Owner's Manual

Model

REFERENCE PHONO PREAMPLIFIER

audio research

HIGH DEFINITION®

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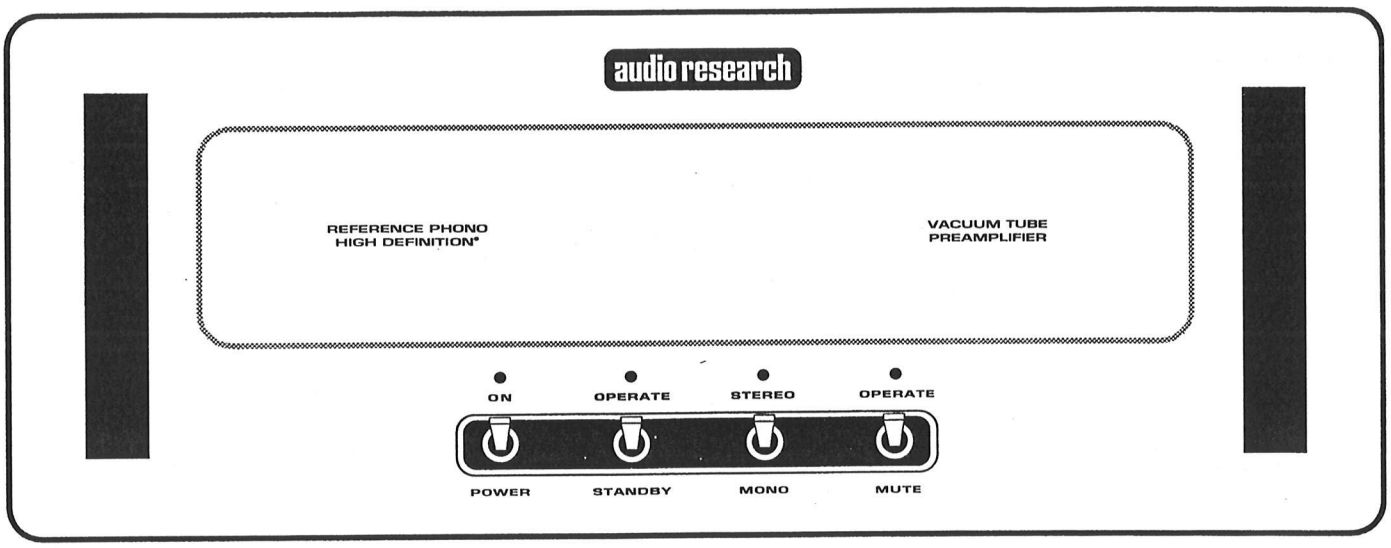
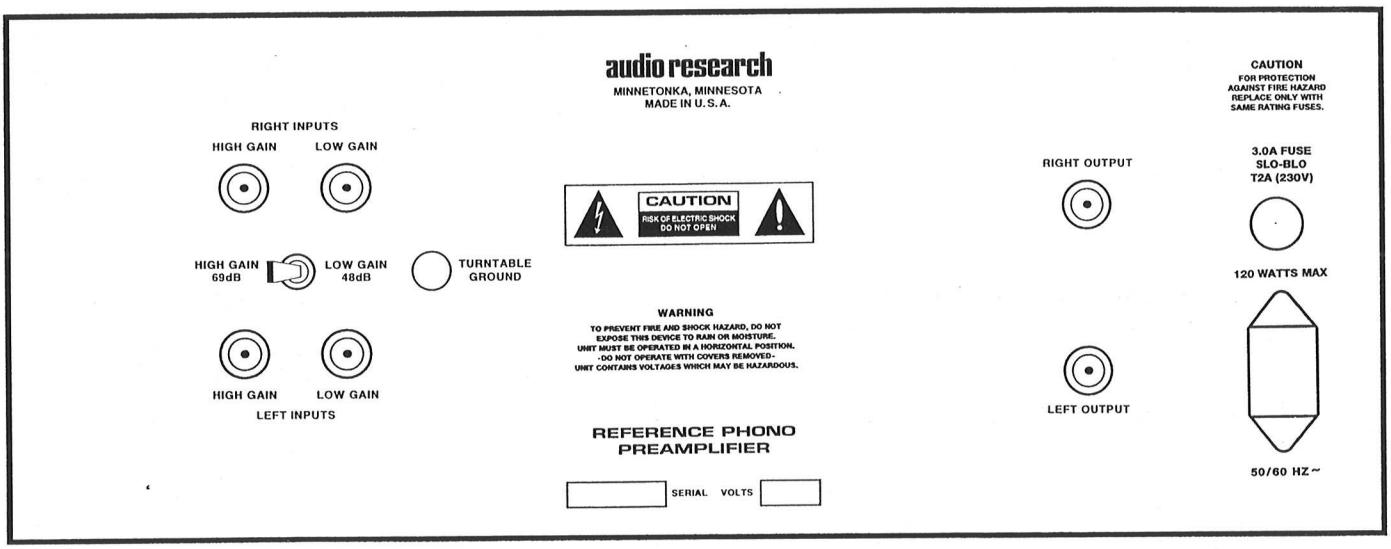
Contents

Model Ref Phono

Section	Page No.
Preface	1
Warnings	1
Packaging	1
Description of Controls	2
Connections	2, 3
Input Impedance Adjustment	3, 4
Input Capacitance Adjustment	4
Installation Instructions	4
Operating/Start-up Procedure	4
Servicing	5
Cleaning	5
Warranty Terms and Conditions	5
Specifications	6

Model Ref Phono





Model Ref Phono

Preface

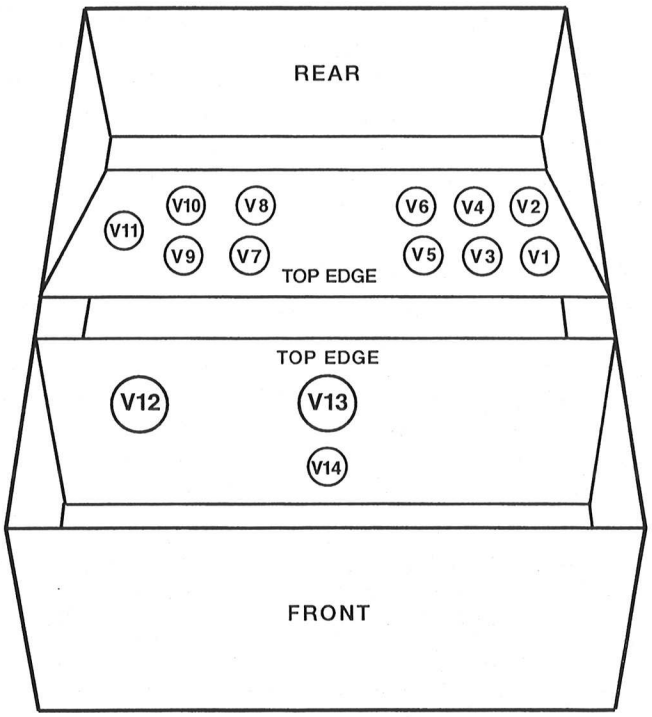
Please take the time to carefully read this instruction manual prior to installation or use of your Ref Phono preamplifier. Because it is a highly advanced electronic instrument, there are several facts and procedures you should know before you place it in operation.

Just as you would not purchase and attempt to operate an expensive camera, computer system or high-performance automobile without first learning something about performance parameters and correct operating procedures, so too your phono preamplifier requires some familiarization before you make it part of your music reproduction system. Your reward, in terms of maximum performance and a long service life, will be well worth the effort.

Warnings

1. To prevent fire, or shock hazard, do not expose your Ref Phono to rain or moisture.
2. 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.
3. The detachable power cord on your Ref Phono is equipped with a standard three-prong grounding plug. For absolute protection, ***do not defeat the ground power plug.*** This provides powerline grounding of the Ref Phono chassis to provide absolute protection from electrical shock.
4. For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

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



Positions of all (14) tubes located on two vertical circuit boards, as viewed from the front and looking down from above the chassis.

Packaging

Save all packaging in a dry place away from fire hazard. Your Ref Phono preamplifier 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 but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your Ref Phono from unnecessary damage or delay.

Note that your Ref Phono has been shipped with the vacuum tubes installed in protective foam blocks under the top cover. With the Ref Phono unplugged, use a phillips-head screwdriver to loosen the fastening screws, remove the top cover and set aside. Install the numbered tubes in their respective sockets, refasten the top cover and store the foam blocks with your carton.

Description of Controls

POWER ON/OFF SWITCH: Supplies power from the AC outlet to the Ref Phono when switched to the "On" position (indicated by illuminated "On" LED). When its "Operate" position is chosen, the Operate/Mute switch LED will remain dim for approximately the first 35 seconds after turn-on, indicating that the unit is in the warm-up automatic muting mode; when both of the "Operate" LEDs are brightly illuminated the unit is ready to play.

OPERATE/STANDBY SWITCH: Prior to turn on or at any time during use, you may select the "Standby" position which supplies voltage only to the heaters of the tubes, allowing the Ref Phono to be partially warmed up, yet save on tube life (the Operate/Standby and Operate/Mute LEDs will then be extinguished). This is especially useful if you plan to listen frequently and don't want to wait for the unit to fully warm up from the power "Off" position each time you listen. When going from the "Standby" to "Operate" position (indicated by illumination of its "Operate" LED) there will be an automatic muting delay of about 35 seconds before the unit is operational, at which time the Operate/Mute LED will brighten if its "Operate" position is selected.

STEREO/MONO SWITCH: Select the "Mono" position to play monophonic recordings or to sum both stereo channels into a mono signal. The "Stereo" position is indicated by illumination of the LED above the switch.

OPERATE/MUTE SWITCH: In the "Mute" position (indicated by dim LED illumination) the outputs of the Ref Phono are shorted to allow listening interruptions. This unit should always be put in "Mute" when the phono cartridge stylus is cued up from or cued down onto a record or when changing the position of the rear-panel input selector toggle switch, as well as when turning off the Ref Phono. Following this muting procedure will prevent potentially damaging subsonic thumps or pops from being amplified through the system. In the "Operate" position (indicated by bright LED illumination), this switch allows the signal to pass normally to the outputs of the unit.

Connections

INPUT CONNECTORS: There are two pairs of RCA input connectors (one for High gain, factory set at either 69dB or 63dB, and the other for Low gain, factory set at 48dB or 42dB) which may be connected one at a time or simultaneously to your tonearm(s)/turntable(s). See the accompanying chart to select the correct gain setting for your cartridge's output. To choose which set of inputs you wish to play through, select the desired setting using the toggle switch located on the rear panel between the two sets of inputs. Note: Do not change the rear panel input selector toggle switch between "Low" and "High" positions unless the Ref Phono is first in the "Mute" position or is turned off. This will prevent unwanted thumps from being amplified through the system. Additionally, a grounding post is provided for use with your turntable(s) as needed to minimize hum.

All current Audio Research line stages utilize the latest digital microprocessors to control functions such as volume, input selection, balance, etc. Although the digital volume control is sonically neutral throughout its range, it is important to make sure that the output level of the source component–in this case, the Ref Phono–is appropriate for the line stage it is driving. If the output level is too high it will overload the volume control and cause distortion. (This will typically happen during loud, dynamic crescendos.)

Model Ref Phono

Ref Phono gain selection chart

The appropriate gain selected for use in the Ref Phono (42, 48, 63 or 69 dB) depends on the output level of the phono cartridge. Please refer to the following chart to help select the proper gain setting when using an Audio Research line-stage preamplifier.

Phono Cartridge Output (mv)	Appropriate Ref Phono Input	Appropriate Line stage Input*
0.05 – 0.3	High Gain: 69dB	For Ref 1: use Aux 1 input (has 3dB attenuation compared to other inputs) For other ARC line preamplifiers: use phono input
0.4 – 3.0	Low Gain: 48dB	For Ref 1: use Aux 1 input (has 3dB attenuation compared to other inputs) For other ARC line preamplifiers: use phono input
4.0 – 6.0	Lowest Gain: 42dB** – optional factory wiring	For Ref 1: use Aux 1 input (has 3dB attenuation compared to other inputs) For other ARC line preamplifiers: use phono input

*These recommendations apply for Audio Research line stages. Consult your dealer or the manufacturer for use with non-Audio Research products.

**High gain becomes 63dB gain with this 42dB lowest-gain option.

All input/output connectors are gold plated and connect "ground" before "hot". On disconnect, "hot" is disconnected first.

NOTE: A "passive" line stage is not recommended for use with the Ref Phono as it will not provide the gain necessary to amplify the output of the Ref Phono to adequate levels to the power amplifier.

At the performance level of the Ref Phono, high quality audio signal interconnect cables such as the Audio Research Litzlink 2 are critical to preserving maximum fidelity. Please consult your Audio Research dealer.

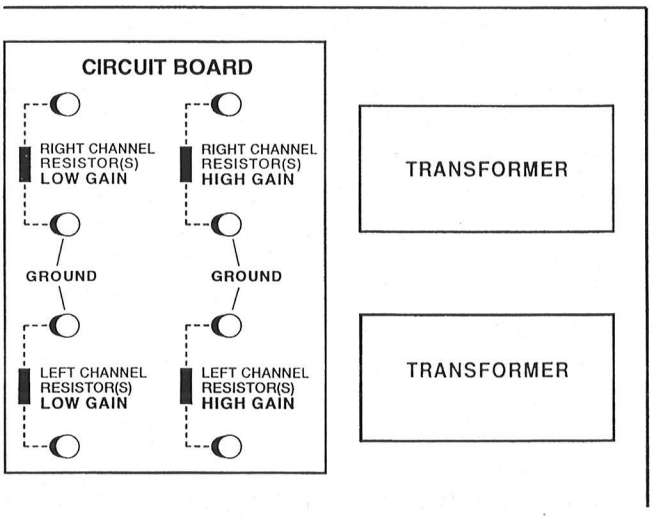
Input Impedance Adjustment

For the best sonic performance from your phono pickup cartridge, it should connect to the proper load impedance as recommended by the cartridge manufacturer. Your Ref Phono comes wired with 47K ohms and 180 pF (Low gain input) and 280 ohms (High gain input) for moving-coil and moving magnet cartridges. A kit of precision load resistors is supplied with your Ref Phono for the load requirements of 30, 60, 100, 200 or 800 ohm moving-coil cartridges. Consult your cartridge manufacturer or dealer to determine the optimum load impedance for your needs.

The use of precision fixed resistors provides better load accuracy and sonic performance at lower cost than most adjustable or switchable loads. Audio Research can supply audiophile grade non-standard load resistor values upon request accompanied by U.S. $10.00 to cover order processing costs (certified funds or money order).

With the Ref Phono unplugged, remove the top and bottom covers and solder the desired resistors (one, or two per channel, in parallel, as required) to the turret terminal posts located on the small circuit board inside the chassis rear panel near the phono inputs (see illustration).

Interior view of chassis back panel.



Wrap and solder resistors to mounting posts.

Wrap the resistor leads around the posts one-half to three-quarter turn, then solder using the special alloy solder supplied with the resistors. Reinstall the covers.

For 30 ohms: Add brown-black-black-black and yellow-orange-red-gold resistors.

For 60 ohms: Add brown-black-black-black and brown-green-black-black resistors.

For 100 ohms: Add brown-black-black-black resistors.

For 200 ohms: Add red-black-green-black and brown-black-black-red resistors.

For 800 ohms: Add brown-black-black-brown and yellow-orange-red-brown resistors.

Input Capacitance Adjustment

The Ref Phono Low gain input has a total input capacitance of 180 picofarads. Different value capacitance can be added to match the requirements of your moving magnet cartridge (consult your cartridge manufacturer or dealer for proper loading values). Following the installation procedure used for resistor loading described under "Input Impedance Adjustment", connect the capacitor(s) for each channel with the lead at the banded end soldered to the ground post to maintain correct polarity

Installation Instructions

While the Ref Phono does not dissipate an unusual amount of heat, it is important that it have a reasonable airflow to assure long, trouble-free operation. In addition, the following installation guidelines will help insure maximum sonic performance as well as reliable service.

1. Upright and horizontal mounting is required if extended operation (longer than one hour) is contemplated.
2. Do not stack the Ref Phono on top of other equipment: not only could this cause overheating, but hum may be introduced into the phono circuits from the proximity of the power transformer of the other equipment.
3. Do not place or operate unit on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate unit without the top and bottom covers installed. These are required both for safety as well as shielding from interference (except in service operations).
5. If rack mounting is employed, use Audio Research Rack Mount Ventilators (RMV-3) below and above the Ref Phono.
6. In a cabinet or rack-mount installation which has an enclosed back, an exhaust fan is desirable so as not to operate the Ref Phono in overheated ambient air. Operation of vacuum tube equipment for long periods of time in hot ambient air will shorten tube life and increase chance of failure of other component parts.

Operating/Start-up Procedure

1. Make sure Power switch is set to "Off" position.
2. Secure connections between turntable, Ref Phono, and line stage preamplifier. Note: Given the advanced performance capabilities of the Ref Phono, it is extremely important that high-quality interconnects be used for connection to ancillary electronics. Audio Research brand interconnects, in either unshielded or RFI-shielded configurations, are strongly recommended. Your authorized Audio Research dealer can assist you in determining which type and lengths are optimal for your system.
3. Plug 3-prong power cord into a grounded AC wall receptacle.
4. Turn Power switch to "On." The green Operate/Mute LED will glow ***dimly*** for approximately 35 seconds while the power supply stabilizes, indicating operation of the automatic muting circuit. After this warm-up period the LED will brighten (when the Mute/Operate switch is set to "Operate"), indicating that your Ref Phono is ready for operation.

Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your Ref Phono may be safely left in "Standby" or in "Operate" continuously for maximum performance at all times, but at the expense of higher maintenance costs (more frequent tube replacement). When not in use, simply use the "Mute" switch. The Ref Phono draws less wattage continuously than a 120-watt light bulb.

Servicing

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

CAUTION: Your Ref Phono contains sufficient levels of voltage and current to be lethal. Do not tamper with a component or part inside the unit. Refer any needed service to your authorized Audio Research dealer or other qualified technician.

The vacuum tubes inside your Ref Phono should not need to be changed for approximately 2,000 hours of use.

Should service be necessary, please contact your Audio Research dealer, or Audio Research Customer Service at (763) 577-9700 (CST).

Cleaning

To maintain the visual appearance of your Ref Phono preamplifier, occasionally wipe the front panel and top cover surfaces 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 "brushed" grain of the front panel finish. A dry 2-inch pure bristle paint brush works well to remove dust from bevels, reliefs and switches.

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.

Model Ref Phono

Specifications

FREQUENCY RESPONSE: ±.15dB of RIAA, 10Hz to 60kHz; 3dB points below 1.0Hz and above 250kHz.

DISTORTION: .005% at 0.5V RMS 1kHz output.

GAIN: Selectable 48dB (Low), 69dB (High) at 1kHz (MC & MM compatible).

SWITCHES: Front (4) Power, Standby, Mono, Mute. Rear (1) Gain.

INPUT IMPEDANCE: 47K ohms and 180pF Unbalanced (Low Gain), 280 ohms Unbalanced (High Gain). (Provisions for any value below 47K ohms or added input capacitance for matching certain magnetic cartridges.)

OUTPUT IMPEDANCE: 200 ohms Unbalanced. Recommended load 50K-100K ohms and 100pF. (10K ohms minimum and 2000pF maximum.)

MAXIMUM INPUTS: 100mV RMS at 1kHz (240 mV RMS at 10kHz).

RATED OUTPUTS: 0.5V RMS 10Hz to 60kHz, 100K ohm load (output capability is 30V RMS output at 1/2% THD at 1kHz).

POWER SUPPLIES: Electronically-regulated low and high voltage supplies. Line regulation better than .01%.

NOISE: 0.56uV equivalent input noise, IHF weighted, shorted (Low Gain) input (65 dB below 1mV 1kHz input). 0.055uV equivalent input noise (High Gain) (65dB below 0.1mV 1kHz input).

TUBE COMPLEMENT: (11) 6922/E88CC dual triodes, plus (1 each) 5AR4, 6L6GC, 6922 in power supply.

POWER REQUIREMENTS: 100-135VAC 60Hz (200-270VAC 50/60Hz) 120 watts maximum. 50W standby. Line fuse 3A SLO BLO (T2A SLO BLO 230V).

DIMENSIONS: 19" (48 cm) W x 7" (17.8 cm) H (standard rack panel) x 15.5" (39.4 cm) D. Handles extend 1.5" (3.8 cm) forward of front panel.

WEIGHT: 28 lbs. (12.7 kg) Net; 42 lbs. (19.1 kg) Shipping.

Specifications subject to change without notice.

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