audio research

HIGH DEFINITION®

Reference 150 SE

Thank You.

Thank you for choosing the Reference 150 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!

Contents

Warnings

To prevent fire, or shock hazard, do not expose your Reference 150 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 150 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 150 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.

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, and ensure that the ventilation fans on the back panel are not obstructed.

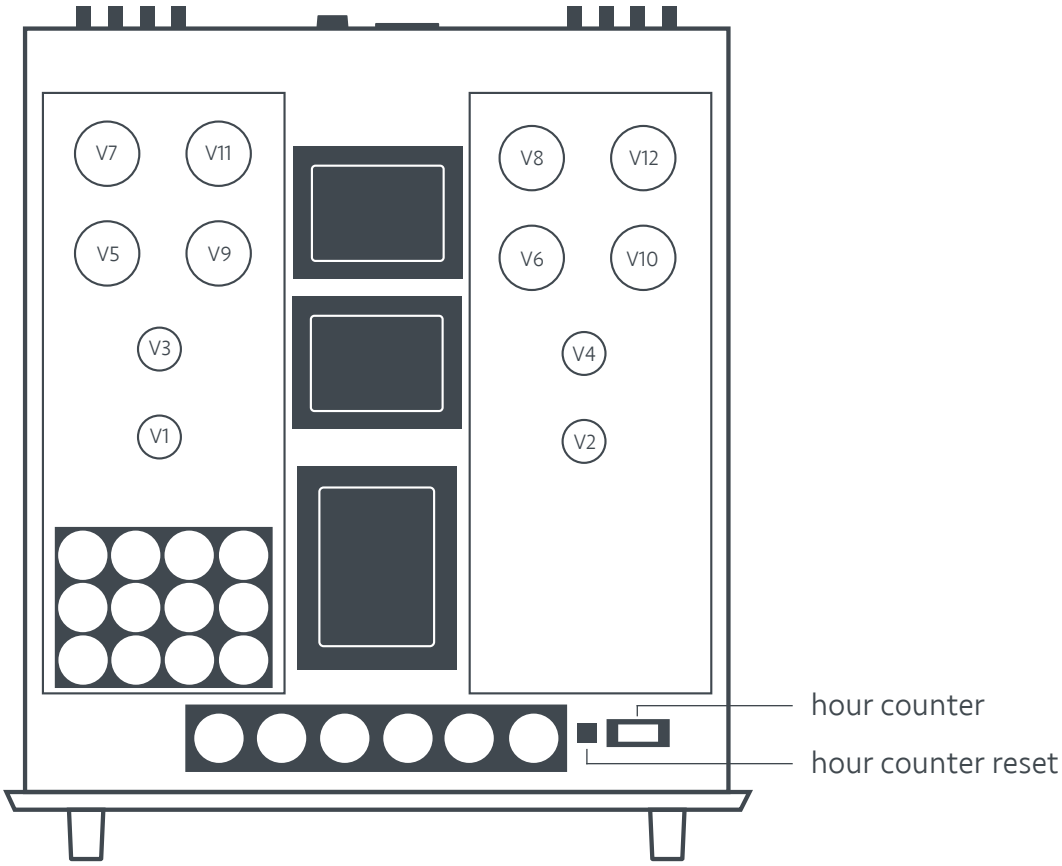
For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

This unit is RoHS compliant.

A note about packaging...

Save all packaging in a dry place away from fire hazard. Your Reference 150 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 150 SE from unnecessary damage or delay.

Installation



Before operating the Reference 150 SE

Your Reference 150 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 two matched quads of KT150 output tubes, and four 6H30 dual triodes used in the input stage. 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 is no restriction above and behind the unit and on either side.

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 86° F or 30° C. Improper installation will cause premature tube failure and will affect your warranty, as well as the service life of the unit.

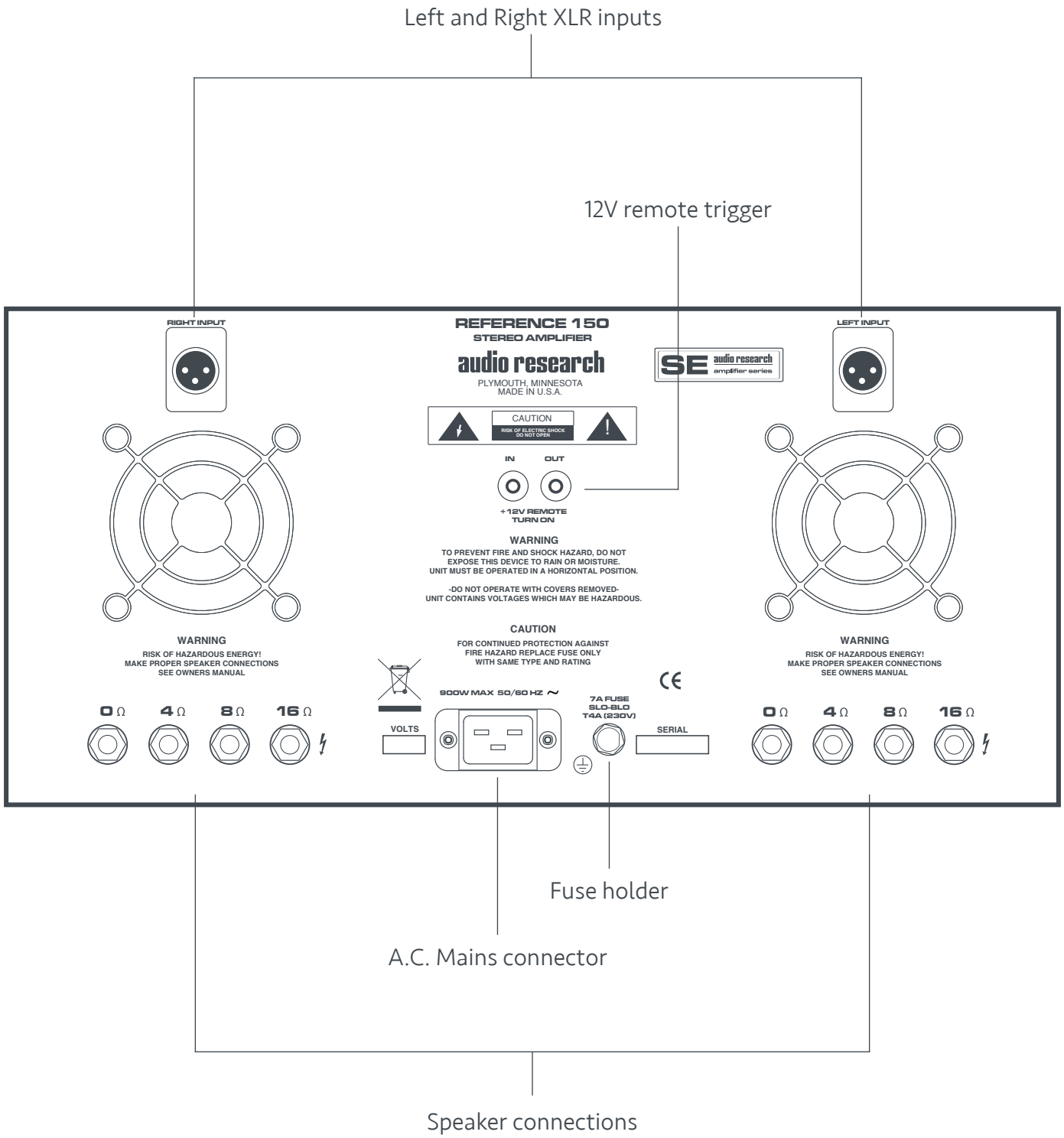
It is normal for a vacuum tube power amplifier to run quite warm, and if used for prolonged periods, hot to the touch. All components within are, however, operated at safe, conservative levels and will not be improperly affected thereby, providing the requirements outlined above are adhered to.

A Note about Vacuum Tubes

The vacuum tubes in your Reference 150 SE have been burned in, tested and electrically matched to provide the best performance and reliability of your amplifier. That said, vacuum tubes must be replaced from time to time. The KT150 output tubes in the Reference 150 SE should have an expected life of approximately 3,000 hours, while the smaller 6H30 tubes should have a life expectancy of approximately 4,000 hours. These life expectancies are only approximate.

Connections

Back Panel Controls and Connections



Connections

Input Connectors

The Reference 150 SE uses a fully balanced circuit topology and has a pair of balanced XLR input connectors 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 150 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 150 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 150 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 150 SE. Connect the red or '+' speaker terminal to the wire that connects to the 4, 8, or 16-ohm terminal on the Reference 150 SE and tighten the speaker terminals securely to ensure best sonic results.

Connections

Remote Turn-on

The Reference 150 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 mini plug to connect to the +12V IN jack on the rear of the Reference 150 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 150 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.

When the 12V DC remote turn-on/off circuit is used, the power switch on the front panel should be turned off.

Connections

A.C. Power Connection

It is important that the Reference 150 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 150 SE for On/Off control of the amplifier, or the 12V start-up trigger for remote installations.

The AC power source for the Reference 150 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 150 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.

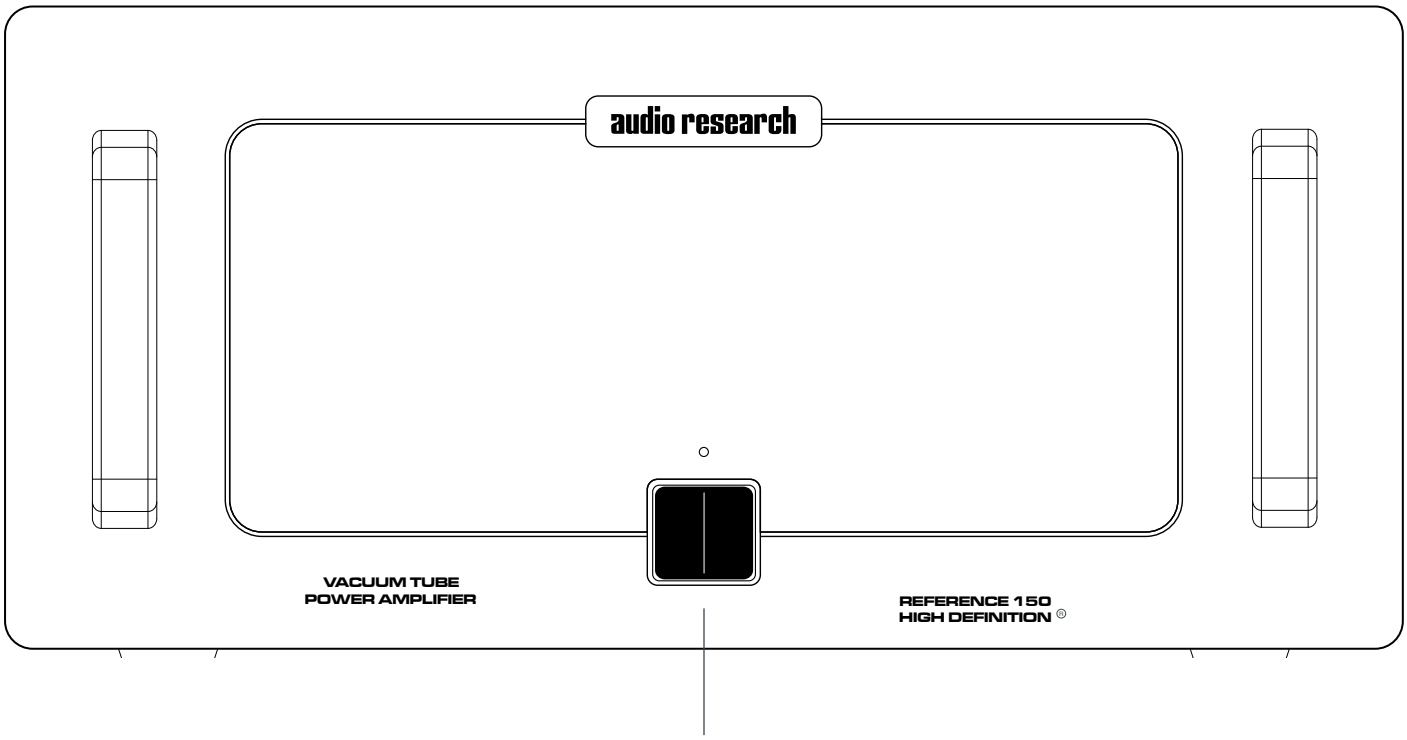
The Reference 150 SE should be turned on after the other components of your system. If the Reference 150 SE is turned on before other components, the amplifier will amplify any extraneous turn-on noises those components might generate, which could potentially damage the loudspeakers. Good operating practice dictates that the amplifier should be turned on last, and turned off first in an audio system.

The Reference 150 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 150 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 150 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



Main Power Switch

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 150 SE front panel control switch. Green power LED will light.
- Unmute preamplifier output, initiate source component signal, and adjust gain as appropriate.

Shut-Down

- Mute preamplifier output.
- Switch Reference 150 SE front panel control switch to off.
- Turn off preamplifier and then the associated input source components.

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 150 SE will sound fantastic out of the box, it will only improve with continued use.

Important!

After the Reference 150 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.

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 150 SE at 120V AC. Adjustment must be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time.

A digital voltmeter capable of accurate measurements with 0.1 mVDC resolution is preferred for accurate adjustment (must have 3 ½ digit display). Use the plastic alignment tool provided to make the adjustment. The measurement points are yellow and black banana test jacks next to each output tube. Adjust the 'bias' for a voltage reading of 65mVDC (.065 Volt DC) at the blue bias pot for one of each output tube pair as follows, noting the voltage setting of the larger V number tube in each pair is slaved to the adjustment setting of its lower V number companion tube: for example, adjust V5 for 65mVDC and measure its companion tube V7 to verify a reading of 57 to 73mVDC. Repeat procedure by adjusting and measuring V9 to read 65mVDC and verify V11 reads 57-73mVDC; adjust and measure V6 to read 65mVDC and verify V8 reads 57-73mVDC, and finally adjust and measure V10 to read 65mVDC and verify that V12 reads 57-73 mVDC.

Hour Counter

An LCD hour counter of elapsed tube operating time can be viewed through the top cover near the front, mounted on the right main circuit board (see illustration page 6). This displays accumulated hours of vacuum tube service life. If the amplifier is unplugged from A.C. supply, the total accumulated hours are retained. Adjacent to the hour counter is the hour counter reset button; after replacing vacuum tubes, press this button to reset the hour counter back to zero. Note that once the hour counter has been reset, it is no longer possible to recall the previous hour count.

Cooling Fan Speed Adjustment

The two D.C. cooling fans located at the rear of the Reference 150 are adjustable in speed. Locate the red colored dip switch under the top cover at the top near the center of the back panel. For highest fan speed move both white tabs on the red dip switch to the upward position; for medium fan speed move either one of the tabs to the downward position, and for low fan speed move both tabs to the downward position. For maximum cooling and extended tube life, use the highest fan speed possible. Be sure to first turn off and unplug the Reference 150SE from its power receptacle before unscrewing the top cover to access the switch. Refasten the top cover before resuming operation. Do not operate the Reference 150SE with fans disconnected or if one or both fans should stop running.

Maintenance

Vacuum Tubes

It is recommended that you replace the vacuum tubes of your Reference 150 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 ordering a new tube.

Servicing

Because of its careful design and exacting standards of manufacture, your Reference 150 SE amplifier should normally require only minimal service to maintain its high level of performance.

Caution

Your Reference 150 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 or call 763-577-9700. You may also initiate a service request by visiting the Audio Research website (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.

Maintenance

Fuse Values and Locations

The Reference 150 SE has three fuses; one external mains fuse, and two internal fuses. Please refer to the illustration below to determine fuse locations. Refer to the table at right for values. When replacing fuses, use the exact values indicated. Audio Research is not responsible for damage caused by improper fuse values or aftermarket fuses.

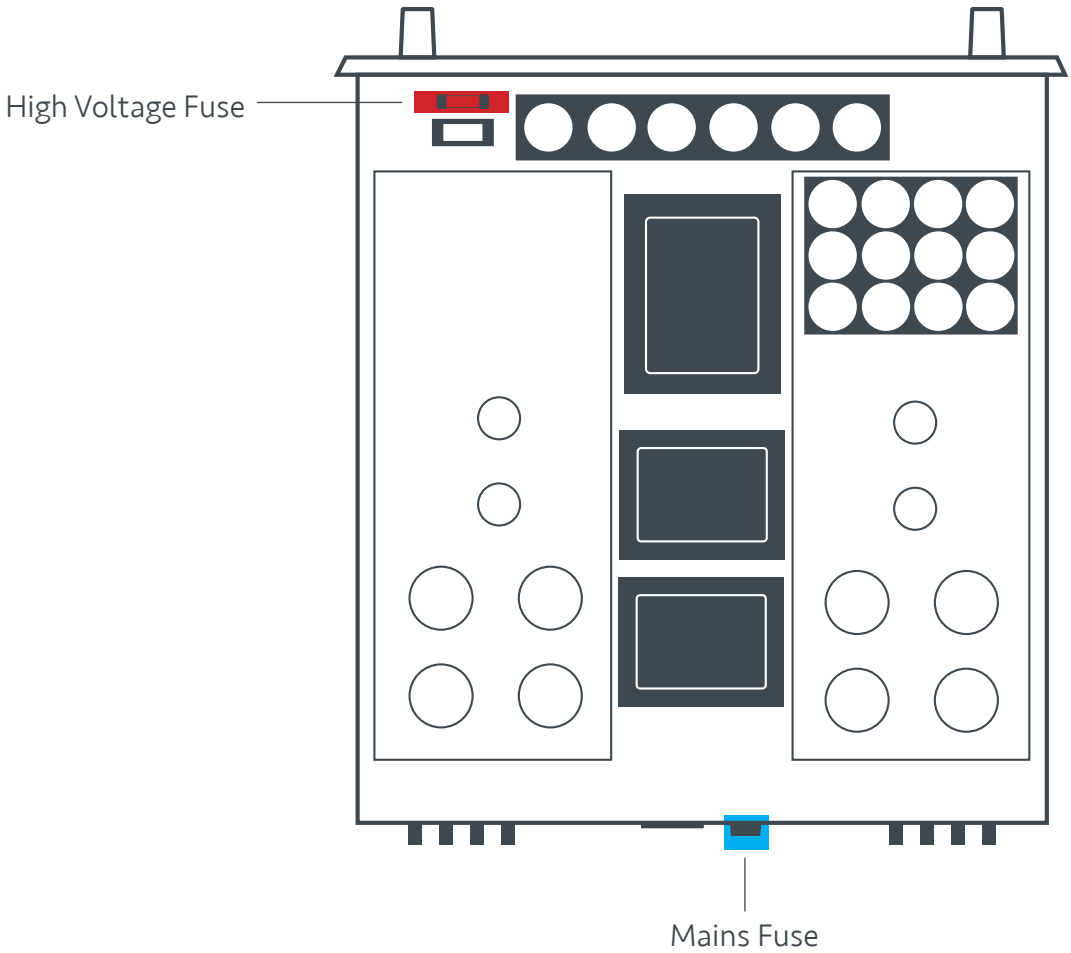
Mains Fuse (indicated in BLUE)

100-125 V units: Bussman MDQ7 slo-blo
220-250 V units: T4A slo-blo

High Voltage Fuse (indicated in RED)

100-125 V units: Bussman MDQ4 slo-blo
220-250 V units: T3.15A slo-blo

When changing an internal fuse (or any time the cover of the unit is removed), make certain the main power is disconnected from the A.C. line. Be very careful working around circuit boards as there are dangerous voltages internally. If you are not comfortable opening your amplifier, please refer to a qualified service technician.



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. 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:
150 watts per channel continuous from20Hz to 20kHz. 1kHz total harmonic distortion typically 0.6% at 150 watts, below 0.03% at 1 watt.

Approximate actual power available at 'clipping' 160 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 80kHz

Frequency Response: (-3dB points at 1 watt) 0.5Hz to 120 kHz

Input Sensitivity: 2.0V RMS BAL for rated output. (24 dB Bal gain into 8 ohms)

Input Impedance: 300K ohms Balanced

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

Output Taps: 16 ohms, 8 ohms, 4 ohms

Output Regulation: Approximately 0.6dB 16 ohm load to open circuit (Damping factor approximately 14)

Overall Negative Feedback: 14dB

Slew Rate: 13 volts/microsecond

Rise Time: 2.0 microseconds

Hum & Noise: Less than 0.1mV RMS – 114dB below rated output (IHF weighted, input shorted)

Power Supply Energy Storage:
Approximately 1040 joules.

Power Requirements: 105-125VAC 60Hz (210-250VAC 50Hz) 730 watts at rated output, 900 watts maximum, 420 watts idle

Tubes Required: 4 – Matched pair KT150 – Power Output; 4 – 6H30 Driver

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:
75 lbs. (34.2 kg) Net
90 lbs. (41 kg) Shipping

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