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# Owner's Manual

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## Model CA50

STEREO INTEGRATED AMPLIFIER

**audio research**  
HIGH DEFINITION®

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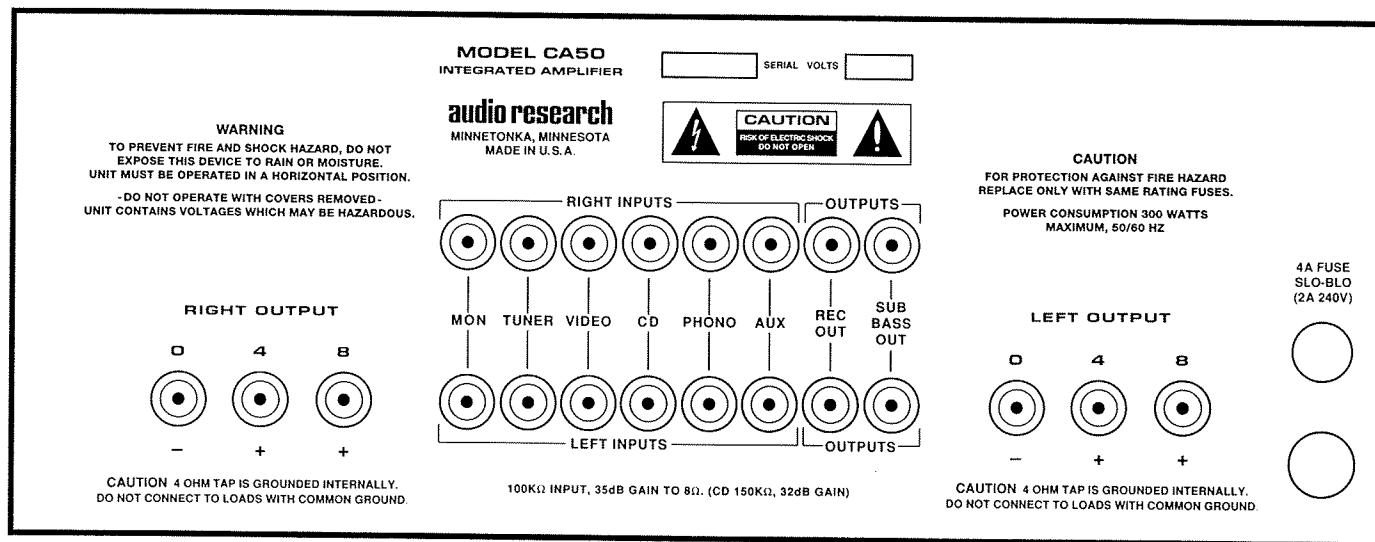
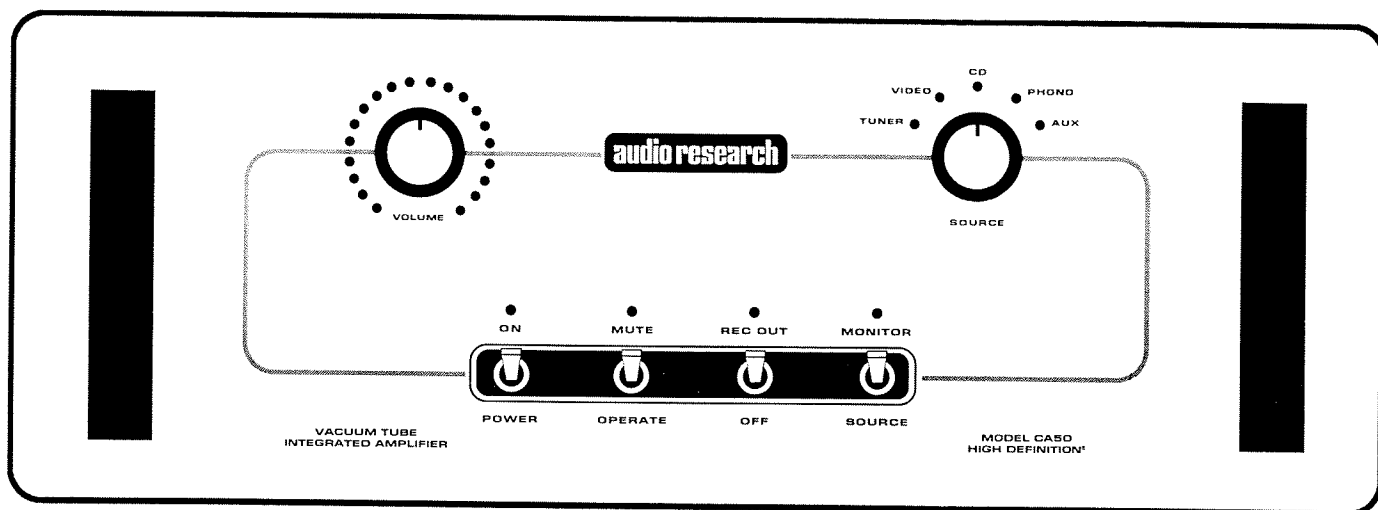
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## Preface

Please take time to carefully read and understand the following instructions before you install or attempt to operate this equipment. 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.

## Accessories

- 1 – Phillips-head screwdriver for cover removal
  - 1 – Plastic screwdriver for bias adjustments
- User replaceable spare fuses include:
- 2 – 4 Amp MDQ slo-blo with 100V and 120V unit
  - 2 – 2 Amp MDQ slo-blo with 220V and 240V units

## Preparation for Use

Your CA50 amplifier is shipped with the vacuum tubes packed in foam blocks. These must be unpacked and installed before you attempt to operate the amplifier. Included are two matched pair of 6550C output tubes, and four 6922 dual triodes used in the input stage. Proceed according to the following instructions.

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

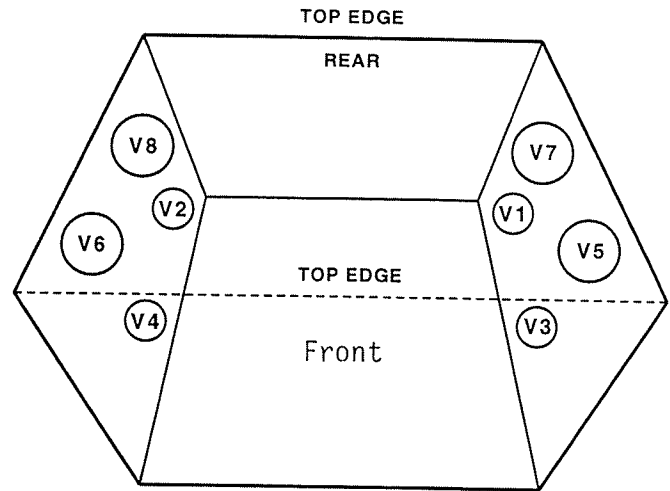


Diagram indicates relative positions of all (8) tubes located on two circuit boards as viewed from the front and looking down from above the amplifier.

1. Using the Phillips-head screwdriver provided, remove the top cover assembly, setting it and the retaining screws aside.
2. Carefully remove each vacuum tube from its protective foam and match its location "V" number (written on the base of the tube) to the "V" number printed next to each socket on the circuit board (see accompanying tube location diagram). **Firmly seat each tube in its matching socket, taking care to "key" the tube pins to the socket holes.** Retain the foam blocks with other packing materials for possible future use.
3. Once all vacuum tubes have been installed, reposition the top cover assembly over the chassis and, fasten with screws.

**Note:** In general, contact enhancers are not recommended for use on vacuum tube contact pins. With continual exposure to heat and air, 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.

## Description of Controls

**VOLUME CONTROL:** The Volume control of the CA50 integrated amplifier 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

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a time. A counter-clockwise turn and release of the control decreases the volume level a step at a time. Holding the Volume control in either direction continuously adjusts the volume level in the respective direction. The selected volume setting is indicated by the illuminated LED position within the LED volume range arc, analogous to a "traditional" volume control level setting.

Note that the CA50 has 70 individual steps across the volume control adjustment range and 20 LEDs per control. The corresponding LED position that is illuminated for a given volume control setting serves as a general level indicator and will remain lit for several individual adjustment steps before an adjacent LED illuminates.

**SOURCE SELECTOR SWITCH:** Allows selecting from any of five single-ended input sources (labeled Tuner, Video, CD, Phono and Aux).

Similar in operation to the Volume control, turning and releasing the spring-loaded Source selector switch in either direction steps through the source options which are indicated by LED illumination.

**POWER ON/OFF SWITCH:** Supplies power from AC wall outlet to CA50 when in upward "On" position (indicated by illuminated LED). In downward position the CA50 and Power LED are turned off.

When turned on, the CA50 will default to minimum volume level, "Mute", Rec Out "Off", "Source" (Monitor "off"), and "CD" input source settings after completing the automatic muting cycle.

Note that changing the settings of the following three toggle switches on the CA50 is accomplished by pressing the toggle downward each time. A lit LED indicates the function above the toggle switch is active. When the LED is unlit the function below the toggle switch is active.

**MUTE/OPERATE SWITCH:** In "Mute" position (indicated by LED illumination), shorts all outputs of the preamplifier to allow listening interruptions for telephone answering or other reasons. This switch should always be activated between listening uses or switching of inputs, in addition to turning the Volume control down. These two simple precautions will prevent inadvertent misuse of your CA50 and help protect your 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 Volume control beyond normal listening positions when the CA50 is in the Mute mode. Always turn the Volume control down when changing program sources, even when it is muted.

**OPERATE/MUTE CIRCUIT LED:** Note that for approximately 60 seconds after start-up this LED will flash until the automatic muting cycle is completed. None of the front panel controls except for the Power On/Off switch are operable during the automatic muting cycle. Upon completing the automatic muting cycle, the unit will then be in the manual "Mute" position (indicated by illuminated Mute LED) until the "Operate" position is manually selected.

**REC OUT/OFF SWITCH:** In "Rec Out" position, the source chosen by the input selector is fed to the Tape outputs (labeled "Rec Out"). In "Off" position, the Tape outputs are disconnected, with no signal being fed to them.

It is recommended that the Rec Out/Off switch be left in the "Off" position at all times (unless a tape recording is being made) for best sound quality.

**MONITOR/SOURCE SWITCH:** In "Monitor" position this switch bypasses the Source selector and presents the signal to the main outputs from the Monitor input on the rear panel. In the "Source" position, the program source is controlled by the Source selector (Tuner, Video, CD, Phono and Aux).

**USE OF REMOTE CONTROL UNIT:** All front-panel functions except Power On/Off are duplicated on the remote control unit for the CA50.

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

The rear panel has:

- 6 – RCA Input connector pairs for single-ended connection, L & R
- 2 – RCA Output connector pairs, for single-ended Rec Out and Sub Bass Out connection, L & R
- 6 – Output binding posts (+) and (–), L & R, for 4 or 8 ohm speaker connection
- 1 – Power line cord
- 1 – Power line fuse holder

**IMPORTANT:** Use the best available speaker wires and interconnects. Audio Research cannot emphasize this enough. As better components and systems are developed, it becomes increasingly important to avoid the limitations of inferior system interconnections. For best results we recommend Audio Research LitzLink 2® interconnects and LitzLine 2® speaker cables. To avoid sonic degradation use the shortest practical length of cables.

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**INPUT CONNECTORS:** All are clearly marked to indicate use. The inputs are 100K ohms single-ended except for the CD inputs which are 150K ohms single-ended.

**SUB BASS OUTPUT CONNECTORS:** The CA50's Sub Bass output may be connected to the input of a crossover network feeding a separate subwoofer amplifier or to the inputs of a powered subwoofer (see your subwoofer or crossover network owner's manual for instructions). Selection of bass crossover frequency and efficiency level matching of the signal to that of the main speakers must be provided for externally. The Sub Bass output of the CA50 is full frequency in bandwidth and its level is controlled by the CA50 Volume control.

**TAPE OUTPUT CONNECTORS:** The CA50's Tape outputs (labeled "REC OUT") should be connected to your tape deck's "REC" or "LINE" inputs. These outputs supply whatever is selected by the Source selector control to the tape deck for recording (the Rec Out switch must be in the "on" position). Level is non-variable and approximately the same as the selected input source.

**SPEAKER CONNECTIONS:** It is important sonically that your entire system be connected so that the audio signal arriving at the speakers has correct, or "absolute" polarity (i.e., non-inverted). Connect the black or "-" speaker terminal to the wire that connects to the "0" terminal on the CA50. Connect the red or "+" speaker terminal to the wire that connects to the "4" or "8" ohm impedance terminal on the CA50. Use the best available speaker cables and tighten all connections securely to ensure best sonic results.

**MATCHING:** It is important to use as close as possible an impedance match between the amplifier and speaker for optimum transfer of power to the speaker with minimum distortion. In the case of speaker systems with significant variations in impedance throughout the frequency spectrum, such as most electrostatic types, the best impedance match should be determined by listening.

**AC POWER CONNECTIONS:** It is essential that the CA50 be connected to a wall AC power receptacle, or a similar heavy-duty source, or the full sonic capabilities of the CA50 may be compromised. Furthermore, the proper control of start-up and shut-down surges may not occur unless the Power switch on the front of the CA50 is actually used for on/off control of the unit. The AC power source for the CA50 amplifier should be capable of supplying 10 amperes for 100 or 120 volt units, or 5 amperes for 220 or 240 volt units.

For the very best performance on domestic 100 or 120 volt circuits, the CA50 should be connected to its own AC power circuit branch, protected by a 15 amp breaker. The other

audio equipment should be connected to a different power circuit and breaker. Avoid the use of extension cords. If they must be used on a temporary basis, use 14-gauge or heavier cords.

The CA50 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 on your CA50 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 CA50 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 CA50, 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 On/Off switch on the panel of the CA50 in the "Off" position before connecting the power line cord to AC power.***

## Installation

1. 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 around the unit. ***Allow at least 8 inches of unrestricted ventilation space above the CA50 top cover during operation.***
2. Do not stack the CA50 directly on top of or below other electronic components: not only could this cause overheating, but hum may be introduced into the CA50 from the proximity of power transformers.
3. The four (4) special non-marring elastomer feet provide adequate ventilation spacing only from a smooth, hard surface. ***Never operate the unit while it is sitting on a soft, irregular surface such as a rug or carpet.***
4. Do not operate your CA50 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 CA50.
6. In a cabinet or rack-mount installation which has an enclosed back, an exhaust fan is desirable so as not to operate the CA50 in overheated ambient air. The



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ambient operating temperature should never exceed 120°F (49°C). Operation of vacuum tube equipment for long periods of time in hot ambient air will shorten tube life and increase the chance of failure of other component parts.

It is normal for a vacuum tube power amplifier to run quite warm, and if used for prolonged periods, to feel 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.

## Operating Procedure

### Start-Up:

1. Make sure you have read and complied with the INSTALLATION AND CONNECTIONS instructions prior to attempting operation.
2. Make sure your CA50 is properly connected to a high-current power receptacle via the attached power cord (see CONNECTIONS), with the power switch turned to "Off" position.
3. Turn Power switch to "On". (If the power indicator LED fails to light, turn the Power switch to "Off" and check the appropriate fuse for possible failure. An extra fuse for A.C. power is included with your CA50.) The Mute/Operate LED will flash for approximately 60 seconds while the power supply stabilizes, indicating operation of automatic muting circuit. After this automatic muting period the LED will stay on, indicating that your CA50 is in the "Mute" position. When the "Operate" position is manually selected the mute LED will turn off, indicating the CA50 is ready for operation.

**Note:** For superior sonic performance, a warm-up period of at least one half hour is recommended. Audio Research does *not* recommend leaving your CA50 on 24 hours a day as is the custom of some audiophiles to achieve maximum sonic performance on demand. While this is often recommended for solid-state equipment, Audio Research does not recommend this procedure for vacuum tube power amplifiers. (2,000 hours of tube life will pass by in 84 days!)

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

### Shut-Down:

1. Set Mute switch to "Mute" position.
2. Turn Volume control counter-clockwise to minimum setting.
3. Turn off power amplifier(s) to subwoofer(s), if applicable.
4. Turn off all input sources.
5. Set CA50 Power switch to "Off" position.

## Tape Recording Procedure

When using the CA50 as a control center for recording, the program source to be recorded must be connected to one of the five inputs controlled by the Source selector switch. This routes the selected program to the Record output.

If you own a three-head tape deck, and wish to monitor the actual tape while making a recording (for a true "A-B" comparison of signals before and after recording), connect the tape deck output to the Monitor input.

It is also possible to dub from one tape deck to another. Simply connect the output from one tape deck to an unused set of inputs controlled by the Source selector (Tuner, Video, CD, etc.) on the CA50. This signal will then be routed to the second tape deck when the appropriate input is selected on the Source selector.

## Muting Provisions

The CA50 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 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 CA50 requires approximately 5 to 10 minutes. The automatic muting circuitry timer is adjusted for about 60 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.)

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The Mute/Operate switch allows manual disabling of the CA50 outputs during the switching of equipment. Use of this switch will minimize stress on your CA50 and other components. It is also highly recommended that manual muting be employed during turn-off for maximum protection.

The automatic muting operates as follows:

1. The automatic muting always disables all outputs and overrides any manual settings. (The "Operate" position of the manual Mute switch is functional only when the unit is not in the automatic mute mode.)
2. The 60-second warm-up timer will restart automatically and the LED will flash if the power is temporarily interrupted for 0.1 second or more.

Note: Power supply regulation of the CA50 is effective down to 100VAC (120V units) without serious sonic degradation.

3. The automatic muting of the CA50 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 signal levels.***

## Servicing

Because of its careful design and exacting standards of manufacture, your CA50 amplifier should normally require only minimal service to maintain its high level of performance.

**CAUTION:** The CA50 integrated 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 your CA50 should not need to be changed for approximately 2000 hours of use. Replacement vacuum tubes should be of equivalent quality and are available through your authorized retailer or directly from Audio

Research Customer Service. For best performance, the 6550C output tubes should be matched pairs.

Additional questions regarding the operation, maintenance or servicing of your amplifier may be referred to the Customer Service Department of Audio Research Corporation at 612-939-0600 (CST).

## Output Tube Bias Adjustment

As shipped from the factory, the output "bias" adjustments are set for a nominal 65mA per 6550C tube. Under these idle conditions the tubes are each dissipating approximately 27 watts of their 41 watt rating (35 watt plate, 6 watt screen). This point of operation provides "enriched" Class AB<sub>1</sub>, and will satisfy the most critical listener.

For best results, operate and adjust the CA50 at the normal rated line voltage listed on the rear panel. Adjustment must be made under zero-signal conditions after at least 15 minutes of uninterrupted stabilization time.

A digital voltmeter capable of accurate measurements with 1mVDC resolution is preferred for accurate adjustment (must have 3 1/2 digit display). Use the plastic alignment tool provided to make the adjustment. The test points are accessible from the top of the circuit boards above the output tubes. Adjust the "bias" on each channel for an average reading of 65mVDC (0.065 Volt DC) between test points (across 0.5 ohm resistor.) Caution: resistor is 420V above ground.

## 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.



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## 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:** 45 watts per channel continuous from 20Hz to 15kHz. 1 kHz total harmonic distortion typically 2% at 45 watts, below .05% at 0.1 watt.

Approximate actual power available at "clipping" 50 watts (1kHz). (Note that actual power output is dependent upon both line voltage and "condition" i.e.: if power line has high distortion, maximum power will be affected adversely, although from a listening standpoint this is not very critical.)

**POWER BANDWIDTH:** (-3dB points) 18Hz to 40kHz.

**FREQUENCY RESPONSE:** (-3dB points at 1 watt) 2Hz to 50 kHz.

**INPUT SENSITIVITY:** 0.3V RMS for rated output. (35 dB gain into 8 ohms.) (optional 38 dB.)

**INPUT IMPEDANCE:** 100K ohms Single-ended.

**MAXIMUM INPUT:** 3.5V RMS (volume-30dB or lower).

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

**OUTPUT REGULATION:** Approximately 1.0dB 8 ohm load to open circuit (Damping factor approximately 13).

**OVERALL NEGATIVE FEEDBACK:** 7dB.

**SLEW RATE:** 10 volts/microsecond.

**RISE TIME:** 5 microseconds.

**HUM & NOISE:** Less than 1.0mV RMS – 85dB below rated output (IHF weighted, input shorted).

**POWER SUPPLY ENERGY STORAGE:** Approximately 183 joules.

**POWER REQUIREMENTS:** 105-125VAC 60Hz (210-250VAC 50Hz) 290 watts at rated output, 330 watts clipping, 190 watts at "idle".

**TUBES REQUIRED:** 2 – Matched pair 6550C – Power Output; 2 – 6922 Driver; 2 – 6922 input.

**DIMENSIONS :** 19" (48.3 cm) W x 7" (17.8 cm) H x 15" (38.1 cm) D. Handles extend 1.5" (3.8 cm) forward.

**WEIGHT:** 43 lbs. (19.5 kg) Net; 56 lbs. (25.5 kg) Shipping.

Specifications subject to change without notice.

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