



GS150

Stereo Power Amplifier

User Guide







Thank you for choosing the GS150 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 GS150 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 GS150 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 GS150 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.

The GS150 is shipped with a protective, power-ventilated cover. While the cover may be removed, its use is recommended to prevent accidental contact with the hot vacuum tubes. The protective cover is also recommended to provide powered ventilation if the amplifier is mounted in shelving.

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...

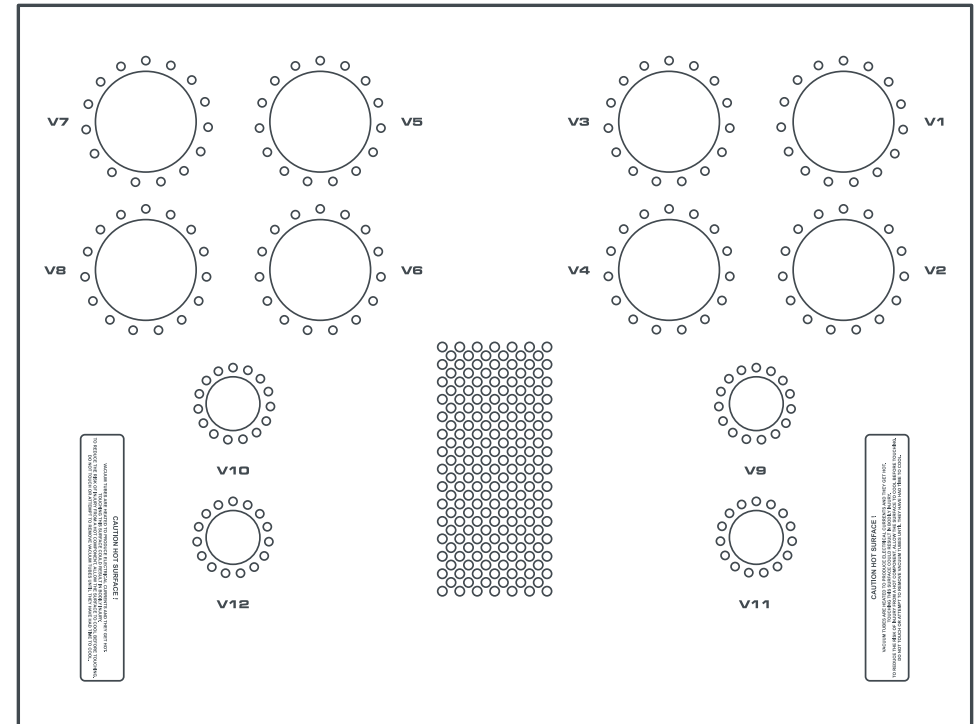
Save all packaging in a dry place away from fire hazard. Your GS150 amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return your unit to the factory for service, but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your GS150 from unnecessary damage or delay.

Installation

Before operating the GS150

This unit has been shipped with the vacuum tubes installed in protective foam in separate boxes packed inside the shipping carton. Included are two matched quads of KT150 power output tubes and four 6H30 tubes. Remove the tubes carefully from the protective foam. Using a phillips-head screwdriver to loosen the fastening screws, remove the top cover and set aside.

After removing the top cover and the vacuum tubes packed in protective foam, see the accompanying illustration for instructions on installing the tubes for your GS150 in their proper locations in the chassis. Note that the numbers written on each tube correspond to a 'V' number etched on the chassis next to each tube socket. Insert each tube firmly, carefully aligning the tube pins with the corresponding socket holes.



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. Be sure that airflow to the 12V D. C. cooling fans 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

Input Connectors

The GS150 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 GS150 before turning on the amplifier.

Output Connectors

Proprietary, heavy-duty output terminals are provided on the rear panel for 4 or 8-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 GS150 puts out the same amount of power whether the 4 or 8-ohm terminals are used.

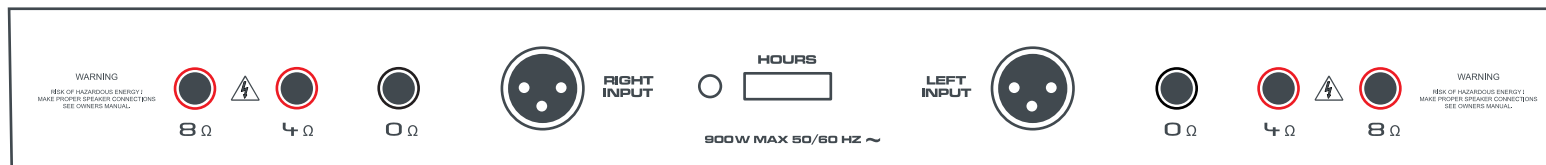
Important

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 GS150. Connect the red or '+' speaker terminal to the wire that connects to the '4' or '8' terminal on the GS150 and tighten the speaker terminals securely to ensure best sonic results.

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 GS150 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.



Connections

A.C. Power Connection

It is important that the GS150 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 GS150 for On/Off control of the amplifier, or the 12V start-up trigger for remote installations.

The AC power source for the GS150 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 GS150 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 GS150 should be turned on after the other components of your system. If the GS150 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 GS150 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 GS150 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 GS150 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.

Connections

Remote Turn-on

The GS150 has a built-in 12VDC 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 GS150.

The +12V IN jack should be connected to the +12VDC output of the master control system, using a continuous +12VDC signal at 12mA per GS150 for the duration of amplifier on-time. Do not use a momentary or data pulse control signal.

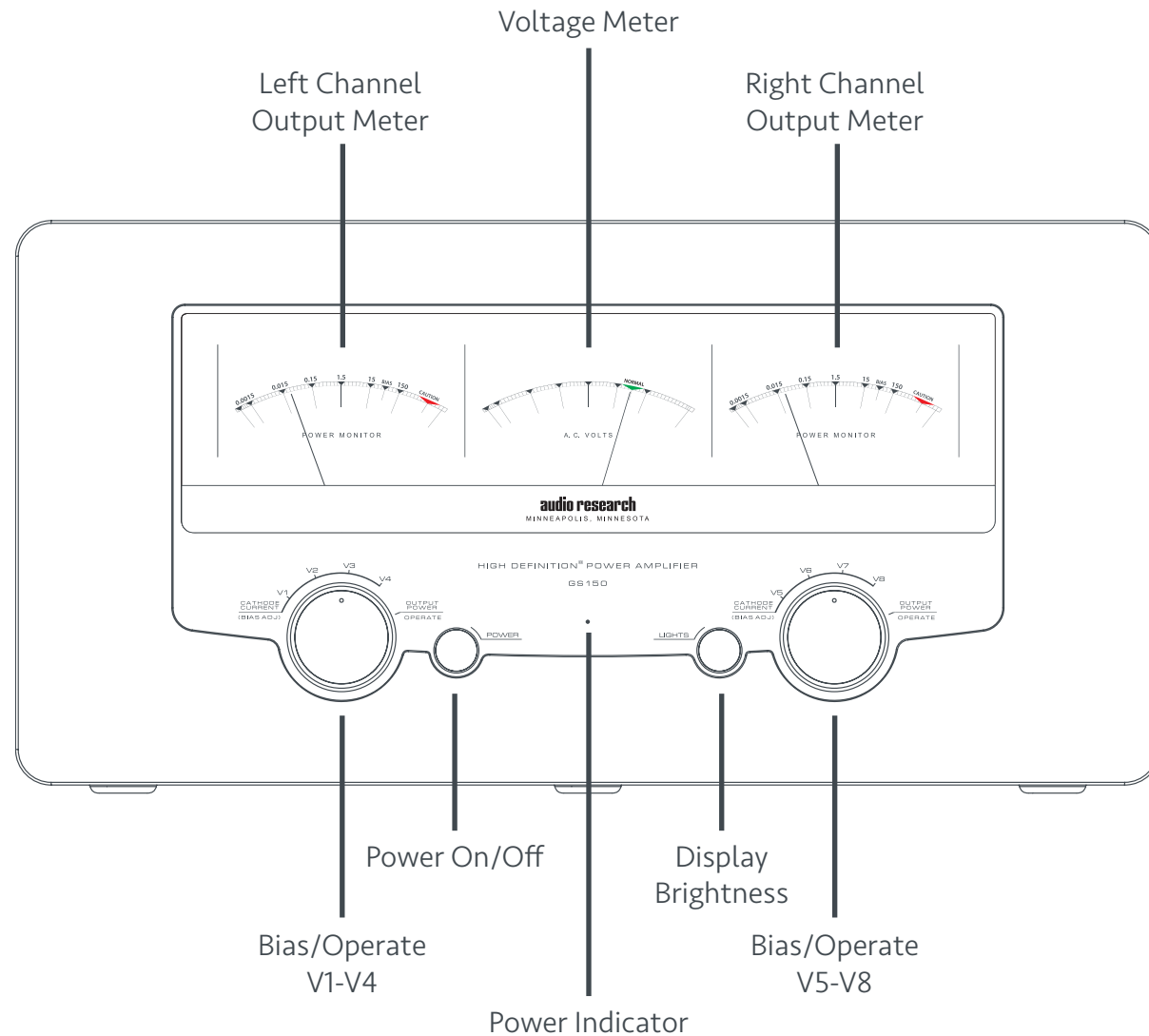
The +12VDC remote jacks have polarity protection, so they will not operate if a -12VDC signal is accidentally connected, or if the control wires are reversed.

RS-232 Control

The GS150 has an RS-232 connector on the back panel, in the event the amplifier is incorporated into an automated or two-way remote communication system. Please see your dealer or contact customer service at Audio Research to acquire the specific codes relative to the RS-232 control.

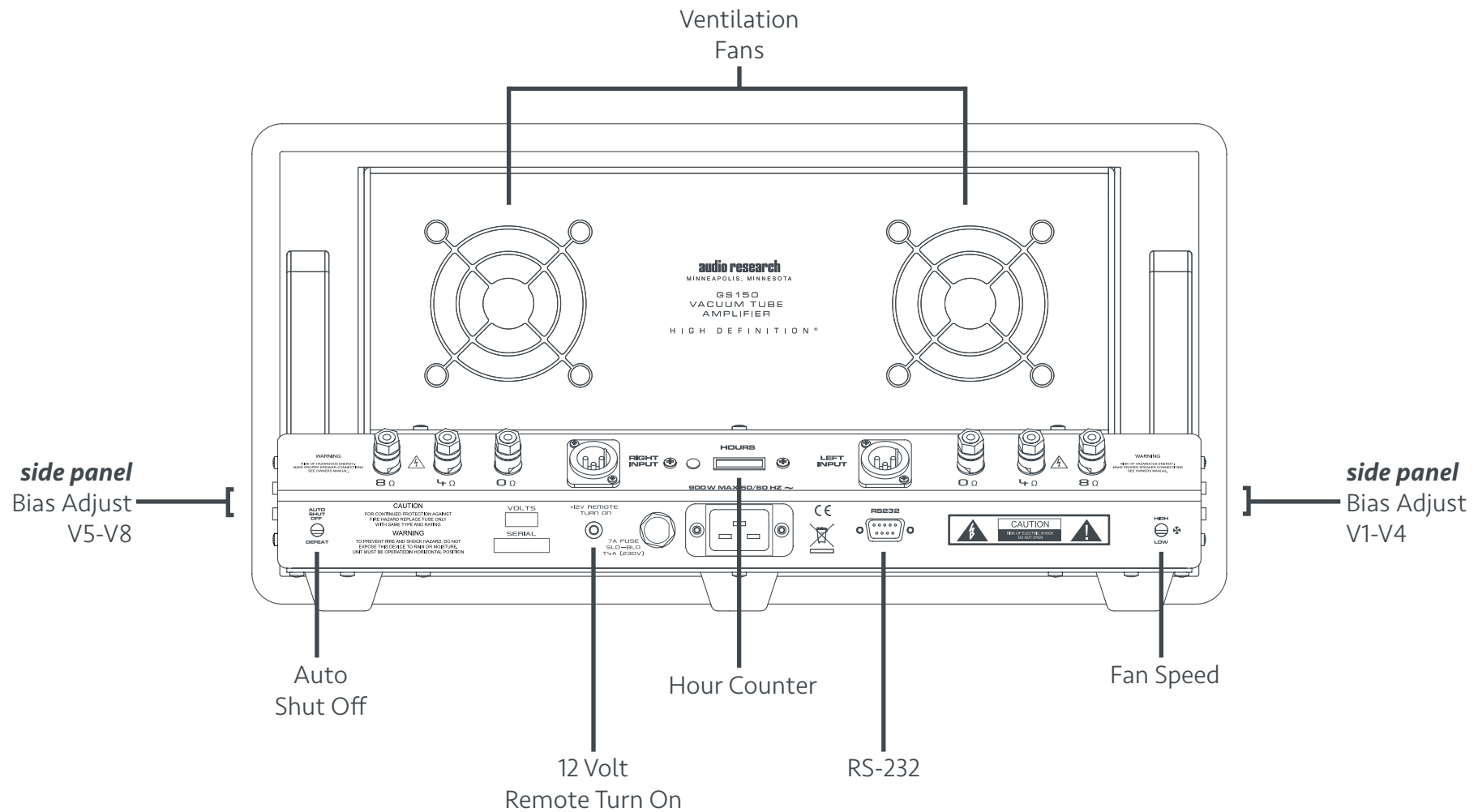
Operation

Front Panel Controls and Displays



Operation

Back Panel Controls and Connections



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 GS150 front panel control switch. Green power LED will light.
- The GS150 has an automatic mute circuit which allows 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.
- Press GS150 front panel control switch.
- Turn off preamplifier and then the associated input source components.

Note

After the Reference 150 is turned off, wait at least five minutes before turning it on again.

Cooling Fan Speed Adjustment

The protective vacuum tube cover of the GS150 has two low-noise fans installed against the back panel to provide ventilation when the cover is installed on the amplifier. Depending on your amplifier installation location, you may wish to change the speed of the fans for adequate cooling. As a guideline, if the amplifier is sitting in the open with a minimum six inch clearance on all sides of the tube cover, the low setting is sufficient. If you are placing the amplifier in a rack or cabinet, the high setting will be preferable to keep the vacuum tubes within a comfortable operating range. To change the fan speed, find the fan speed switch located on the back panel, on the far right side of the unit. Select between high and low speeds.

When removing or installing the protective vacuum tube cover, be sure to first turn off and unplug the amplifier from its power receptacle. At the back of the amplifier, make sure to connect or disconnect the power cable for the cooling fans. When reinstalling the cover, be certain the threaded collar is secured before replacing and screwing on the vacuum tube cover.

Note

Do not operate the GS150 with the protective vacuum tube cover installed and the cooling fans disabled. This could result in damage to your amplifier due to overheating.

Operation

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 'Lights'. Press this button to toggle through the three available settings.

Hour Counter

An LCD hour meter of elapsed tube operating time can be viewed on the back panel, located in the center above the IEC power connector. This displays accumulated hours of vacuum tube service life. If the amplifier is unplugged from the mains supply, the total accumulated hours are retained. The hour counter may be reset by inserting a small, pointed object in the hole directly to the left of the LCD counter. The KT150 power vacuum tubes in your GS150 have an average life span of approximately 2000 hours. The smaller 6H30 vacuum tubes have a life span of approximately 4000 hours. Actual tube life will vary dependant on the frequency and manner of usage of the amplifier.

Note

Once the hour counter has been reset, the total accumulated hours can not be recalled.

Auto Shut Off

The GS150 is equipped with an auto shut off feature, designed to turn the amplifier off after a period of time during which it is not used. The auto shut off feature is comprised of a signal-sensing circuit designed to detect any incoming signals from your preamplifier. In the event that quiet music is listened to at very low volumes, there may not be adequate signal for the auto shut off circuit, resulting in the amplifier going into standby mode. If this is the case, please disengage the auto shut off feature. The auto shut off feature control switch is located on the back panel of the GS150 at the far left side. Toggling the switch allows you to turn the feature on or off.

Note

The auto shut off feature is not in the signal path of the amplifier and has no deleterious sonic effect to music playback.

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 GS150 will sound fantastic out of the box, it will only improve with continued use.

Operation

Output Tube Bias Adjust

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 70 watt rating. This point of operation provides 'enriched' Class AB1, and will satisfy the most critical listener. For best results, operate and adjust the GS150 at the voltage specified for your unit. Adjustment must be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time.

The GS150 operates with paired vacuum tubes; one tube provides adjustment for a second 'slave' tube. For example, V1 provides adjustment for both V1 and V2, V3 provides adjustment for both V3 and V4, and so on. When making adjustments, understand that one adjustment pot affects the bias of two power output tubes.

To adjust bias, turn one of the 'Bias/Operate' knobs on the front panel to a vacuum tube position. Using the supplied plastic bias adjustment tool, locate the appropriate adjustment pot on the side of the amplifier, immediately behind the front panel. Insert the adjustment tool into the pot corresponding to the 'V' number selected with the 'Bias/Operate' knob. Slowly turn the adjustment tool, watching the front panel meter of the selected vacuum tube. Continue to adjust the bias until the needle of the meter is within the black 'Bias' triangle on the meter. Once

you have made the adjustment, switch the 'Bias/Operate' knob to the next tube to check that the bias of the slaved tube is also within the acceptable bias region on the meter. Continue to the next adjustment tube, and repeat the operation.

Please note there may be slight variances between paired tubes; this is normal. Though the output tubes of your amplifier are carefully matched before installation at the factory, small changes can occur over the life span of the vacuum tubes. Remember that one tube is slaved to the adjustment of another tube; readjusting the bias for the first tube will change the bias of the paired slave tube. If the bias difference between the two output tubes can not be maintained within the acceptable range on the panel meter, your output tubes may need replacement. Contact your dealer or the Audio Research service department for a replacement set of output tubes.

Note

It is recommended that you replace the vacuum tubes of your GS150 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.

Maintenance

Servicing

Because of its careful design and exacting standards of manufacture, your GS150 amplifier should normally require only minimal service to maintain its high level of performance.

Caution

Your GS150 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.

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 155 watts per channel continuous from 20Hz to 20kHz. 1kHz total harmonic distortion typically 0.6% at 155 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 8 ohms, 4 ohms.

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).

Controls Rotary selector for tube bias, Power on/off, fan speed, auto shut-off on/defeat, RS232, 12V trigger

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" (483 mm)
height	9 7/8" (251 mm)
depth	22 1/2" (572 mm)

Weight 87 lbs. (39.5 kg)





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