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HIGH DEFINITION®



## Reference 250 SE

FINE SOUNDS  
GROUP



Thank you for choosing the Reference 250 SE to be a part of your high performance music listening system. Since 1970, Audio Research has been creating some of the world's finest audio equipment. Each piece is handcrafted in Minnesota, and has been designed to provide many years of listening enjoyment.

We understand you are eager to begin listening; however, please take a few minutes to read through this guide for useful information concerning the operation of your new amplifier. Once installed, please allow an appropriate break-in period to fully appreciate the benefits this amplifier will provide to your system.

After reading the user guide, if you have any further questions regarding your amplifier, contact your dealer or Audio Research customer service - they will be happy to help you make the most of your new component.

Happy Listening!

**Thank You.**

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## Warnings

To prevent fire, or shock hazard, do not expose your Reference 250 SE to rain or moisture.

Do not place objects containing water on top of this unit.

This unit contains voltages which can cause serious injury or death. Do not operate with covers removed. Refer servicing to your authorized Audio Research dealer or other qualified personnel.

The detachable power cord on your Reference 250 SE is equipped with a heavy gauge, 3-conductor cable and a standard three-prong grounding plug. For absolute protection, do not defeat the ground power plug. This provides power line grounding of the Reference 250 SE chassis to provide absolute protection from electrical shock.

The appliance coupler (a.c. power connector) at the rear of this unit must be accessible for emergency power disconnect.

For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

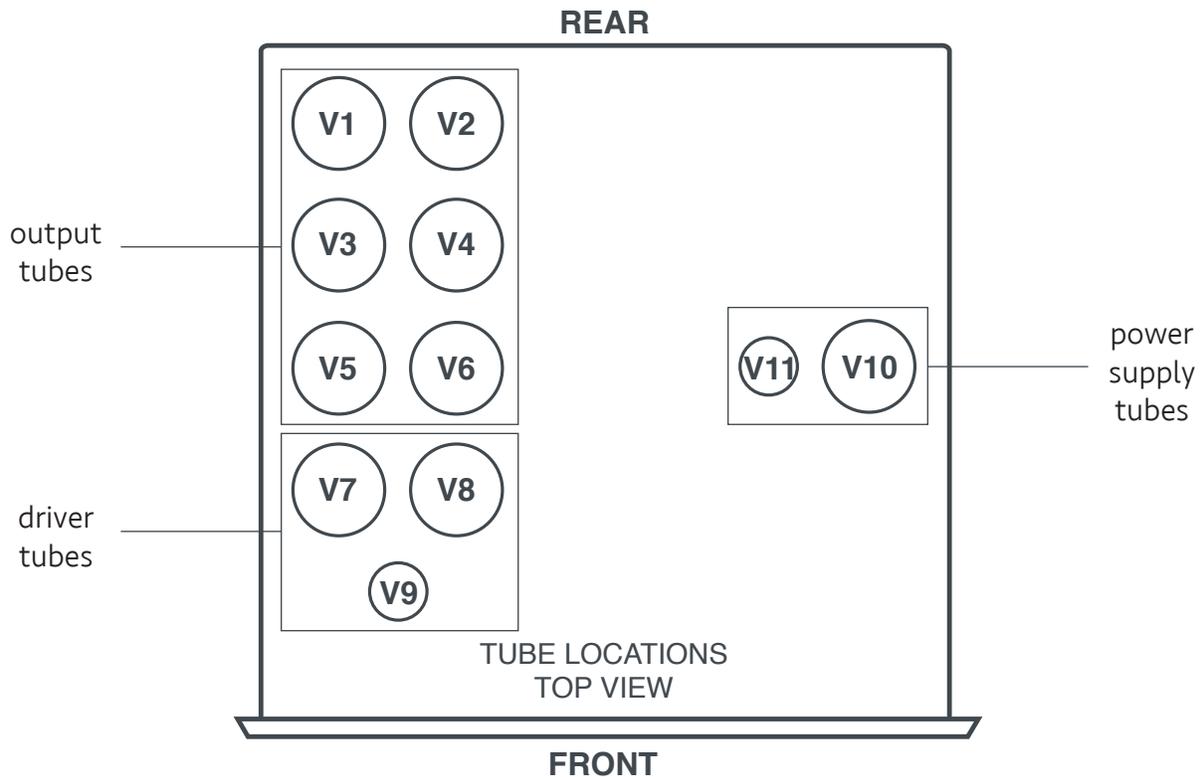
The power button on the front of this unit, when off, does *not* disconnect all power from this unit. This unit is in sleep mode when not on.

This unit is RoHS compliant.

### ***A note about packaging...***

Save all packaging in a dry place away from fire hazard. Your Reference 250 SE amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return your unit to the factory for service, but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your Reference 250 SE from unnecessary damage or delay.

# Installation



## ***Before operating the Reference 250 SE***

Your Reference 250 SE amplifier is shipped with the vacuum tubes packed in foam blocks. These must be unpacked and installed before you attempt to operate the amplifier. Included are a matched sextet of KT150 output tubes, a matched pair of KT150 driver tubes, 2 6H30 dual triode used in the input and regulator stages, and a 6550WE for the power supply regulator. Proceed according to the following instructions.

Remove all screws fastening the top cover. Carefully remove each vacuum tube from its protective foam and match its location 'V' number (written on the base of the tube) to the 'V' number printed next to each socket. Firmly seat each tube in its matching socket, taking care to 'key' the tube pins to the socket holes. Retain the foam blocks with other packing materials for possible future use.

Refasten top cover on amplifier.

# Installation

## ***In your system***

To insure normal component life and safe operation this unit must be operated only in an upright position. Adequate airflow and proper cooling can occur only if there are no restrictions above and behind the unit and on either side. Be sure that airflow to the 12V D. C. cooling fan located on the rear panel is not blocked.

The special non-marring elastomer feet provide adequate spacing and stability only on a smooth, hard surface, and also assist to isolate the amplifier from spurious vibrations. For upright stability and best performance, never operate the unit while it is sitting on a soft surface such as a thick rug or carpet.

Due to its weight, this amplifier must be supported on a surface specifically rated for such a load. Check with the manufacturer of your support system to be sure it is rated to handle this weight.

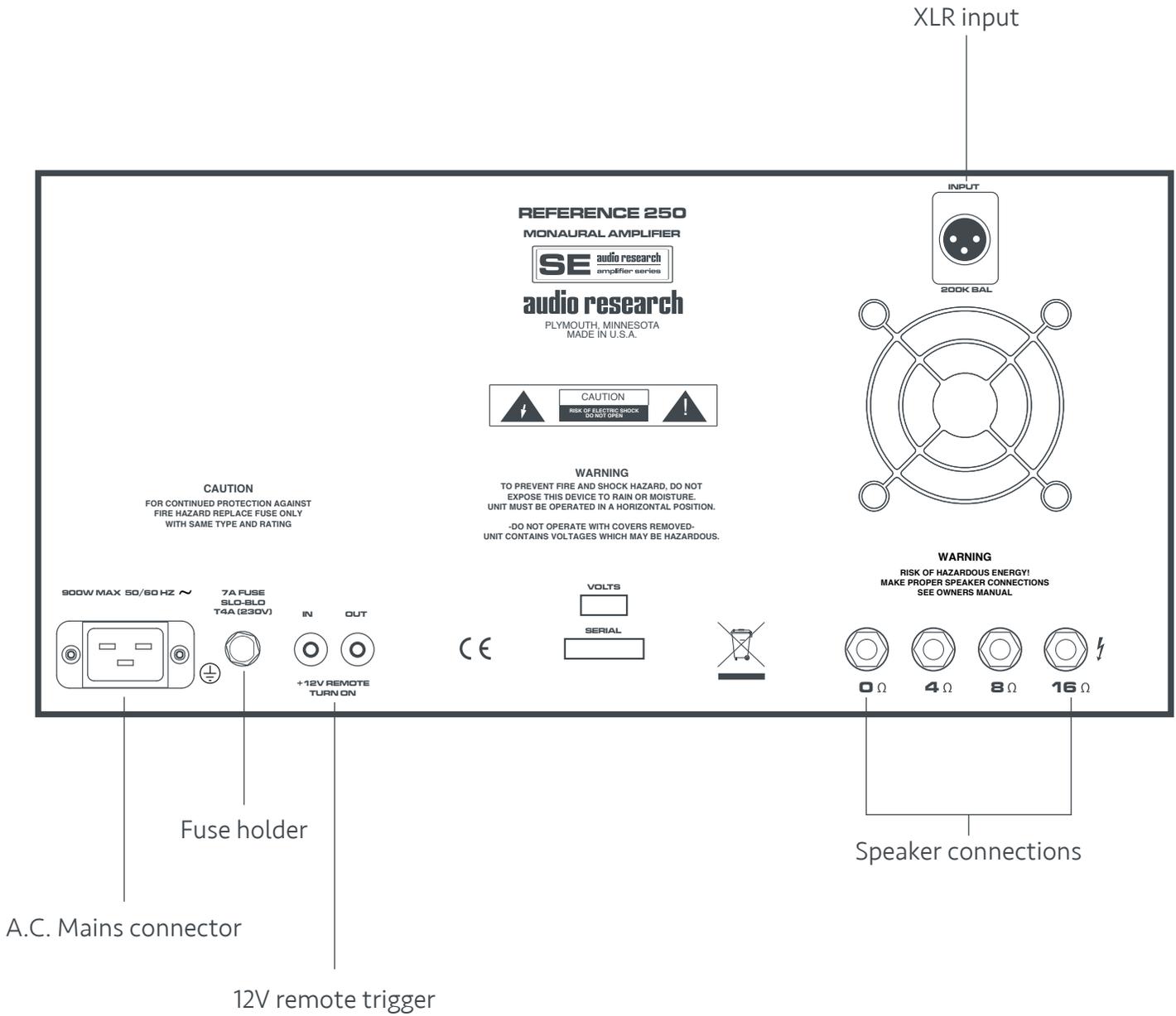
If the unit is to be operated in an enclosure such as an equipment rack, make certain that adequate airflow above and to each side of the unit is provided.

The 'ambient' operating temperature should never exceed 120° F or 49° C. Improper installation will cause premature tube failure and will affect your warranty, as well as the service life of the unit.

It is normal for a vacuum tube power amplifier to run quite warm, and if used for prolonged periods, hot to the touch. All components within are, however, operated at safe, conservative levels and will not be improperly affected thereby, providing the requirements outlined above are adhered to.

# Connections

## Back Panel Controls and Connections



# Connections

## **Input Connectors**

The Reference 250 SE uses a fully balanced circuit topology and has a balanced XLR input connector on the rear panel. It therefore requires a balanced preamplifier output, as provided by most Audio Research preamplifiers. Connect your preamplifier's output to the Reference 250 SE before turning on the amplifier.

## **Output Connectors**

Heavy-duty output terminals are provided on the rear panel for 4, 8, or 16-ohm speaker impedance loads. Using high-quality speaker cables, securely fasten the (-) speaker lead to the appropriate (black) terminal, then the (+) lead to the matching (red) terminal. Follow your speaker manufacturer's impedance specification.

The Reference 250 SE puts out the same amount of power whether the 4, 8, or 16-ohm terminals are used.

## **Matching**

It is important to use as close as possible an impedance match between the amplifier and speaker for optimum transfer of power to the speaker with minimum distortion. In the case of speaker systems with significant variations in impedance throughout the frequency spectrum, such as most electrostatic types, determine the best impedance match empirically for best overall sonic results.

Connect the Reference 250 SE input to the preamplifier or electronic crossover, using only the highest grade of audio interconnect cables. To avoid sonic degradation use the shortest practical length of cables.

## **Important**

Use the best available speaker wires and interconnects. Audio Research cannot emphasize this enough. As better components and systems are developed, it becomes increasingly important to avoid the limitations of inferior system interconnections.

It is important sonically that your entire system be connected so that the audio signal arriving at the speakers has correct, or 'absolute' polarity (i.e., non-inverted). Connect the black or '-' speaker terminal to the wire that connects to the 0 terminal on the Reference 250 SE. Connect the red or '+' speaker terminal to the wire that connects to the 4, 8, or 16 ohm terminal on the Reference 250 SE and tighten the speaker terminals securely to ensure best sonic results.

## Connections

### ***Remote Turn-on***

The Reference 250 SE has a built-in 12V DC remote turn-on/off circuit for operation by a master control system in a home theater or large audio system. Use a 3.5mm (.140") diameter mono mini plug to connect to the +12V IN jack on the rear of the Reference 250 SE.

The +12V IN jack should be connected to the +12V DC output of the master control system, using a continuous +12V DC signal at 12mA per Reference 250 SE for the duration of amplifier on-time. Do not use a momentary or data pulse control signal.

The +12V DC remote jacks have polarity protection, so they will not operate if a -12V DC signal is accidentally connected, or if the control wires are reversed.

# Connections

## **A.C. Power Connection**

It is important that the Reference 250 SE be connected via its supplied 20 amp IEC 12-gauge power cord to a secure, dedicated A.C. power receptacle. Never connect to convenience power receptacles on other equipment. Only use the power switch on the front of the Reference 250 SE for On/Off control of the amplifier, or the 12V start-up trigger for remote installations.

The AC power source for the Reference 250 SE amplifier should be capable of supplying 10 amperes for 100 or 120 volt units, or 5 amperes for 220 or 240 volt units.

For the very best performance on 100 or 120 volt circuits, the Reference 250 SE should be connected to its own AC power circuit branch, protected by a 15 amp breaker. The preamplifier and other audio equipment should be connected to a different power circuit and breaker.

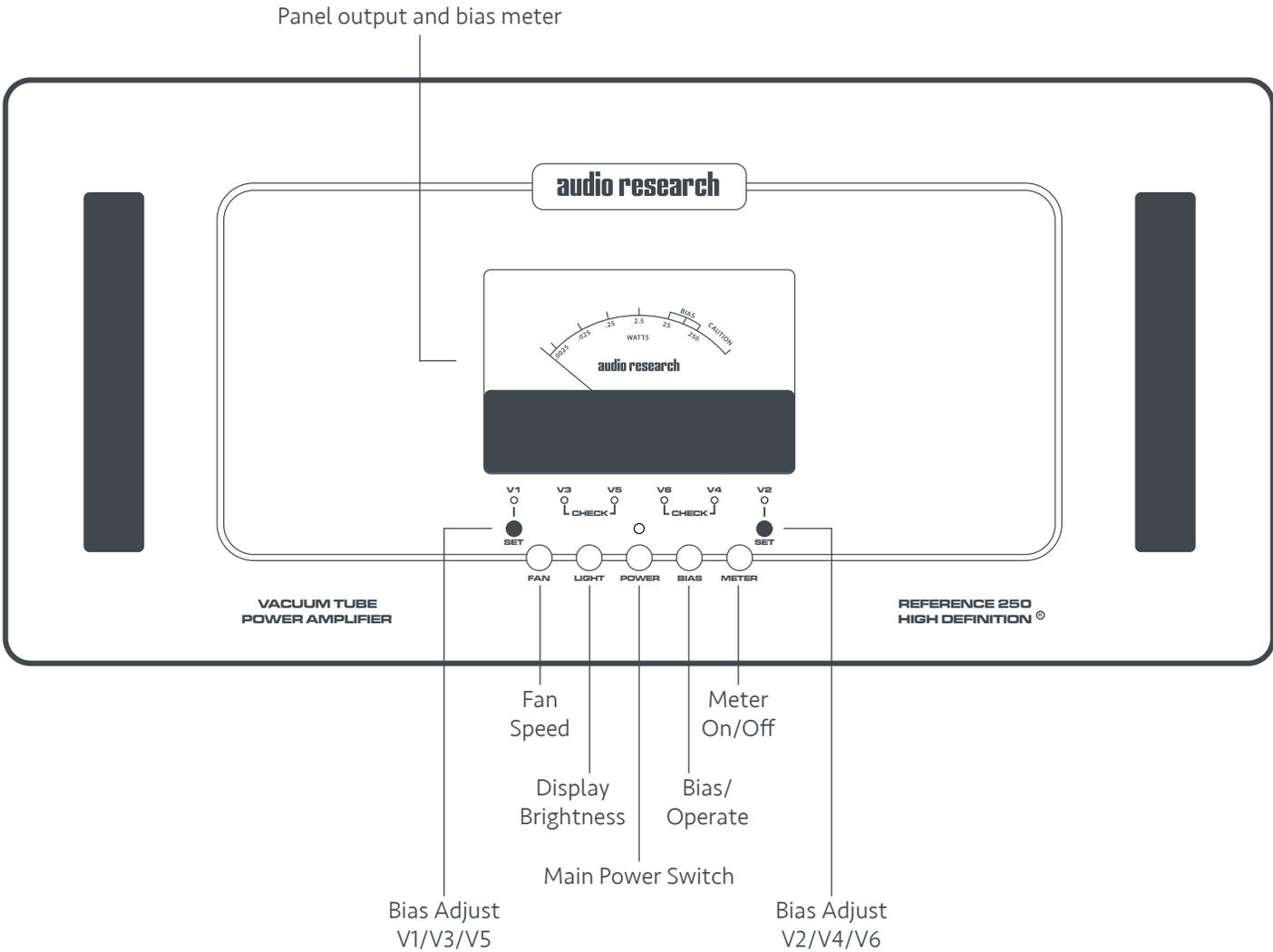
The Reference 250 SE should be turned on after the other components of your system. If the Reference 250 SE is turned on before other components, the amplifier will amplify any extraneous turn-on noises those components might generate, which could potentially damage the loudspeakers. Good operating practice dictates that the amplifier should be turned on last, and turned off first in an audio system.

The Reference 250 SE uses a grounding system that does not require a ground-lifter adapter plug on the A.C. power cord to minimize hum. The power cord supplied with the Reference 250 SE has a standard grounding plug to provide maximum safety when properly connected to a grounded wall receptacle. If there is any question regarding proper grounding procedures in your installation, seek help from a qualified technician. Caution should be taken before using custom after-market power cords: they must be at least 12-gauge and have a standard grounding plug properly installed. These power cords are to be used with caution, at the sole risk of the owner.

If electronic crossovers or other AC powered equipment is used with the Reference 250 SE it may be necessary to use 'ground lifter' adapters on the power plugs of that equipment to minimize system hum. Generally, the lowest hum is achieved when the only direct connection between audio common 'ground' and true earth ground occurs in the preamplifier, through its grounded power cord. Other equipment in the system should have some form of isolation to prevent ground loops and associated hum.

# Operation

## Front Panel Controls and Displays



# Operation

## **Start-Up**

- Secure interconnects between the amplifier and your preamplifier; attach speaker leads to the appropriate output terminals.
- Attach supplied power cord to rear IEC inlet of amplifier, and plug other end into grounded A.C. power receptacle.
- Turn on preamp and all other components; mute preamp output.
- Press Reference 250 SE front panel control switch. Green power LED will light.
- The Reference 250 SE has an automatic mute circuit which lasts approximately 45 seconds to allow the amplifier to stabilize voltage before becoming active.
- Unmute preamplifier output, initiate source component signal, and adjust gain as appropriate.

## **Shut-Down**

- Mute preamplifier output.
- Turn off Reference 250 SE front panel power switch.
- Turn off preamplifier and then the associated input source components.

## **Important!**

After the Reference 250 SE is turned off, wait at least five minutes before turning it on again. This allows the large bank of storage capacitors to drain energy. Not allowing enough time for this process can result in blown fuses or other damage to your amplifier.

## **Display Brightness Adjustment**

The front panel meter display is illuminated with ultra low-noise, low voltage LED lighting which has no impact on sound quality when turned on. The display brightness has three settings: high, low, and off. To change the brightness of the display, locate the front panel button labeled 'Light'. Press this button to toggle through the three available settings.

## **Fan**

Press the fan switch to select low (dim Power LED) or high (bright Power LED) for fan speed setting.

## **Meter**

Press meter button to turn on or off the power level monitoring meter function.

## **Note**

The light, fan, and meter settings at turn off are retained each time the amplifier is turned on.

## **Break-in**

All quality stereo equipment benefits from a break-in period; during this time, the various components, wiring and solder connections change as electrical signals pass through them. While your Reference 250 SE will sound fantastic out of the box, it will only improve with continued use.

# Operation

## **Output Tube Bias Adjustment**

As shipped from the factory, the output 'bias' adjustments are set for a nominal 65mA per KT150 tube. Under these idle conditions the tubes are each dissipating approximately 27 watts of their 75 watt rating. This point of operation provides 'enriched' Class AB1, and will satisfy the most critical listener.

For best results, operate and adjust the Reference 250 SE at 117.5 VAC (or 230 VAC). Adjustment must be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time.

With the amplifier warmed up and signal set to zero, press BIAS switch once and the V1 output tube LED is illuminated with its bias level indicated on the front panel meter. Adjust V1 tube bias level with the plastic flat-bladed bias tool (provided), inserted in the V1 SET hole in the front panel so the meter reading is in the center of the labeled bias range. Press BIAS switch again to check V3 tube bias level which should be within the bias range arc. Press the BIAS switch again and check the V5 tube bias level in the same way. Note that the V3 and V5 tube bias levels are controlled by the V1 bias setting.

Press the BIAS switch once more to read and adjust V2 tube bias level with the bias tool in the V2 SET hole in the front panel in same way the V1 tube bias level is adjusted. Press BIAS switch again to check V4 tube bias level, and once again to check the V6 tube bias level.

Note that the corresponding V number LED is illuminated for each output tube as you proceed through the bias adjustment and monitoring sequence. Press BIAS switch a final time to exit the bias status function and return the meter to the power level monitoring function.

The Reference 250 SE is shipped from the factory with all tubes properly biased and ready to use. It is not necessary to check bias each time the amplifier is turned on. Under typical circumstances, most owners will find that checking the bias level once a month or so will insure proper operation and good service life of the output tubes.

# Maintenance

## **Vacuum Tubes**

It is recommended that you replace the vacuum tubes of your Reference 250 SE in sets. All of the tubes in your amplifier have been matched to have similar operating characteristics, to provide the best sound quality and reliability. In the event you need to replace a single output tube, please refer to the numbers written on the silver base at the bottom of the vacuum tube when placing an order.

## **Servicing**

Because of its careful design and exacting standards of manufacture, your Reference 250 SE amplifier should normally require only minimal service to maintain its high level of performance.

## **Caution**

Your Reference 250 SE amplifier contains sufficient levels of voltage and current to be lethal. Do not tamper with a component or part inside the unit. Even with the power turned off, a charge remains in the energy storage capacitors for some time. Refer any needed service to your authorized Audio Research dealer or other qualified technician. Additional questions regarding the operation, maintenance or servicing of your amplifier, please contact the Customer Support Department of Audio Research Corporation at [service@audioresearch.com](mailto:service@audioresearch.com) or call 763-577-9700. You may also initiate a service request by visiting the Audio Research website ([www.audioresearch.com](http://www.audioresearch.com)) and selecting 'Service Repair' at the top right of the home page.

## **Cleaning**

To maintain the new appearance of this amplifier, occasionally wipe the front panel and top cover with a soft, damp (not wet) cloth to remove dust. A mild, non-alkaline soap solution may be used to remove fingerprints or similar smudges. Cleaners containing abrasives should not be used as they will damage the anodized finish of the front panel. A small, soft paintbrush is effective in removing dust from bevels, the recessed nameplate and other features of the front panel.



## **Disposal and Recycling Guidelines**

To dispose of this electronic product, do not place in landfill. In accordance with the European Union Waste Electrical and Electronic Equipment (WEEE) directive effective August 2005, this product may contain regulated materials which upon disposal require special reuse and recycling processing. Please contact your dealer or importing distributor for instructions on proper disposal of this product in your country. Or, contact Audio Research Corporation (763.577.9700) for the name of your importing distributor and how to contact them. Packing and shipping materials may be disposed of in a normal manner.

## Warranty

Audio Research Corporation products are covered by a 3-Year Limited Warranty or a 90-Day Limited Warranty (vacuum tubes). This Limited Warranty initiates from the date of purchase, and is limited to the original purchaser, or in the case of demonstration equipment, limited to the balance of warranty remaining after original shipment to the retailer or importer. In the United States, the specific terms, conditions and remedies for fulfillment of this Limited Warranty are listed on the warranty card accompanying the product in its shipping carton. The warranty terms are also available on the internet at [www.audioresearch.com/en-us/company/warranty-statement](http://www.audioresearch.com/en-us/company/warranty-statement). Outside the United States, the authorized importing retailer or distributor has accepted the responsibility for warranty of Audio Research products sold by them.

The specific terms and remedies for fulfillment of the Limited Warranty may vary from country to country. Warranty service should normally be obtained from the importing retailer or distributor from whom the product was purchased. In the unlikely event that technical service beyond the ability of the importer is required, Audio Research will fulfill the terms and conditions of the Limited Warranty. Such product must be returned at the purchaser's expense to the Audio Research factory, along with a photocopy of the dated purchase receipt for the product, a written description of the problem(s) encountered, and any information necessary for return shipment. The cost of return shipment is the responsibility of the purchaser.

# Specifications

**Power Output:** 250 watts per channel continuous from 20Hz to 20kHz. 1kHz total harmonic distortion typically 0.5% at 250 watts, below .04% at 1 watt. Approximate actual power available at "clipping" 270 watts (1kHz). (Note that actual power output is dependent upon both line voltage and "condition" i.e.: if power line has high distortion, maximum power will be affected adversely, although from a listening standpoint this is not very critical)

**Power Bandwidth:** (-3dB points)  
5Hz to 70kHz

**Frequency Response:** (-3dB points at 1 watt) 0.5Hz to 110 kHz

**Input Sensitivity:** 2.4V RMS Balanced for rated output. (25.5 dB gain into 8 ohms)

**Input Impedance:** 200K ohms Balanced

**Output Polarity:** Non-inverting.  
Balanced input pin 2+ (IEC-268)

**Output Taps:** 16 ohms, 8 ohms, 4 ohms

**Output Regulation:** Approximately 0.9dB 16 ohm load to open circuit (Damping factor approximately 10)

**Overall Negative Feedback:** 8.8dB

**Slew Rate:** 20 volts/microsecond

**Rise Time:** 1.5 microseconds

**Hum & Noise:** Less than 0.2mV RMS – 110dB below rated output (IHF A-weighted, input shorted, 16 ohm output)

**Power Supply Energy Storage:**  
Approximately 900 joules

**Power Requirements:** 105-130VAC 60Hz (210-250VAC 50Hz) 770 watts at rated output, 1000 watts maximum, 380 watts at "idle," 1 watt off

**Tubes required:** 3 Matched pair KT150 (Power output V1-6); 1 Matched pair KT150 (Driver V7-8); 2 6H30 (Gain stage V9 and Regulator Driver V11); 1 6550C (Regulator V10)

## Dimensions:

width 19" (48.3 cm)

height 8.75" (22.2 cm)

depth 19.5" (49.5 cm)

Handles extend 1.5" (3.8 cm) forward

## Weight:

47 lbs. (21.3 kg) Net

63 lbs. (28.6 kg) Shipping



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