
Owner's Manual

Model Reference 2

STEREO LINE PREAMPLIFIER

audio research
H I G H D E F I N I T I O N[®]

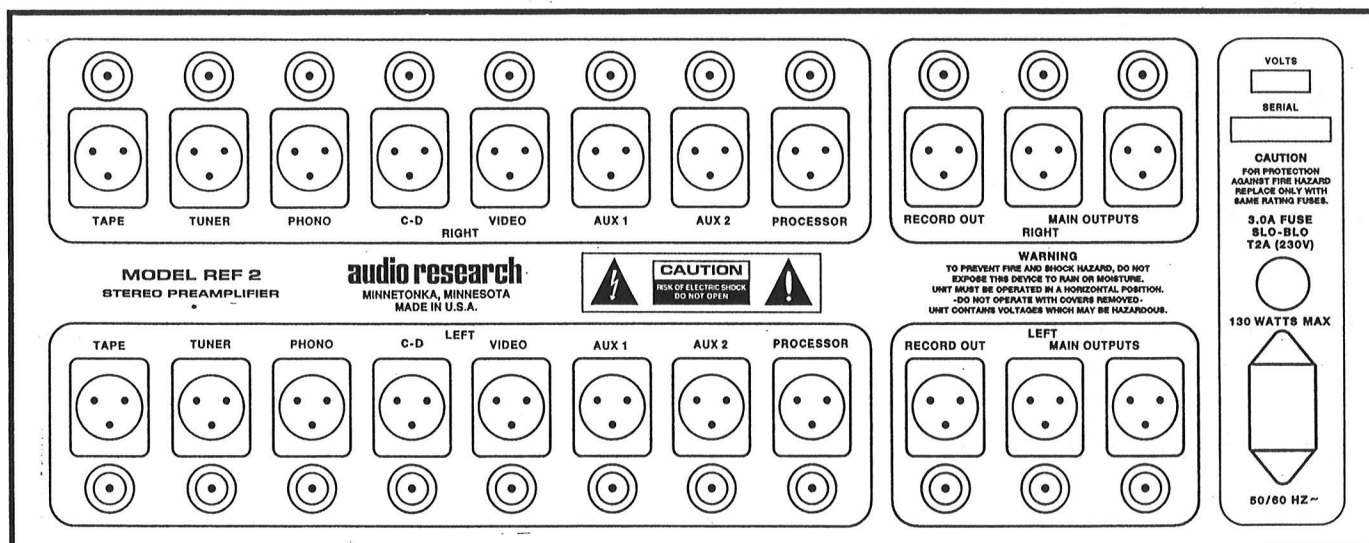
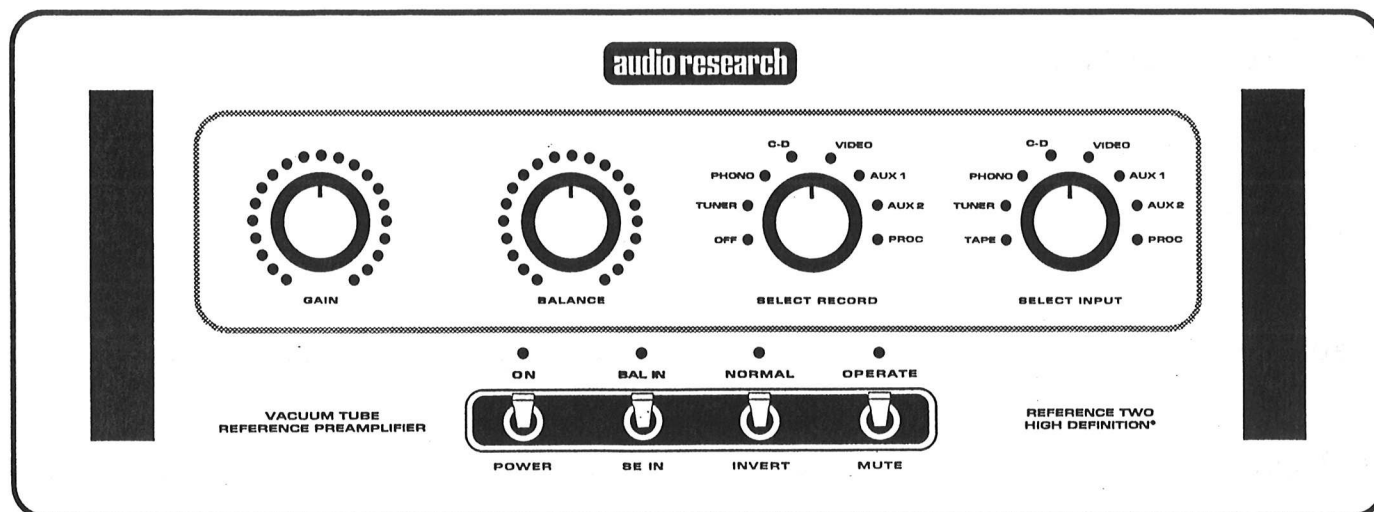
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Preface

Please take time to carefully read and understand the following instructions before you install or attempt to operate your Audio Research Reference 2 preamplifier. Becoming familiar with the product and its correct operating procedures will help assure you of maximum musical enjoyment and reliable operation. The effort you invest now will be well rewarded in the years ahead.

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. 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 replacement of the plug or power cord, or any unauthorized modification of the active circuitry or controls of this unit, automatically voids warranty coverage, and could cause injury or death.
4. 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.

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.

Note: This unit has been shipped with the vacuum tubes installed in protective foam blocks under the top cover. Using 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.

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

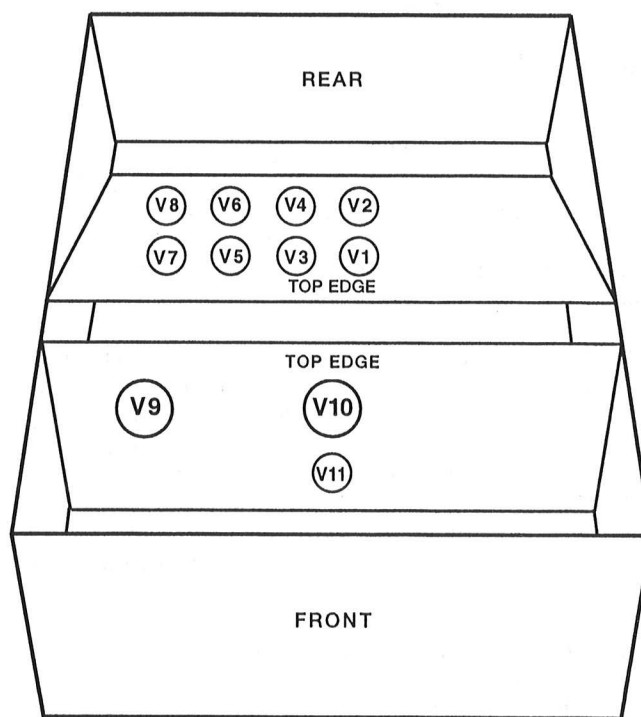


Diagram indicates relative positions of all (11) tubes located on two vertical circuit boards, as viewed from the front and looking down from above the chassis.

Description of Controls

GAIN CONTROL: The Gain control of the Reference 2 preamplifier is a departure from the traditional mechanical volume control potentiometer. Instead, there is a 2-way switch with a spring-loaded center return position that electronically adjusts volume level either a step at a time or continuously. By turning the switch clockwise and releasing it quickly, the volume level increases a step at a time. A counter-clockwise turn and release of the control decreases the volume level a step at a time. Holding the Gain control in either direction continuously adjusts the volume level in the respective direction. The selected gain setting is indicated by the illuminated LED position within the LED volume range arc, analogous to a "traditional" volume control level setting.

BALANCE CONTROL: Similar in operation to the Gain control, turning the Balance control switch to the left (counter-clockwise) increases left channel gain; turning it to the right (clockwise) increases right channel gain. LED illumination indicates gain offset level in either channel direction, with illumination of the center LED indicating a normal, centered channel balance setting.

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Note that the Reference 2 has over 100 individual steps across the gain and balance control adjustment range and 21 LEDs per control. The corresponding LED position that is illuminated for a given gain or balance control setting serves as a general level indicator and will remain lit for several individual adjustment steps before an adjacent LED illuminates.

RECORD SELECTOR: Allows selecting any of 7 labeled input signal sources (TUNER, PHONO, CD, VIDEO, AUX 1, AUX 2 or PROC) to be routed to the Tape output jacks (labeled "Record Out") for connecting to your tape deck's inputs. Set switch to "Off" position when not recording an input source.

INPUT SELECTOR: Indicates selection of various source material options: "Tape" for playback of a tape deck; "Tuner" for AM/FM radio tuners; "Phono" for phono preamplifiers; "CD" for compact disc players or digital-to-analog processors; "Video" for audio output from HiFi videotapes, discs, or broadcasts; "Aux" (1, 2) for any additional high level source—tape, tuner, CD, video, etc.; and "Proc" processor input (see *Connections* section for use of processor input).

Turning and releasing the spring-loaded Input selector or Record selector switches in either direction steps through their respective source options which are indicated by LED illumination.

The separate Record and Input selector controls allow listening to any input source while simultaneously recording the same or another input source onto a tape deck.

POWER ON/OFF SWITCH: Supplies power from AC wall outlet to Reference 2 when switched to the "On" position (indicated by illuminated LED). In the event of loss of power to the Reference 2 while it is turned on, the Power On/Off switch will default to the "Off" position when power is restored. If the Reference 2 is unplugged the Power On/Off switch will default to the "Off" position when it is plugged in again. In each instance you must manually select the Power switch "On" position to begin operation of the unit.

SE IN (SINGLE-ENDED INPUT) / BAL IN (BALANCED INPUT) SELECTOR SWITCH: Each of the 8 sets of inputs on the rear panel (chosen via the front panel Input selector switch) will accept either a single-ended or balanced pair of connectors.

Note: Although you may connect as many as 8 input sources at once to the Reference 2, only one pair of input cables—either single-ended or balanced—should be connected to any one of the Reference 2 inputs at a time. Connecting both single-ended and balanced sources simultaneously to the same input may seriously degrade the sound.

By connecting your source components per the following procedure, the Reference 2 will automatically configure each input connection internally as a balanced or single-ended source whenever it is selected for use. Anytime an input source component is being connected to the Reference 2, set the Input selector switch in the position which corresponds to the labeled rear input jacks you are connecting the source component to. Then set the SE In/Bal In switch in the position corresponding to the single-ended or balanced output of that source component. (The LED above the SE In/Bal In selector switch illuminates when the balanced input configuration setting is active, and is off when in the single-ended input setting).

Note that when making a new input source component connection to the Reference 2, the SE In/Bal In switch defaults to the "Bal In" balanced input setting during the above connecting procedure unless manually overridden by selecting the "SE In" single-ended input switch position.

Should you lose power to the Reference 2 or unplug it from its power receptacle, an internal memory maintains any previously selected single-ended or balanced input configuration settings for at least one year.

NORMAL/INVERT SWITCH: Inverts the absolute phase of the selected input signal 180° when switched to "Invert" position. LED illumination indicates "Normal" phase setting.

MUTE/OPERATE SWITCH: In "Mute" position (indicated by dim LED illumination), shorts the main outputs of the preamplifier to allow listening interruptions for telephone answering or other reasons. This switch should always be activated between listening uses and while changing any connections or switching inputs, in addition to turning the Gain (volume) control down. These two simple precautions will prevent inadvertent misuse of your Reference 2 and help protect your power amplifier(s) and speakers from unexpected transient signal pulses. In "Operate" position, this switch allows the signal to pass normally to the outputs.

CAUTION: Do not turn up the Gain control beyond normal listening positions when the Reference 2 is in the Mute mode. Always turn the Gain control down when changing program sources, even when it is muted.

OPERATE/MUTE CIRCUIT LED: Note that for approximately 45 seconds after start-up or in Mute mode, this LED will glow more dimly, indicating proper operation of the muting circuit. When switched to the Operate mode the LED brightens after warm-up and your Reference 2 is ready for normal operation.

RESETTING CONTROLS: To avoid discharging static to the Reference 2 controls, contact another surface (such as a metal equipment rack) to drain away the charge before

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touching the Reference 2. If a static charge should "lock up" the microprocessor making the front panel controls inoperable, put the Reference 2 in mute, power down the system and turn off and unplug the Reference 2 from its power receptacle. After waiting a few seconds plug in the Reference 2 and power it up with the rest of the system; the controls should resume normal operation. If the problem persists, contact your dealer or Audio Research Customer Service at 612-939-0600, CST.

USE OF REMOTE CONTROL UNIT: All front-panel functions except SE In/Bal In switching are duplicated on the remote control unit for the Reference 2.

The life of the batteries in the remote control is about 1 year. For replacement use only batteries of the type RO3, UM4 or AAA.

Connections

INPUT CONNECTORS: All are clearly marked to indicate use. The inputs are 220K ohms impedance balanced, and 110K ohms single-ended.

PROCESSOR INPUT CONNECTORS (PROC): Included on the front-panel input selector is a processor input setting. This home-theater processor input is configured as a dedicated multi-channel processor "pass through". When a processor with its own volume control is connected to the processor input on the back of the Ref 2, and the "PROC" (processor) input is selected on the REF 2's front panel input selector, all volume LEDs on the REF 2 volume control are extinguished and the REF 2 is at unity gain. The multi-channel processor will then control the volume level for all channels. All other relevant REF 2 front panel functions remain operational when using the processor input (including channel balance, polarity, mute/operate and BAL/SE operation). When the REF 2 is switched from the "PROC" input to any other input, the volume will be at its lowest setting.

MAIN OUTPUT CONNECTORS: For maximum flexibility, there are 2 sets of single-ended and 2 sets of balanced output connectors. Any or all 4 sets may be connected simultaneously to your crossover or amplifier(s) as necessary.

NOTE: The XLR connector pin leads are as follows: 1-shield; 2-positive; 3-negative. If used with a power amplifier which utilizes different pin leads for positive, negative and/or shield, the signal being fed to the loudspeakers will be incorrect. Please consult your Audio Research dealer.

At the performance level of the Reference 2, high-quality audio signal interconnect cables are critical to preserving maximum fidelity. Audio Research RFI-shielded or unshielded interconnect cables are highly recommended

for connection to your power amplifier(s) and to other ancillary equipment. See your authorized Audio Research dealer for recommended lengths.

TAPE OUTPUT CONNECTORS: The Reference 2's Tape outputs (labeled "Record Out") should be connected to your tape deck's "REC" or "LINE" inputs. These outputs supply whatever is selected by the Input selector control to the tape deck for recording. Level is non-variable and approximately the same as the selected input source.

Installation Instructions

While the Reference 2 does not dissipate an unusual amount of heat, it is important that it be provided with 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. Allow at least 4" of space above the top cover for ventilation.
2. Do not "stack" the Reference 2 on top of a power amplifier; not only could this cause overheating, but "hum" may be introduced into the Reference 2 from the proximity of the amplifier's power transformer.
3. Do not place or operate your Reference 2 on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate your Reference 2 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 your Reference 2.
6. In a cabinet or rack-mount installation which has enclosed sides or an enclosed back, an exhaust fan is desirable so as not to operate the Reference 2 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 Procedure

Start-Up:

1. Secure all rear-panel connections between Reference 2, power amplifier(s) and input sources.
2. Plug 3-prong powerline cord from rear of Reference 2 into grounded AC wall receptacle. (Power On/Off switch defaults to "Off" position when unit is plugged into power receptacle.)

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3. Turn Power switch to "On". Adjust the Gain control to the minimum level, as indicated by fully counter-clockwise LED illumination. The Mute/Operate LED will glow *dimly* for approximately 45 seconds while power supply stabilizes, indicating operation of automatic muting circuit. After this automatic muting period, the LED will brighten if the "Operate" position is selected, indicating that your Reference 2 is ready for operation.

Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your Reference 2 may be safely left "on" continuously for maximum performance at all times, but at the expense of higher maintenance costs (more frequent tube replacement).

4. Turn Input selector to source desired; set switch options to positions desired.
5. Activate input source, then deactivate Mute switch and adjust Gain control as necessary.

Shut-Down:

1. Set Mute switch to "Mute" position.
2. Turn Gain control counter-clockwise to minimum level setting.
3. Turn off power amplifier(s).
4. Turn off all input sources.
5. Set Reference 2 Power switch to "Off" position.

Tape Recording Procedure

When using the Reference 2 as a control center for recording, the program source to be recorded must be connected to 1 of the 7 inputs controlled by the Record selector. This routes the selected program to the Tape outputs ("Record Out").

It is also possible to dub from one tape deck to another. Simply connect the output from a secondary tape deck to an unused set of inputs controlled by the Input selector (Aux, Video, etc.) on the Reference 2. This signal will then be routed to the primary tape deck when the appropriate input is selected on the Input selector.

Muting Provisions

The Reference 2 has several provisions to help protect against misuse of the exceptional dynamic range and wide bandwidth that it offers. It is not subject to damage itself, but some power amplifiers and speakers are more limited in their ability to withstand signal extremes. These provisions, both manual and automatic, are designed not to interfere with the listening experience, while giving reasonable protection against warm-up surges and power line

interruptions. However, for absolute protection of associated equipment some operator understanding and responsibility are required.

Initial "settling" time of all circuit parameters within the Reference 2 requires approximately 5 to 10 minutes. The automatic muting circuitry timer is adjusted for about 45 seconds. (This is because recurrent interruption "settling" time is much less. You would not want to wait for 5 to 10 minutes each time such an interruption occurred.)

The Mute/Operate switch allows manual disabling of the Reference 2 outputs during the switching of equipment. Use of this switch will minimize stress on your amplifier even if it is "off". It is also highly recommended that manual muting be employed during turn-off for maximum protection.

While it is true that the automatic muting will provide reasonably adequate protection against speaker burnout during these periods, it has limitations. At the 45-second point the automatic timer "releases" the output if the Mute/Operate switch is set in the "Operate" position. Although this is normally adequate protection, utilization of the manual mute provision will completely avoid stress to your speakers.

Some solid-state power amplifiers have a DC offset present at their input connections. (This, of course, should not be.) Operation of the manual Mute switch with such an amplifier connected will result in a "click" or "pop" in your loudspeaker (commensurate in level with the amount of the offset) each time the switch is activated. Repair or replacement of such amplifiers is suggested.

The automatic muting operates as follows:

1. The manual Mute switch always disables all "main" outputs and overrides any automatic provisions, when the Reference 2 is turned on. (The "Operate" position of the manual Mute switch is functional only when the unit is not in the automatic mute mode.)
2. When turned on by the Power On/Off switch, the Reference 2 will return to the mode last used, Operate or Mute, after completing the 45-second automatic muting cycle. Alternately, if the "Operate" switch position is manually selected during the automatic muting cycle, its LED will brighten on completion of the cycle, indicating the Reference 2 is ready to play. Manually selecting the "Mute" switch position before completion of the automatic muting cycle will maintain the Reference 2 in the mute mode until the "Operate" switch position is selected.
3. The 45-second warm-up timer will restart automatically and the LED will dim if the power is temporarily interrupted for 0.1 second or more.

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Note: Power supply regulation of the Reference 2 is effective down to 105VAC without serious sonic degradation.

4. The automatic muting of the Reference 2 is designed to be effective only against power line interruptions and power line failures. It will not mute against subsonic signal transmissions from your input source. ***Proper fusing of speakers is essential to protect against excessive audio level or power amplifier faults.***

Servicing

Because of its careful design and exacting standards of manufacture, your Reference 2 should normally require only minimal routine service to maintain its high level of performance.

CAUTION: Your Reference 2 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 Reference 2 are quality 6922/E88CC, 5AR4 and 6L6GC types, and with normal use should not need to be changed for approximately 4,000 hours of use. Replacement tubes should be of equivalent quality and are available from Audio Research.

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

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 or dilute isopropyl alcohol 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.

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.

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Specifications

FREQUENCY RESPONSE: +0 -3dB 0.5Hz to 60kHz at rated output.

DISTORTION: Less than .015% at 2V RMS Balanced output.

GAIN: Main output: 18dB Balanced, 12dB Single Ended output.
Tape output: 0dB. (Processor input: 0dB Balanced. Aux 1 input: 13dB Balanced.)

INPUT IMPEDANCE: 132K ohms Balanced, 66K ohms SE,
Inputs (8): tape, tuner, phono, CD, video, aux 1, aux 2, processor,
(XLR and RCA connectors).

OUTPUT IMPEDANCE: 400 ohms Balanced, 200 ohms SE main
(2), 20K ohms minimum load and 2000pF maximum capacitance.
Outputs (3): 2 main, 1 tape (XLR and RCA connectors).

OUTPUT POLARITY: Non inverting

MAXIMUM INPUT: 14V RMS maximum Balanced,
(7V RMS SE).

RATED OUTPUTS: 2V RMS (1V RMS SE) into 100K ohm
balanced load (maximum balanced output capability is 30V RMS
at less than 0.5% THD at 1kHz).

CONTROLS: Gain (125 steps), Balance, Select Record,
Select Input. Toggle switches: Power/Off, SE/Balanced Input,
Invert/Normal, Mute/Operate.

POWER SUPPLIES: Electronically regulated low and high voltage
supplies. Automatic 45 sec. warm-up/brown-out mute. Line
regulation better than .01%.

NOISE: 20uV RMS residual IHF weighted balanced noise output
with gain control minimum (100dB below 2V RMS output, 97dB
below 1V RMS SE output).

TUBE COMPLEMENT: (8)-6922/E88CC dual triodes, plus
(1 each) 5AR4, 6L6GC, and 6922 in power supply.

POWER REQUIREMENTS: 100-135VAC 60Hz (200-270VAC
50/60Hz) 130 watts maximum. (108W typical).

DIMENSIONS: 19" (48 cm) W x 7" (17.8 cm) H (standard rack
panel) x 15.5" (39.4 cm) D. Handles extend 1 1/2" (3.8 cm) forward
of the front panel.

WEIGHT: 31 lbs. (14.1 kg) Net; 44 lbs. (20 kg) Shipping.

Specifications subject to change without notice.

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