
Owner's Manual

Model Reference 300

MONOBLOCK POWER AMPLIFIER

audio research
HIGH DEFINITION®

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Contents

Model Reference 300

Section	Page No.
Preface.	1
Warnings.	1
Packaging.	1
Unpacking/Repacking.	1
Accessories.	1
Preparation for Use.	1, 2
Front Panel Controls/Displays.	2
Installation.	2
Rear Panel Connections.	2
Connection Instructions.	2, 3
Use of Controls/Operating and Adjustment Procedure.	3, 4
Servicing.	4
Cleaning.	4
Limited Warranty.	5
Specifications.	5

Addendum to REF 300 Owner's Manual pertaining to REF 300 MKII version.

The information in the REF 300 Owner's Manual applies to the REF 300MKII, but with the following changes for the MKII version:

On each of the two output circuit boards in the REF 300 MKII, two 6H30 tubes are used in place of the two 6922 tubes in the original REF 300 (the four 6550 output tubes on each output circuit board are the same output tube type for the original and MKII versions).

On the rear power supply circuit board all tube types are changed: three 6AS7 tubes and two 6N1P tubes are used in the REF 300 MKII. These take the place of four 6550 and five 6922 type tubes used on this circuit board in the original REF 300. Because of differing circuit topologies and electrical requirements, **none of the differing tube types between the REF 300 MKII and original REF 300 are interchangeable.** The 6550 output tubes common to both versions is the only exception.

In addition to removing the top cover to get at and install the tubes on the two output circuit boards, the rear panel with handles must be removed to install all of the tubes on the rear circuit board. All covers must be reinstalled before operating the amplifier for safety.

(OVER)

IS-278 50-007201

REMOTE TURN-ON CONNECTIONS

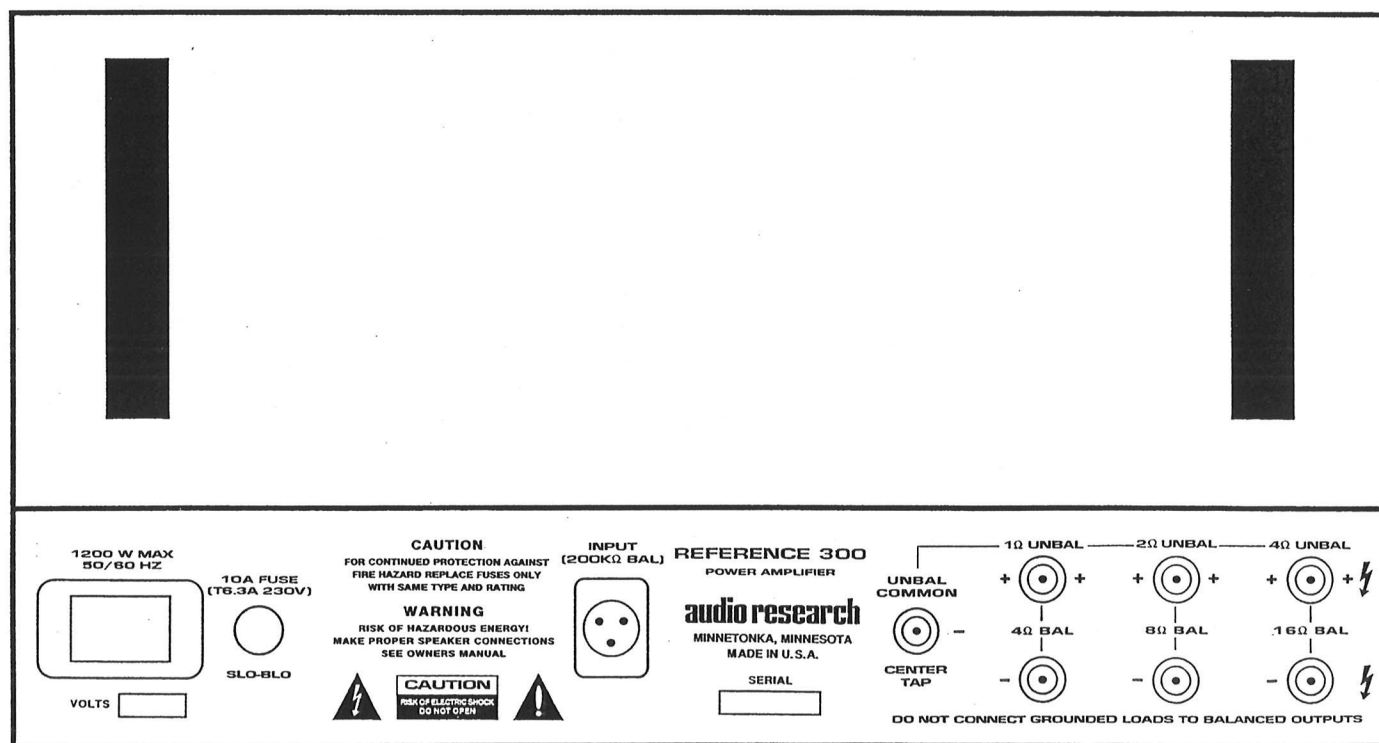
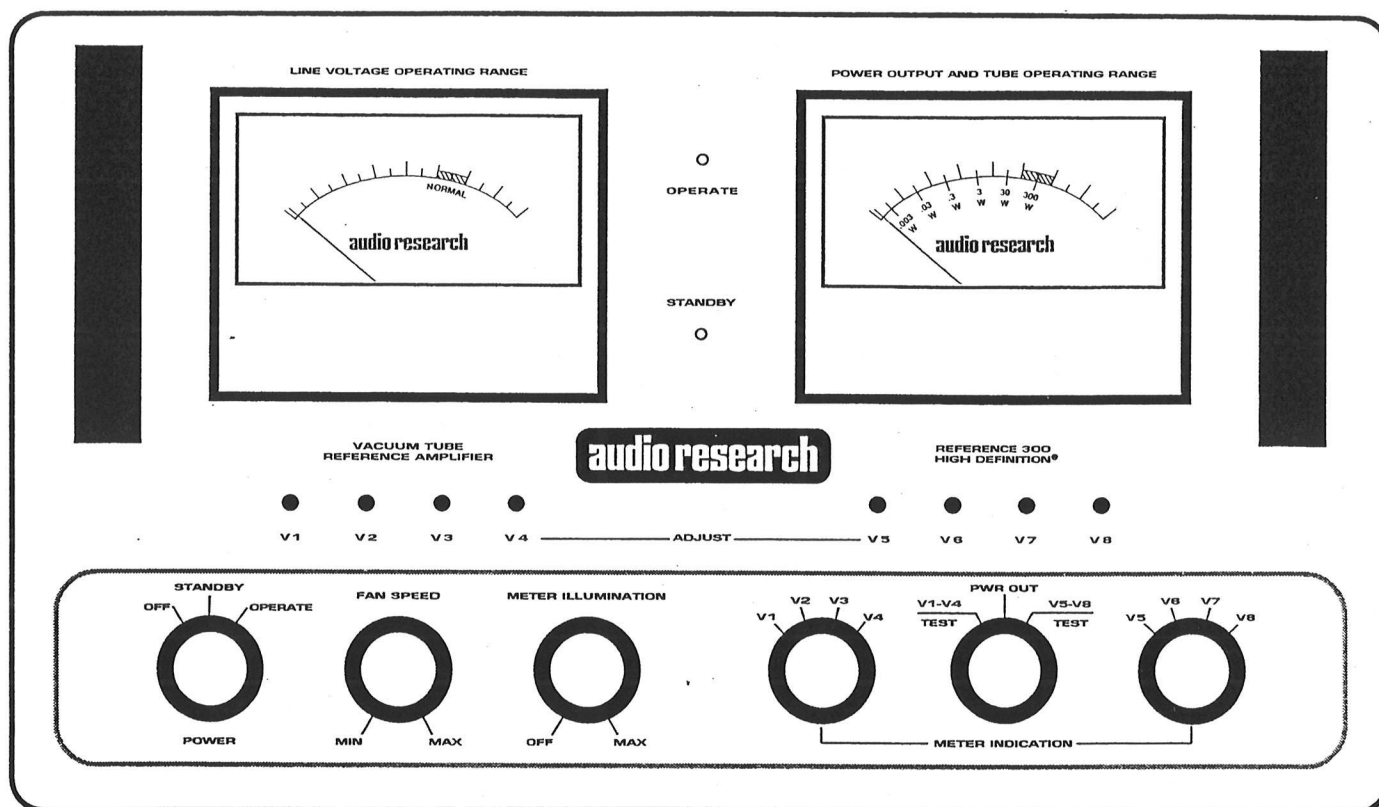
The REF 300 MKII has a built-in 12VDC remote turn-on/off circuit for operation by a master control system in a home theater or large audio system. Use a 3.5mm (.140") diameter mono mini-plug to connect to the +12V IN jack on the rear of the REF 300 MKII. Two identical paralleled jacks are provided to allow chaining connections to control two or more REF 300 MKIIs or other equipment.

The +12V IN jack should be connected to the +12VDC output of the master control system, using a continuous +12VDC signal at 12mA per REF 300 MKII for the duration of amplifier on-time. Do not use a momentary or data pulse control signal.

The front power switch on the REF 300 MKII may be "Off" or in "Standby" to use the remote turn-on. The front power switch may still be used when the remote turn-on is connected, but the remote will not turn the REF 300 MKII off if the front power switch is left "On" or in "Standby". The front power switch will not turn the REF 300 MKII "Off" or to "Standby" if the remote system is on.

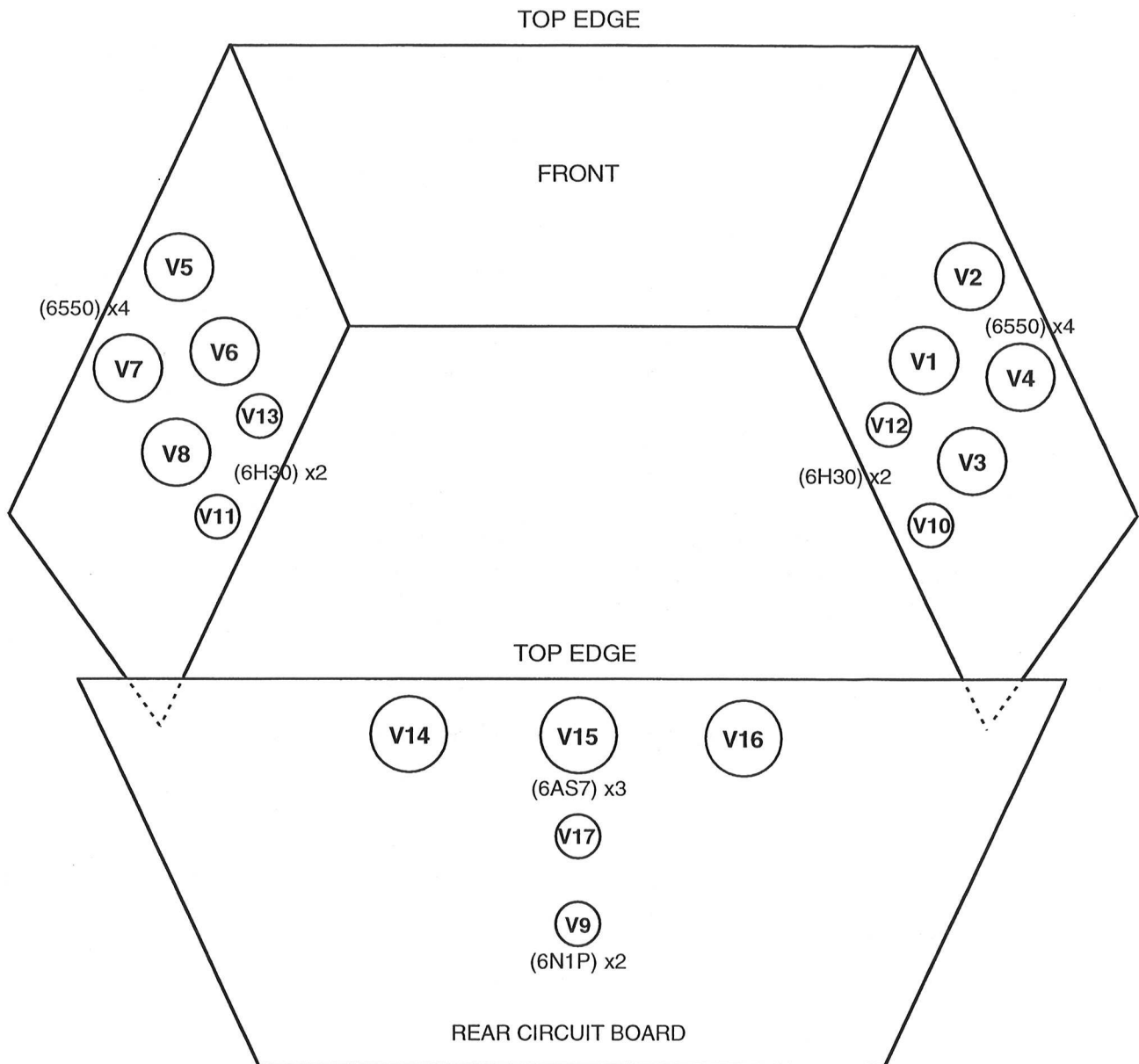
The +12VDC remote jacks have polarity protection, so they will not operate if a -12VDC signal is accidentally connected, or if the control wires are reversed. The 12V remote relay in the REF 300 MKII has click suppression to protect circuits in the master control system.

Model Reference 300



WARNING!

DO NOT ATTEMPT TO OPERATE THIS
REFERENCE 300 MKII AMPLIFIER BEFORE INSTALLING
THE VACUUM TUBES IN THEIR PROPER SOCKETS.



RELATIVE POSITIONS OF ALL (17) TUBES LOCATED ON THREE
CIRCUIT BOARDS AS VIEWED FROM THE REAR AND
LOOKING DOWN FROM ABOVE THE AMPLIFIER.

SEE YOUR OWNER'S MANUAL FOR COMPLETE INSTRUCTIONS
FOR SAFE INSTALLATION AND OPERATION.

Instructions for tube damping rings supplied with Reference 300 MKII amplifier

As shipped from the factory, tube damping rings are installed and should be in place on all (4) 6H30 tubes V10-V13 and the (2) 6N1P tubes V9 and V17 in the Reference 300 MKII as outlined below.

Each 6H30 tube in the Reference 300 MKII is supplied with a pair of clear or black tube damping rings. Each 6N1P tube in the Reference 300 MKII is supplied with either four high-temperature clear tube damping rings or a single premium black tube damping ring. Clear damping rings were supplied until February 2004, premium black damping rings thereafter.

It is normal for clear tube damping rings to “lock” in place on the tube and become less pliable over time. As a result, it is recommended that new tube damping rings be installed when replacing the tube. The premium black damping rings can be reused when the tube is replaced.

Do not install damping rings on V1-V8 or V14-V16 tubes.

IS-299 50-401330

WARNING

PRECAUTIONARY USE OF YOUR PREAMPLIFIER'S MUTING PROVISION DURING PHONO PLAYBACK WITH REFERENCE 300 AMPLIFIERS.

**Always mute the preamplifier
when cueing the phono cartridge
stylus up or down.**

Due to the immense power supply reserves, unusually high power output, and wide bandwidth of the Reference 300's, 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 600 watts (which the Reference 300 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.)

Model Reference 300

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 300 vacuum tube monoblock power amplifier. Becoming familiar with important facts about your amplifier and its correct operating procedures will help assure you of maximum musical satisfaction and reliable operation. The effort you invest now will be well rewarded as time goes by.

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 supplied with 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 use of a power cord without a grounding plug, or any unauthorized modification of the active circuitry or controls of this unit, automatically voids warranty coverage, and could cause injury or death.
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 132 lb. (59.9 Kg) net weight per chassis, the Reference 300 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. 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.

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.

Unpacking/Repacking

See separate "Unpacking/Repacking Instructions" insert 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 cover removal.
 - 1 – Plastic screwdriver for front panel potentiometer bias adjustment.
- User replaceable spare fuses include (one each per unit):
- 1 – 1/2 Amp AGC normal-blo for meter lamps, all units.
 - 1 – 4 Amp MDQ slo-blo for start-up circuit in 100V, 120V units.
 - 1 – T3.15A slo-blo for start-up circuit in 220V, 240V units.
 - 1 – 10 Amp MDA slo-blo for main power in 120V units.
 - 1 – 10 Amp MDA slo-blo for main power in 100V units.
 - 1 – T6.3A slo-blo for main power in 220V, 240V units.

DO NOT ATTEMPT TO OPERATE THIS EQUIPMENT BEFORE INSTALLING THE VACUUM TUBES IN THEIR PROPER SOCKETS.

(See tube location diagram)

Diagram indicates relative positions of all tubes located on 3 circuit boards as viewed from the rear and looking down from above the amplifier.

Preparation for Use

Your Reference 300 amplifier is shipped with the vacuum tubes packed in protective foam blocks under the top cover. *These must be unpacked and installed according to the following instructions before you attempt to operate the amplifier.*

1. Using the Phillips-head screwdriver provided, remove the top and rear covers, setting them and the fastening screws aside.
2. Carefully remove each vacuum tube from its protective foam and note its location "V" number (written on the base of the tube). Referring to the accompanying tube location diagram, firmly seat each tube in its matching "V" numbered socket, taking care to "key" the tube pins to the socket holes. Retain the foam block packing materials for possible future use.

Model Reference 300

Note: For easiest access, install the lowest rows of smaller tubes first, working upward to the top rows of larger tubes on each circuit board.

3. Once all the vacuum tubes have been installed, reposition the top and rear covers and reinstall the screws.

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.

Front Panel Controls/Displays

- 1 – Line voltage operating range meter
- 1 – Power output and tube operating range meter
- 8 – Cathode current bias adjustment potentiometers (V1-V8)
- 1 – Power switch with "Off", "Standby" and "Operate" positions
- 1 – Fan speed control
- 1 – Meter illumination control
- 1 – V1-V4 and V5-V8 tube test selector switch with "Pwr Out" operating position
- 2 – 4-position meter indication switches for V1-V4 and V5-V8 individual tube operating range adjustment
- 1 – "Standby" status LED (amber)
- 1 – "Operate" status LED (green)

Installation

To insure normal component life and safe operation this unit **must be operated only in a horizontal (upright) position**. Adequate air flow and proper cooling thereby can occur only if there is no restriction **below, behind and above** the unit.

The special non-marring elastomer feet provide adequate spacing only from a smooth, hard surface. **Never operate the unit while it is sitting on a surface such as a rug or carpet.**

If the unit is to be operated in an enclosure such as an equipment rack, make certain that adequate air flow above and below the unit is provided. The "ambient" operating temperature should never exceed 120° F or 49° C. Audio Research Corporation Rack Mount Ventilators (RMV-3) must be used above and below each unit. 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.

Rear Panel Connections

The rear panel has:

- 1 – High-current IEC connector for attaching removable power cord (supplied).
- 1 – Fuse post
- 7 – Output binding posts for various output impedances
- 1 – XLR balanced input connector

Connection Instructions

The amplifier should always be turned on and off via its own power on-off switch. Because of the very high energy storage within this amplifier, special warm-up circuitry is provided which gets its sequencing from its own power on-off switch. Further, other discrete components of an audio system should be turned on first. Otherwise, with some equipment, the amplifier will reproduce warm-up thumps, etc., some of which could be harmful to your speaker system. ARC preamplifiers have automatic warm-up muting, and are much less likely to exhibit this problem; however, good operating practice says **"Turn the amplifier on last, and turn it off first."**

The Reference 300 input is "balanced" and therefore requires a preamplifier with a balanced output, or the addition of an Audio Research BL1 Balanced Line Driver between a single-ended output preamplifier and the input of the Reference 300.

Pairs of ARC's proprietary and non-twisting output connectors are employed for each impedance. Simply observe the legend, connecting your speakers to the appropriate set of binding posts for their rated impedance. Connect the "negative" speaker lead to the "balanced" 4, 8 or 16 ohm (-) post; and the "positive" speaker lead to the (+) post directly above.

IMPORTANT: Use the best available speaker wires and interconnects. As better components and systems are developed, it becomes increasingly important to avoid the limitations of inferior system interconnections. For best results we recommend Audio Research LitzLink 2® interconnects and LitzLine 2® speaker cables.

Model Reference 300

Some loudspeakers and some speaker switch boxes have "common ground" systems, either by hookup between the speakers or in a special crossover device. Most headphone adaptor boxes also have a common ground. In these instances it is important to connect the "negative" speaker leads (or headphone common leads) to the "unbalanced, common-ground" post to avoid shorting the amplifier or causing monaural performance to occur. Use the unbalanced 4, 2 or 1 ohm post for the "positive" speaker leads. Contact your authorized Audio Research dealer or Audio Research Customer Service Department for help with these special cases.

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).

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 300 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.

AC POWER CONNECTIONS: It is essential that the Reference 300 amplifier be connected to a wall AC power receptacle, or a similar heavy-duty source. Do not connect to convenience receptacles on preamplifiers, etc. The proper control of start-up and shut-down surges may not occur unless the power switch on the front of the Reference 300 is actually used for on/off control of the amplifier. The AC power source for the Reference 300 amplifier should be capable of supplying 20 amperes for 100 or 120 volt units, or 10 amperes for 220 or 240 volt units.

For the very best performance on domestic 100 or 120 volt circuits, each Reference 300 should be connected to its own AC power circuit branch, protected by a 20 amp breaker. The preamplifier and other audio equipment should be connected to a different power circuit and breaker. If the power receptacle of the Reference 300 is more than 25 feet from the building power entrance and breaker box, it would be preferable to use installed wiring capable of 20 amperes 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 or heavier cords.

The Reference 300 utilizes a compatible grounding system that generally does not require a "ground lifter" adapter plug on the AC power cord to minimize hum. The power cord supplied with your Reference 300 has a standard three-prong grounding plug to provide maximum safety when it is connected to a grounded wall receptacle. If there is any question regarding the safety of grounding procedures, be certain to seek competent help with the installation.

If electronic crossovers or other AC powered equipment is used with the Reference 300 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 pre-amplifier, through its grounded power cord. Other equipment in the system should have some form of isolation to prevent ground loops and associated hum.

Always place the Power switch on the front panel of the Reference 300 in the "Off" position before connecting or disconnecting the power line cord to AC power.

Use of Controls/Operating and Adjustment Procedure

1. Make sure you have read and complied with the INSTALLATION and CONNECTION instructions prior to attempting operation.
2. Make sure your Reference 300 is properly connected to a high-current power receptacle via the supplied power cord (see CONNECTION instructions) with the Power switch in the "Off" position.
3. When the power cord is plugged in, the Line voltage operating range meter continuously monitors incoming line voltage available to the amplifier, indicating the normal range the line voltage should fall within for proper amplifier performance.
4. Your preamplifier should be "On" and muted and/or set at minimum gain.
5. Set the Power switch to "Standby" (indicated by illumination of the amber LED) for at least 5 minutes to warm up the amplifier slowly (extending internal component and tube life) before operation.

Next, rotate the Power switch from "Standby" to "Operate" position (indicated by illumination of the green LED). The amber "Standby" LED will blink for approximately 35 seconds before the green "Operate" LED illuminates.

Model Reference 300

After putting the Power switch in the "Operate" position, set the V1-V4/V5-V8 test selector switch in the "V1-V4 test" position and set the V1-V4 Meter indication switch in the "V1" position. As the unit warms up, make a slow preliminary adjustment of the "V1" trim potentiometer using only the plastic insulated screwdriver included with the unit. Adjust the pot so that "V1" reads within the green (normal) portion of the arc on the Power output and tube operating range meter. Continue rotating the V1-V4 Meter indication switch through the V2-V4 positions, adjusting the corresponding trim pot on the front panel in turn so the meter reading for each tube falls within the green (normal) portion of the meter arc. Next, set the V1-V4/V5-V8 test selector switch in the "V5-V8 test" position and repeat the above tube bias adjustment procedure in order on the V5-V8 tubes. After about 20 minutes, a fine adjustment of each tube bias position should be made as needed. During the bias adjustment procedure the amplifier's input is muted.

Note that it is not necessary to repeat the tube bias adjustment procedure each time the amplifier is turned on. It should be repeated occasionally, however, to determine that all of the power output tubes are operating normally. Should any tube fail to adjust within the normal range of the meter, that tube is faulty, and should be replaced.

6. Return the V1-V4/V5-V8 test selector switch to the "PWR OUT" (center) position for listening. Your Reference 300 is now ready for operation. However, a full stabilization or warm-up period of at least one-half hour is recommended for best sonic performance.
7. During operation, the Power output and tube operating range meter indicates the approximate power output (in watts) of the amplifier.
8. Fan speed and meter illumination controls may be set where desired. Note that a higher fan speed setting (at the cost of only slightly higher fan noise) will increase cooling and extend tube life.

Note: When using the test position for checking or adjusting output tube current, it is normal for the right-hand meter to fluctuate slightly with typical power line fluctuations. The right-hand meter is more sensitive to these fluctuations than the left-hand meter. Use an average meter indication, and disregard these fluctuations. (They do not affect the performance.)

Servicing

Because of its careful design and exacting standards of manufacture, your Reference 300 amplifier should normally require only minimal service to maintain its high level of performance.

CAUTION: The Reference 300 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.

The vacuum tubes inside the Reference 300 are high-quality 6550, and 6922 types. The power output tubes supplied with your new Reference 300 are matched pairs of 6550's. Reliable, matched, low gas 6550 replacement tubes – such as those available from ARC – are strongly recommended for maximum performance and longevity. Observe the operating and adjustment procedure for adjusting bias when replacing any power output tubes.

Expected service life from a set at 6550 output tubes is approximately 2000 hours, and will vary with conditions of use.

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 unit, 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.

Model Reference 300

Limited Warranty

Audio Research Corporation products are covered by a 3-Year Limited Warranty (all products except CD players, transports, and vacuum tubes), a 2-Year Limited Warranty (CD players and transports), 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: 280 watts continuous at 16 ohms from 20Hz to 20kHz with less than 1% total harmonic distortion (typically less than .05% at 1 watt).

Actual maximum power available (at the point of clipping) is dependent upon the following:

- 1) power line voltage.
- 2) power line condition (ie: regulation, distortion).
- 3) type and brand of power output tube used.

Typical power under average circumstances will be around 290 watts. Maximum power under ideal conditions will be around 300 watts.

POWER BANDWIDTH: (-3dB points) 12Hz to 100kHz.

FREQUENCY RESPONSE: (-3dB points at 1 watt) 0.5Hz to 160 kHz.

INPUT SENSITIVITY: 1.75V RMS balanced for rated output. (32dB gain into 16 ohms).

INPUT IMPEDANCE: 200K ohms balanced.

OUTPUT TAPS: 1, 2, 4, 8, 16 ohms.

OUTPUT REGULATION: Approximately 0.8dB 16 ohm load to open circuit (Damping factor approximately 11).

OVERALL NEGATIVE FEEDBACK: 10dB.

HUM & NOISE: Less than 0.2mV RMS -110dB below rated output (IHF weighted, input shorted, 16 ohm output).

POWER SUPPLY ENERGY STORAGE: Approximately 448 joules.

POWER REQUIREMENTS: 105-125VAC 60Hz (210-250VAC 50Hz) 900 watts at rated output, 1200 watts maximum, 480 watts at idle, 280 watts standby.

TUBES REQUIRED: 4 Matched pair 6550C Power Output; 4-6550C Regulators; 1-6922 Regulator Amplifier; 4-6922 Driver; 4-6922 input.

The Reference 300 has sufficient bias adjustment range to allow the use of any of the following output tube types: 6550, 6550B, 6550C, KT88, KT90, KT91, KT100.

The Reference 300 as supplied from Audio Research is equipped with the Russian 6550C, which is our current choice for reliability and long service.

DIMENSIONS: 19" (48.3 cm) W x 10.5" (26.7 cm) H x (23.5" (59.7 cm) D. Handles extend 1.5" (3.8 cm) forward.

WEIGHT: 132 lbs. (59.9 kg) Net; Shipped in pairs, 410 lbs. (186 kg) per pair.

Specifications subject to change without notice.

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