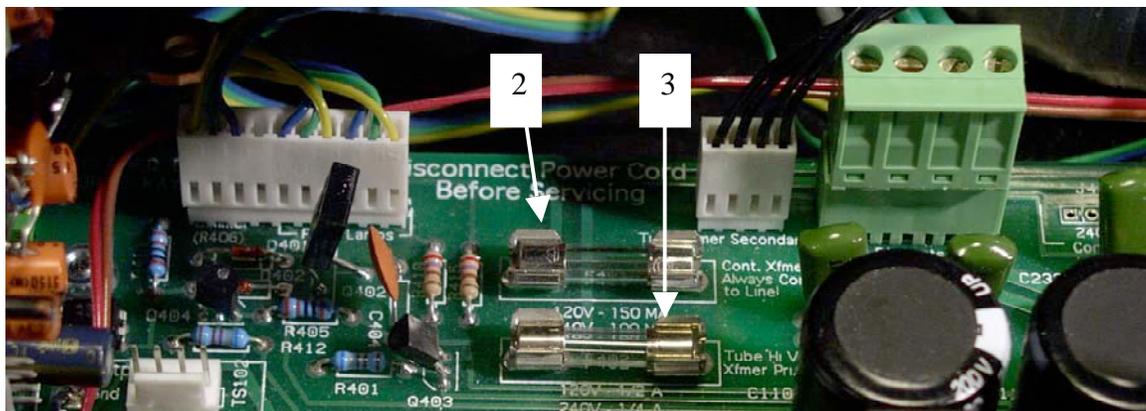
There are a total of 7 fuses in your amplifier:

External

1. (1) Main Power Fuse for 120V use 10 A Fast Blow or for 240V use 5A Fast Blow 3AG

Internal

2. (1) Control Transformer Fuse 120V/160mA 5mm x 20mm, for 240V/100mA Fast Blow
3. (1) High Voltage Transformer Fuse 120V1/2A 5mm x 20mm, for 240V 1/4A Fast Blow

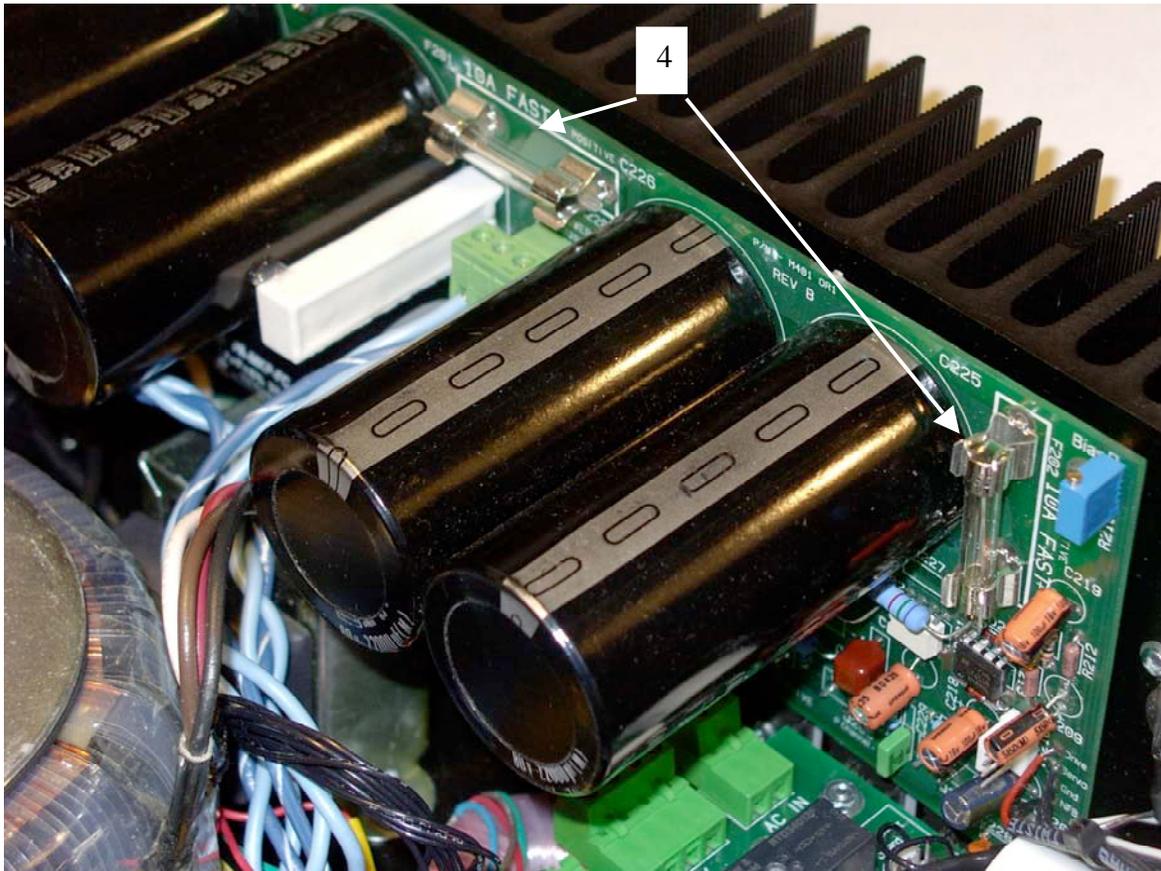


See next page for output module fuses.

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4. (4) + and - power module rail fuses (2 per channel) 10 Amp Fast Blow 3AG.



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Features and Specifications

401HR Features

- Low negative feedback
 - Feedback loop in only one stage of amplification
 - Improves high frequency clarity and bass response
 - Allows direct coupling to the speaker
 - No output inductor needed for stability
 - First stage open-loop topology uses no global negative feedback
- Output-transformerless
- Optically-coupled floating bias circuit maximizes output stage behavior
- Servo-controlled output stage eliminates DC offset
- Dual-mono power supplies
 - Power demands on one channel doesn't affect the other
 - Gives a stable soundstage and consistent, controlled bass
- Dual-mono double-regulated high-voltage DC power supplies
 - Over 120 dB of channel-to-channel power supply isolation
- Passively regulated DC filament supply on amplification stage
 - Low noise floor
 - Ultra-quiet backgrounds
- Independent filament supply for driver tubes
- Auto Filament Switcher
 - Auto-senses 12V center-tap tubes and adjusts circuit
- Mono switch parallels both inputs for easy vertical biamping
- MIT coupling and Solen/Châteauroux bypass capacitors
- 12V power-on/off trigger for remote control power on

Build Features

- Well-designed ventilation assures long component life
- Oversize power module heatsinks
 - Chassis completely covers heatsink
 - No rough edges
- 1/2" thick faceplate
 - Fine-grain anodized finish in Black or Clear
- 14-gauge steel chassis
- 14-gauge heavy-duty power cord supplied
- Cardas input connectors
- Cardas internal wiring
- Edison Price Music Posts

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- O₂-free copper heavy-duty 5-way binding posts directly soldered to output board
 - No output wiring
- Minimized number of solder joints.
- Minimalist wiring
 - Only 4 wires per channel carry audio signal
 - Two hot, two ground
- Fully shock-mounted circuit board on elastomer suspension
 - Absorbs acoustical and resonant energy
 - Reduces microphonic effects
- Audio path hand wired
 - Soldered directly to pc board for better low-level signal retrieval
 - No off-board speaker wiring
- Compact output modules for better low level detail, more stability
- 6 output devices per channel
 - Easily powers lower impedance speakers
 - Longer life

Specifications:

- Power: 200Wpc (RMS) @ 8 Ohms: 200; 4 ohms: 300+, both channels operating
- THD at full output: (tube dependent) with 6H30pi for V101 & 201, 0.15% or less at full power.
- Noise (inputs shorted): < 1mv
- Voltage Gain: (tube dependent) approx. 30-33 db.
- Tube Complement:
 - Choice of 6H30Pi, 6GU7, 6DJ8, 6922, 6FQ7, 5814, 7730, or 12AU7
 - (2 each) 6H30Pi, 6GU7 supplied
 - Must be same tube types in "mirrored" positions
 - Inner tube pairs must be same type
 - Outer pairs must be same type
- Power Requirements:
 - Wattage idle: approx 120W (1 amp); Watts at full output: approx 960 (8 amps)
 - Available for 120V (USA), 230-240V (European), and 100V (Japan)
- Dimensions: Chassis W: 17 1/2", D: 14 1/2", H: 6 1/4" Faceplate width: 19"
- Shipping Weight: Approx 52 lbs
- Connections
 - Input: Cardas Gold RCA, unbalanced, 100K input impedance
 - Output: Edison Price Music Posts Standard
 - Power: IEC standard connector

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Notes/ Tube Records:

- Date purchased _____

- Tubes Maintenance:

•	Date	V101	V201	V102	V202
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____
•	_____	_____	_____	_____	_____

Notes:

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Warranty Statement:

TERMS AND CONDITIONS

1. LIMITED WARRANTY

Moscode warrants the product designated herein to be free of manufacturing defects in material and workmanship, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser, excepting vacuum tubes which are warranted for 90 days only (See 6).

2. CONDITIONS

This Warranty is subject to the following conditions and limitations. The Warranty is void and inapplicable if the product has been used or handled other than in accordance with the instructions in the owner's manual, abused, or misused, damaged by accident or neglect or in being transported, or the defect is due to the product being repaired or tampered with by anyone other than Moscode or an authorized Moscode repair center. The product must be packed and returned to Moscode or an authorized Moscode repair center by the customer at his or her sole expense. Moscode will pay return freight of its choice. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THE ORIGINAL PURCHASE RECEIPT. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and the price paid by the purchaser. Moscode reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.

3. REMEDY

In the event the above product fails to meet the above Warranty and the above conditions have been met, the purchaser's sole remedy under this Limited Warranty shall be to return the product to Moscode or an authorized Moscode repair center where the defect will be rectified without charge for parts or labor, except vacuum tubes (See 6).

4. LIMITED TO ORIGINAL PURCHASER

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not be transferred to a subsequent purchaser of the product.

5. DURATION OF WARRANTY

This Warranty expires on the third anniversary of the date of purchase.

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6. VACUUM TUBES

Vacuum tubes are warranted for the original 90-day period only.

7. MISCELLANEOUS

ANY IMPLIED WARRANTIES RELATING TO THE ABOVE PRODUCT SHALL BE LIMITED TO THE DURATION OF THIS WARRANTY. THE WARRANTY DOES NOT EXTEND TO ANY INCIDENTAL OR CONSEQUENTIAL COSTS OR DAMAGES TO THE PURCHASER. Some states do not allow limitations on how long an implied warranty lasts or an exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

8. WARRANTOR

Inquiries regarding the above Limited Warranty may be sent to the following address: Moscode (Current address is always listed on WWW.MOSCODE.COM.) ATTN: Customer Service or Email: CustomerService@Moscode.com

9. WARRANTY OUTSIDE THE U.S.A.

If Moscode has authorized distribution in any countries of the world. In each country, the authorized importing retailer or distributor has accepted the responsibility for warranty of products sold by that retailer or distributor. Warranty service should normally be obtained from the importing retailer or distributor from whom you purchased your product. In the unlikely event of service required beyond the capability of the importer, Moscode will fulfill the conditions of the warranty. Such product must be returned at the owner's expense to the Moscode factory, together with a photocopy of the bill of sale for that product, a detailed description of the problem, and any information necessary for return shipment.

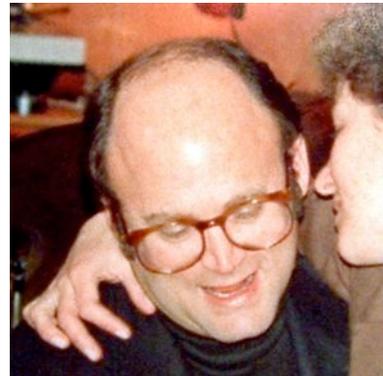
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Harvey's Original Intro

And now without further ado, complete and unexpurgated for Moscode Lovers everywhere, I give you Harvey "Dr. Gizmo" Rosenberg's introduction to the original Moscode.

Enjoy...



Purchasing audio equipment is often a dismal process that's filled with anguish and disappointment. Your purchase of a Moscode Tube Amplifier shall be remembered as a shining moment of good audio judgment. The very fact that you are about to unpack your new purchase means that you have reached a level of listening sensitivity and sophistication. Therefore, being a person of refinement, we shall treat you as such. We hope these instructions will be helpful.

PREPARATION

Before you unpack your amplifier it is important that we first prepare you--the listener. We don't want you to rush to unpack your amplifier and in great haste listen to it. Quite to the contrary, you must be carefully prepared before you listen to your Moscode Tube Amplifier for the first time.

STEP I

Take a bath, one of the appropriate temperature and most assuredly with the proper pine salts and a smidgen of Dead Sea salts. It is important to have a bottle of absolutely ice-cold pure spring water (with a permissible slice of lemon). Under no circumstances should wine or champagne be imbibed while in a hot tub. It is also necessary to have some candlelight at this time, Never use incandescent or fluorescent light nor sit in darkness. Please do NOT ask your girlfriend, lover or wife to enter the tub with you, because this will distract you.

STEP II

Take an ice cold shower. The colder the better. You know it is very cold when it feels like your private parts have jumped up into your lower throat for protection.

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STEP III

Lie down on your private massage table and get your customary massage. It doesn't matter whether it is a Shiatsu or Swedish massage because the only thing that matters is that any tightness in your muscles is relieved. Take special care of upper back, and neck and facial muscles, because they are very significant to the hearing process.

STEP IV

Take a medium warm shower to remove all the rare scented oils from your body so that you can feel comfortable about putting on

STEP V

your silk robe. I usually wear a beautiful silk kimono I bought in Japan. I love wearing this long black silk robe with beautiful pastel colored flowers cascading from the shoulders. It is a very samurai-like. Of course you can wear a dressing gown, or smoking jacket. It really doesn't matter what kind of robe you wear, the important thing is that you wear nothing underneath it.

STEP VI

If you are a smoker, now is the time to do your thing. Who cares about the price we pay for smoking. There are moments of human experience that demand a smoke. To do otherwise would be moral cowardice.

STEP VII

By now you have sufficiently relaxed so that both your mind and spirit are in a delicate state of arousal couched in the serenity of great well being, and you are now instructed to open your favorite bottle of wine. I shall not wax at any length on the importance of wine in the great bumpy process of civilizing man. The point is obvious to me - without wine the world would have already destroyed itself, or, who would want to live in a world without wine? Be sure to use your finest crystal. Take a languorous taste. Breathe its essence; reflect on the subtle warm wave that is flowing over your body. You are now ready to unpack your amplifier.

-Harvey Rosenberg