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# Owner's Manual

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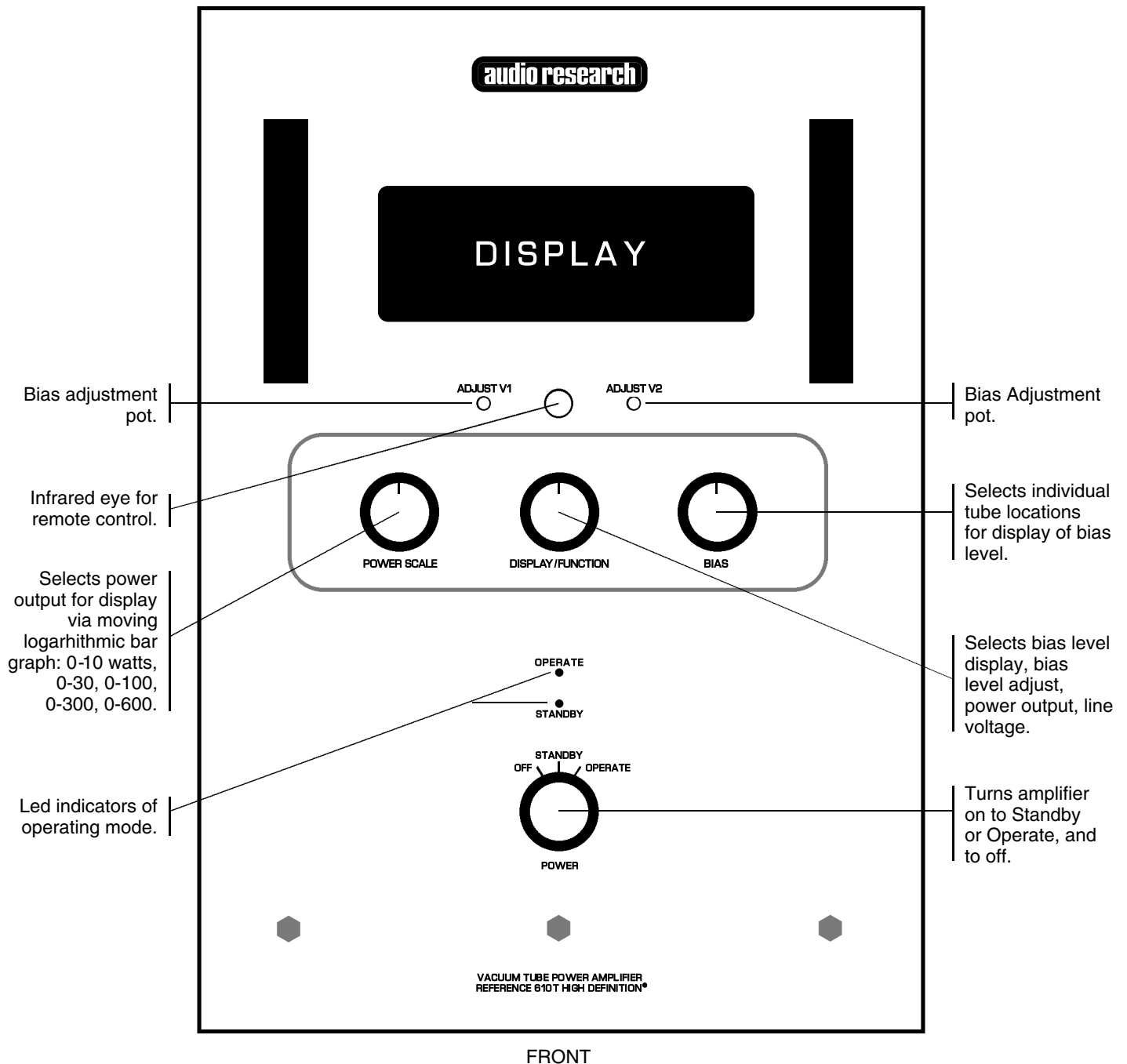
## **Model Reference 610T**

**MONOBLOCK POWER AMPLIFIER**

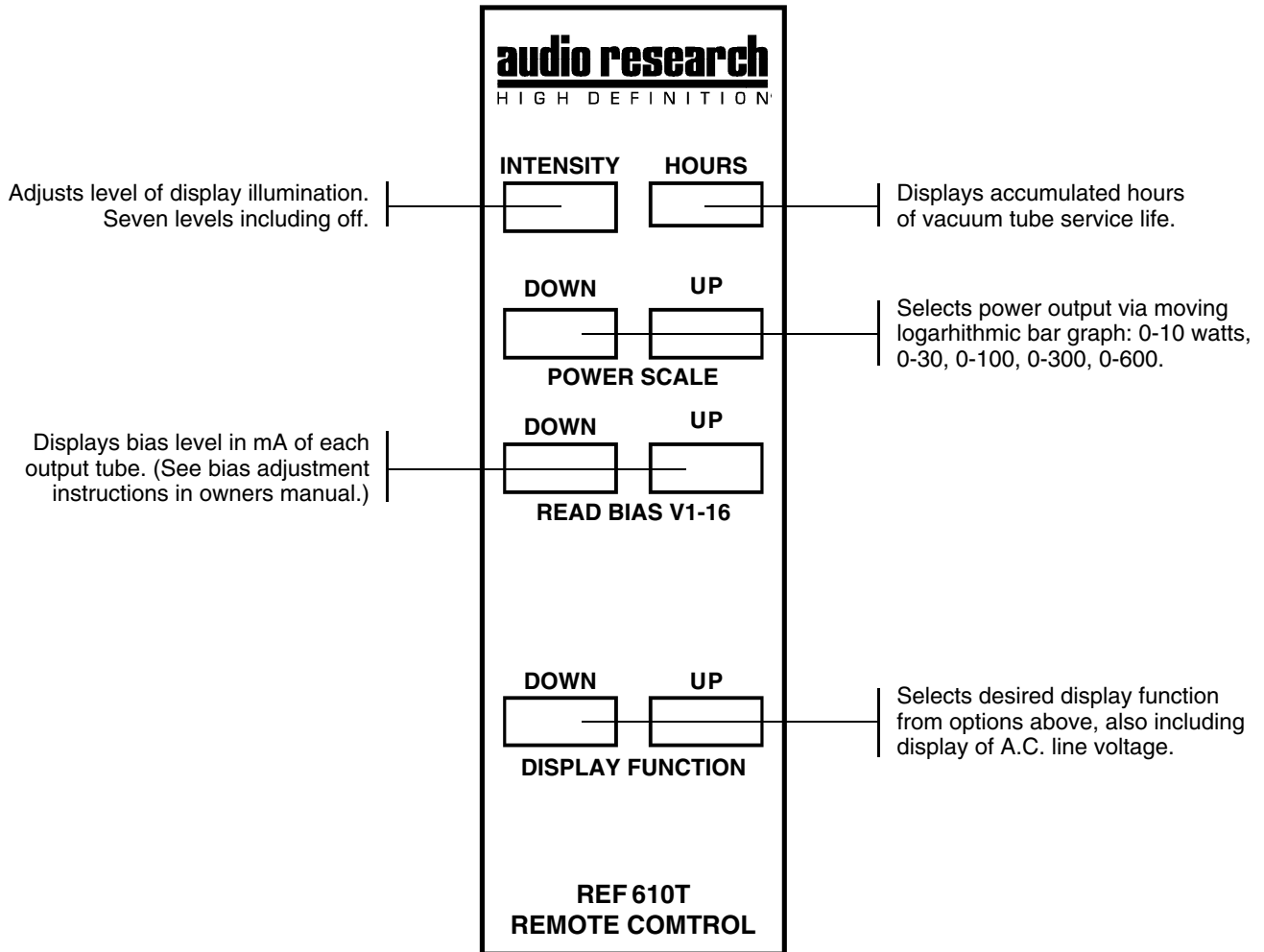
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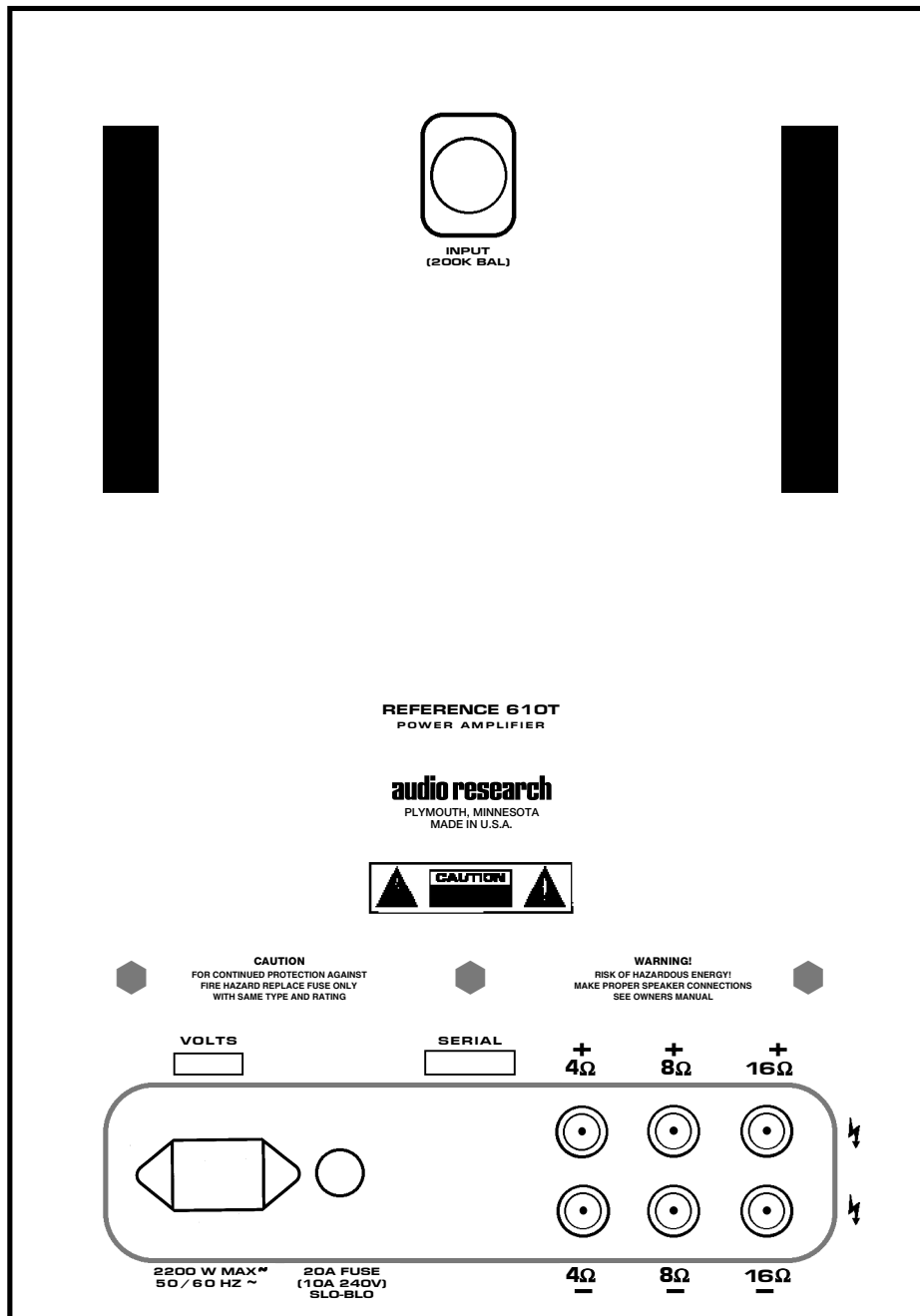
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## Preface

Please take time to carefully read and understand the following information and instructions before you install or attempt to operate your Audio Research Reference 610T vacuum tube monoblock power amplifier. Becoming familiar with important facts about your amplifier and its correct operating procedures will help assure maximum musical satisfaction and reliable operation.

## Packaging

Save all packaging accompanying this product. You have purchased a precision electronic instrument, and it should be properly cartoned any time shipment becomes necessary. It is very possible that this unit could be damaged during shipment if repackaged in cartoning other than that designed for it. The original packaging materials help protect your investment from unnecessary damage, delay and added expense whenever shipment of this unit is required.

See separate "Unpacking/Repacking Instructions" card attached to the outer amplifier carton before attempting to unpack or repack this amplifier for shipment. Retain unpacking/repacking instructions for future reference.

## Accessories

- 1 – Phillips-head screwdriver for panel removal.
- 1 – Plastic screwdriver for front panel potentiometer bias adjustment.

## Fuses

- 1 – 2 Amp MDQ slo-blo for LV power transformer in 120V units.
- 1 – T1 Amp fast-blo for LV power transformer in 220, 240V units.
- 1 – 4 Amp MDQ slo-blo for start-up circuit in 120V units.
- 1 – T3.15 Amp fast-blo for start-up circuit in 220, 240V units
- 1 – 20 Amp MDA for main power in 120V units.
- 1 – 10 Amp MDA for main power in 220, 240V units.

## Vacuum Tubes and Preparation for Use

Do not attempt to operate this amplifier before installing the necessary vacuum tubes in their indicated sockets. The tubes are protectively packed in a separate carton; save packing for possible future use.

1. All input, driver and output-stage tube locations are clearly labeled with tube type and "V" number on the anodized plate covering the top of the amplifier. There are two 6N1P and one 6H30 input tubes, two 6L6GC drivers, and 16 6550C output tubes. In addition, two power-supply regulator tubes—one 6H30 and one

6550C—are located inside on the upper or second-level circuit board. To access this location, use the supplied Phillips-head screwdriver to remove all fastening screws on one of either of the two side panels; the tube sockets will be visible near the center of the board.

2. Match each tube's "V" number marked on the tube with the "V" number of the corresponding socket. Insert tubes by carefully aligning tube pins with socket holes and gently applying downward pressure. The base of the tube should firmly contact the surface of the socket. Once the power-supply tubes have been installed inside the amplifier, refasten the side panel and proceed to install the tubes on top of the amplifier.
3. **Note:** In general, contact enhancers are not recommended for use on vacuum tube contact pins. With continual exposure to heat and air, many of these substances can form gummy, dust-collecting residues which actually reduce contact and degrade sonic performance. Proper external use of these preparations – on interconnect plugs, speaker connections, etc.– is subject to the discretion of the owner. Contact Audio Research for specific recommendations.

## Installation

To insure normal component life and safe operation this unit **must be operated only in an upright position**. Adequate air flow and proper cooling can occur only if there is no restriction above the unit and on either side.

The special non-marring elastomer feet provide adequate spacing and stability only on a smooth, hard surface. **For upright stability, never operate the unit while it is sitting on a soft surface such as a thick rug or carpet.**

Due to its unusually high weight, this amplifier must be supported on a surface specifically rated for such a load. Standard furniture cabinetry and shelving are not typically designed to adequately support this amplifier. 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 air flow 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.

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## Warnings

1. To prevent fire or shock hazard, do not expose this product to rain or moisture.
2. This unit operates on voltages which can cause serious injury or death. Do not operate with covers removed. Any necessary servicing should be carried out by your authorized Audio Research dealer or other qualified electronics technician.
3. Use only the plastic insulated screwdriver included with this unit when making front panel bias adjustments.
4. The power cord on this unit is safety-tested and is equipped with a proper grounding plug. If used normally, it will provide a safe earth ground connection of the chassis. Defeat of the grounding plug, or any unauthorized modification of the active circuitry or controls of this unit, automatically voids warranty coverage.
5. For safe operation and protection against fire hazard, replace fuses only with those of the same type and rating as those supplied with this unit.
6. At 170 lbs. (77.2 Kg) net weight per chassis, the Reference 610T amplifier is too heavy for one person to lift. To avoid injury, do not attempt to unpack, lift or move the unit without the help of at least one other person.
7. Always mute the preamplifier when cueing a phono cartridge stylus up or down.

Due to the immense power supply reserves, unusually high power output, and wide bandwidth of the Reference 610T, added emphasis must be placed on use of your preamplifier's mute switch from a safety standpoint. A transient signal burst or "pop" such as caused by tonearm cueing, accidental dropping or brushing of the phono cartridge stylus—even at a normal listening level—could cause an instantaneous peak power demand on the amplifier of up to 1000 watts (which the Reference 610T will try to deliver). The importance of lowering the preamplifier volume level to a minimum setting and activating the mute switch whenever cueing the tonearm or making contact with the phono cartridge stylus cannot be over-emphasized. Adhering to this precautionary muting procedure is equally important when turning your system on or off, and when connecting or disconnecting any cables in the system. Carefully following this recommendation will minimize the chance of causing undue stress and potential damage to your amplifiers and loudspeakers. (See your preamplifier Owner's Manual for more detailed instructions on use of muting provisions.)

## Description of Controls

### Front Panel Rotary Controls

There are four front panel rotary controls: Power, Power Scale, Display/Function, and Bias.

**POWER:** This control turns the amplifier on and off, and selects one of two operating modes. From the "Off" position, the amplifier should be switched to "Operate." There will be an automatic warm-up sequence for approximately two minutes, during which "Mute" will flash in the display window. After this initial warm-up the amplifier is ready for listening. The "Standby" position keeps the high voltage regulator at half its normal operating voltage so that it is in a warm, ready state. Tube filaments are on but the tubes are not conducting. This reduces the time it takes the Reference 610T to reach full sonic performance without sacrificing output tube life, and should be used between listening sessions. When the amplifier is switched from "Standby" to "Operate" there will be an automatic warm-up sequence for approximately two minutes, during which "Mute" will flash in the display window. We recommend that the Reference 610T be switched to "Off" when there are protracted intervals between listening sessions.

**POWER SCALE:** This control selects in the display window one of five logarithmic, moving bar graphs to display power output: 0-10 watts, 0-30 watts, 0-100 watts, 0-300 watts and 0-600 watts. The Power Scale function must first be selected with the Display/Function control before selecting a specific Power Scale mode.

**DISPLAY/FUNCTION:** This control selects one of three functions: power output scale, line voltage, or output tube-bias measurement/adjust.

**BIAS:** This control selects individual output tube locations for checking output tube bias current level. When V1 and V2 are selected, the actual bias level of these two tubes may be adjusted by inserting the supplied flat-bladed tool into the labeled adjustment pot and rotating until the display reads 65mA. All other output tubes may be checked, but not adjusted, for their individual bias levels, which should normally fall in the range of 57–73mA. A tube which persistently measures outside this range should be replaced.

**DISPLAY SCREEN:** The large vacuum-fluorescent display screen on the front panel has seven levels of brightness, including off. The illumination level of the display can only be adjusted using the handheld remote control; this function cannot be selected via the front-panel controls. When the display is off, the use of any control will turn the display back on for ten seconds, then off again.

The screen displays all functions and operating modes as they are selected: Standby/Mute in Standby mode; Power Output bar graph as normal default in Operating Mode; large numerals for A. C. line voltage; large numerals for bias check; and small numerals for total hours accumulated. Note that the "Hours" function can only be selected using the handheld remote and will turn off after ten seconds.

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In the event of A. C. interruption or low-A. C. line conditions while in "Operate", the amplifier automatically mutes the output without indication in the display. When sufficient A.C. supply resumes, the amplifier will enter its normal two-minute warm-up cycle.

## Handheld Remote Control Functions

All display functions of the Reference 610T may be addressed by pressing buttons on the handheld remote control. Note that power on/off, Standby and Operate modes can only be selected by using the front-panel rotary control.

**INTENSITY:** Adjusts level of display screen illumination to any of seven levels including full off.

**HOURS:** Displays accumulated hours of vacuum-tube service life, up to 500,000 hours. If the amplifier is unplugged from A.C. supply, total accumulated hours are retained. May be reset by qualified technician. Contact Audio Research Customer Service for more information about reset procedure.

**POWER SCALE DOWN/UP:** Selects and displays power output scale via moving logarithmic bar graph: 0-10 watts, 0-30 watts, 0-100 watts, 0-300 watts, 0-600 watts. The normal default display mode when the amplifier is in Operate.

**READ BIAS V1-V16 DOWN/UP:** Displays bias level of each output tube in mA. When selected, V1 or V2 may also be adjusted by inserting the supplied flat-bladed tool into the respective adjustment pot on the front panel and rotating until "65 mA" appears in the display. All other tube locations (V3-V16) may only be checked for bias level, not adjusted. They should normally display a bias value between 57 and 73 mA. Note that amplifier is muted in this mode.

**DISPLAY FUNCTION DOWN/UP:** Selects desired display function from options listed above, also including display of A.C. line voltage entering the amplifier, shown in large numerals. Amplifier is muted when checking line voltage.

## Connections

**INPUT CONNECTOR:** The Reference 610T uses a fully balanced circuit topology and thus has one 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 610T before turning on the amplifier.

**OUTPUT CONNECTORS:** Proprietary, 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 (-) terminal, then the (+) lead to the matching (+) terminal, following your speaker manufacturer's impedance specification. The Reference 610T puts out the same amount of power whether the 4, 8 or 16-ohm terminals are used.

**A.C. POWER CONNECTIONS:** It is important that the Reference 610T 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 610T for On/Off control of the amplifier. Note that there is not a 12V start-up trigger for remote installations.

The A. C. power source for the Reference 610T should be capable of supplying 20 amperes for 120V units, or 10 amperes for 220/240V units. Preferably, the amplifier should be connected to its own A. C. power circuit branch, protected by a 20-30 amp circuit breaker. The preamplifier and other related equipment should be connected to a separate power circuit and breaker. If the power receptacle is more than 25 feet from the building's power entrance and breaker box, circuit wiring capable of 30 amperes should be installed to minimize voltage drop using a 20-amp breaker. Avoid the use of extension cords. If they must be used on a temporary basis, use 12-gauge cords or heavier.

The Reference 610T should be turned on **after** the other components of your system. If the Reference 610T 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 610T uses a grounding system that does not require a ground-lifter adaptor plug on the A. C. power cord to minimize hum. The power cord supplied with the Reference 610T 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.

## Operating Procedure

### Start-Up:

1. Secure input connection between the amplifier and your preamplifier; attach speaker leads to the appropriate output terminals.

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2. Attach supplied power cord to rear IEC inlet of amplifier, and plug other end into grounded A. C. power receptacle.
3. Turn on preamp and all other components; mute preamp output.
4. Turn Reference 610T front-panel control from Off to Operate; a two-minute mute/warm-up cycle will follow.
5. Select display function desired.
6. Unmute preamplifier output, initiate source component signal, and adjust gain as appropriate.

## Shut-Down:

1. Mute preamplifier output.
2. Turn Reference 610T front-panel control from either Operate or Standby to Off.
3. Turn off preamplifier and then the associated input source components.

## Bias Adjustment Procedure

1. Amplifier should be turned on and operating for at least 30 minutes before adjusting bias of output tubes.
2. Select bias level function in display screen using either front panel control or remote control. The 610T will mute. Display will default to V1 location, showing bias level and instructions to adjust bias to 65mA.
3. Using supplied flat-bladed tool, insert into V1 pot opening on front panel and rotate until screen reads 65mA.
4. Using front-panel Bias knob or remote control, switch to V2 location and repeat adjustment procedure.
5. Check bias level for all other output tubes (V3–V16); each should measure in the range of 57mA to 73mA. If a tube persistently measures outside this range, it should be replaced.
6. Once tubes have been adjusted and checked for bias level, return display screen to Power Scale function and amplifier is ready to play. Note that if the bias level function is addressed while the amplifier is in Standby, it is not possible to adjust bias; the display will simply read "NA".

The Reference 610T 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. Audio Research-supplied output tubes are warranted for 90 days, and under normal conditions should provide up to 2000 hours of service life. This expected life will vary depending on conditions of use—ventilation, speaker loads, average playing level and A. C. voltage and line condition.

Complete sets of replacement tubes or individual tubes are available from Audio Research, and are strongly recom-

mended for best sonic performance and reliability. These tubes are burned in, measured, matched and specifically selected for your Audio Research amplifier. Contact your authorized dealer for suggested retail prices.

## Installation of Optional Tube Cover

To install the optional fan-cooled tube cover, first align the front of the cover with the top front edge of the amplifier, making sure the fans are positioned at the rear. Note that there are five holes along the top edge of each side panel; these should match up with corresponding holes along the bottom side edges of the tube cover. Before settling and aligning the tube cover at the rear, insert the 12V D.C. plug attached to the fans into the 12V socket located at the back edge of the anodized top plate. Then secure and align the tube cover completely, insert supplied screws and tighten moderately.

The high-quality 12V D.C. fans are single-speed and are not adjustable. They operate at a speed selected to provide adequate cooling of the tubes with a minimum of air turbulence or noise.

## Servicing

Because of its careful design and exacting standards of manufacture, your Reference 610T amplifier should normally require only minimal service to maintain its high level of performance.

**CAUTION:** The Reference 610T 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 may be referred to the Customer Service Department of Audio Research Corporation at 763-577-9700 (CST). When ordering a service manual from Audio Research or an authorized dealer, be sure to identify the serial number on your amplifier.

## 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 paint brush is effective in removing dust from bevels, the recessed nameplate and other features of the front panel.



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## Disposal and Recycling Guidelines

To dispose of this electronic product, do not place in land-fill. 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.

## Limited 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, or may be obtained from the authorized retailer or from the Audio Research Customer Service Department. 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:** 600 watts continuous at 16 ohms from 20Hz to 20kHz. 1kHz total harmonic distortion typically 0.5% at 600 watts, below .05% at 1 watt.

Approximate actual power available at "clipping" 630 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.)

**POWER BANDWIDTH:** (-3dB points) 15Hz to 150kHz.

**FREQUENCY RESPONSE:** (-3dB points at 1 watt) 1Hz to 200 kHz.

**INPUT SENSITIVITY:** 4.2V RMS balanced for rated output. (24dB Gain into 8 ohms)

**INPUT IMPEDANCE:** 200K ohms balanced.

**OUTPUT:** 4, 8, 16 ohms.

**OUTPUT REGULATION:** Approximately 0.8dB 16 ohm load to open circuit (Damping factor approximately 16).

**OVERALL NEGATIVE FEEDBACK:** 13dB.

**POWER SUPPLY ENERGY STORAGE:** Approximately 1000 joules.

**POWER REQUIREMENTS:** 105–125VAC 60Hz (210–250VAC 50Hz) 1700 watts at rated output, 2300 watts maximum, 800 watts at idle, 370 watts standby.

**TUBES REQUIRED:** 8 Matched pair 6550C Power Output; 1–6550C Regulator; 1–6H30.Regulator Amplifier; 2–6L6GC Driver; 2–6NIP input, 1–6H30 Follower.

**DIMENSIONS:** 13.5" (34.3 cm) W x 23" (58.4 cm) H x (20.8" (52.8 cm) D. Handles extend 1.5" (3.8 cm) forward and rearward..

**WEIGHT:** 170 lbs. (77.2 kg) Net; Shipped in pairs, 395 lbs. (180 kg) per pair.

Specifications subject to change without notice.

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