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# Owner's Manual

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## **Model V35**

**STEREO POWER AMPLIFIER**

**audio research**  
HIGH DEFINITION®

5740 GREEN CIRCLE DRIVE / MINNETONKA, MINNESOTA 55343-4424 / PHONE 612/939-0600 FAX 612/939-0604

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# Model V35

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## Introduction

Please take time to carefully read and understand the following information and instructions before you install or attempt to operate your Audio Research V35 hybrid stereo 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.

## Model V35

The V35 hybrid stereo power amplifier represents an evolutionary improvement of the circuit topology first established in the popular "Classic" series amplifiers introduced by Audio Research a few years ago.

While continuing to use triode operation and Audio Research's patented, cross-coupled circuit, the V35 amplifier also incorporates a fully balanced input stage to minimize noise and distortion products that otherwise could degrade the musical performance of the output stage. The input stage uses select J-FET transistors with MOSFET followers to provide ultra quiet, low-impedance drive to the 6FQ7 dual triodes, which directly drive the output tubes. Partial cathode coupling and highly advanced output transformer design yield an effective power bandwidth of 10 Hz to 80 kHz. Audio Research's patented DEC (Decoupled Electrolytic Capacitor) circuit and the latest coaxial coupling capacitors are used to further enhance the performance of this remarkable amplifier.

The V35 also incorporates unique "soft" start-up and shut-off modes to help prevent life-shortening current "spikes" from reaching the output tubes. At turn-on, a 30-second delay allows the output tube heaters to rise to proper operating voltage and lets bias supply voltage stabilize; this sequence is then followed by a two-second ramp-up of B+ supply voltage to enable normal operation. Similarly, at turn-off the B+ supply voltage is ramped down to prevent abrupt loss of operating bias — again preventing undue stress to the output tubes.

In short, the V35 is an elegant, logical refinement of proven circuit design, with an astonishing ability to resolve meaningful musical detail. Providing sufficient power to drive a wide variety of today's highest quality loudspeakers, the V35 is both versatile and virtuoso; it will produce highly satisfying results from dynamic, electrostatic or planar loudspeaker types.

And, while shipped with KT90 type power output tubes, the V35 is compatible with several popular alternative tube types: 6550, 6550A, KT88 or KT100. (See instructions for output tube biasing elsewhere in this manual.)

You will find the performance of the V35 amplifiers a revelation in reproducing hitherto hidden musical intri-

cacies, as well as in lifelike dynamic expression; it is a revelation you will continue to enjoy for years to come.

## Construction and Testing

Like every Audio Research product, your V35 power amplifier has been designed and carefully handcrafted in the U.S.A., using precision mechanical parts, electronic components and assembly procedures similar to those used in the manufacture of scientific equipment and musical instruments. To assure consistent performance standards, each V35 is visually inspected at several assembly points, test run, electronically tested and sonically evaluated prior to shipment.

This time-consuming, perfectionist approach to the design and manufacture of audio equipment is intended to provide you with the best in musical satisfaction and lasting value.

## Packaging

Save all the packaging in a dry place. Your Audio Research amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. Because of its weight, it is highly probable that the unit will be damaged during shipment if repackaged in cartoning other than that designed for the unit.

You may not have occasion to return the unit to the factory for service, but if that should prove necessary, or other occasion to ship it occurs, the original packaging may save your investment from unnecessary damage, delay and expense.

## Unpacking

The V35 is packed within two cartons (inner and outer) which have impact-absorbing panels in between. Because of the weight of the unit and because it is a precision electronic instrument it is necessary to take reasonable care of its unpacking and preparation for use.

It is best to have a large, open work area with two persons available to help. Set the carton upright in the center of the work area and with a small knife carefully slit the taped edges of the outer carton's top flaps. Fold the flaps to the sides and while holding the inner carton in place, roll the unit upside down. You can now lift the outer carton off and set it and the filler panels aside. Now slit the inner carton's taped seams on the bottom (now facing upward). Again, fold the flaps over and while holding the unit in, roll it over as before. You can now lift the inner carton off to find your V35 sitting upright, undamaged and uncartoned. Carefully remove the plastic wrap. Now, while you remember how, reassemble the carton system for future use.



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## Accessories

- 1 – Phillips-head screwdriver for cover removal
- 1 – Plastic screwdriver for bias adjustments

## User-replaceable spare fuses include:

- 2 – 1/4 Amp AGC 250V normal-blow with 100V, 120V and 220V/240V units
- 2 – 4 Amp MDX 125V slo-blow with 120V units
- 2 – 5 Amp MDX 125V slo-blow with 100V units
- 2 – 2 Amp MDX 250V slo-blow with 220V/240V units

## Warnings

1. To prevent fire or shock hazard, do not expose your V35 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 16-gauge, 3-conductor power cord on your V35 is equipped with a standard 3-prong grounding plug. If used normally, it will provide a safe earth ground connection of the chassis. Refer to the section on "AC Power Connections" for detailed information.
4. For continued protection against fire hazard, replace fuses only with the same type and rating of fuses as specified.

## Preparation for Use

Your V35 amplifier is shipped with the vacuum tubes packed in individual protective cartons. These must be unpacked and installed before you attempt to operate the amplifier. Proceed according to the following instructions.

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 carton and match its location number (written on the base of the tube and on its protective carton) to the number printed next to each socket on the circuit board. Firmly seat each tube in its matching socket, taking care to "key" the tube pins to the socket holes. Retain the tube cartons 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:** Contact Enhancers — such as the commercial preparation "Tweek" — 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.

# Model V35

## Panel Controls

The front panel has:

- |                   |                          |
|-------------------|--------------------------|
| 1 – Switch        | 1 - Power Line On-Off    |
| 2 – Fuse holders: | 1 - Power Line           |
|                   | 1 - High Voltage         |
| 2 – Indicators:   | 1 - Power "ON" (Green)   |
|                   | 1 - High Voltage (Green) |

## Use of Controls

**POWER-ON SWITCH:** Initiates/terminates AC line power to the amplifier. Function indicated by green LED at left of toggle switch.

**Note:** Audio Research does **not** recommend leaving your V35 "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!)

## 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 five (5) 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.

## Connection Instructions

The rear panel has:

- 2 – Input XLR connector
- 2 – Output Barrier Terminal Block
- 1 – Power Line Cord

**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® interconnects and LITZLINE® speaker cables.

Audio Research uses circuitry called "partial cathode coupling" in all of its vacuum tube and hybrid power amplifier designs. This requires the 4 ohm taps of the V35's outputs to be grounded (internally). This is of no consequence when using most loudspeakers. Simply connect the "negative" speaker lead to "0" and the "positive" speaker lead to 4, 8 or 16 ohms, as required.

Some loudspeakers, however, including the Polk SDAs, Infinity RS-1 Series, and some electrostatic designs 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 "4" ohm taps rather than the "0" ohm taps to avoid shorting the amplifier or causing monaural performance to occur. Use either "0" ohms or "16" ohms for the "positive" speaker leads. (The "0" ohm tap will provide an inverted signal. 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). Connect the black or "-" speaker terminal to the wire that connects to the "0" terminal on the V35. Connect the red or "+" speaker terminal to the wire that connects to the "4", "8" or "16" terminal on the V35. Use the best available speaker cables and tighten the screw terminals securely with the phillips screwdriver supplied 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, determine the best impedance match empirically for best overall sonic results.



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Connect the V35 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 V35 amplifier be connected to a wall AC power receptacle, or a similar heavy-duty source. If it is connected to convenience receptacles on preamplifiers, etc., the full sonic V35 capabilities of both the V35 and the preamplifier 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 V35 is actually used for on/off control of the amplifier. The AC power source for the V35 amplifier should be capable of supplying 15 amperes for 100 or 120 volt units, or 8 amperes for 220 or 240 volt units.

For the very best performance on domestic 100 or 120 volt circuits, the V35 should be connected to its own AC power circuit branch, protected by a 15 amp breaker. The preamplifier and other audio equipment should be connected to a different power circuit and breaker. If the power receptacle of the V35 is more than 25 feet from the building power entrance and breaker box, it would be preferable to use installed wiring capable of 30 amperes to minimize voltage drop, using a 15 amp breaker. Avoid

the use of extension cords. If they must be used on a temporary basis, use 14-gauge or heavier cords.

The V35 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 V35 has a standard three-prong grounding plug to provide maximum safety when it is connected to a ground 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 are used with the V35 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 preamplifier, 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 front of the V35 in the OFF position before connecting the power line cord to AC power.

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## Operating Procedure

1. Make sure you have read and complied with the INSTALLATION and CONNECTION instructions prior to attempting operation.
2. Make sure your V35 is properly connected to a high-current power receptacle via the attached power cord (see CONNECTIONS).
3. Your preamplifier should be "On" and muted and/or set at minimum gain.
4. Turn the POWER switch from "Off" to "Power." The green "Power" LED indicator should glow immediately, and the high voltage LED is dim. Approximately 30 seconds later the green "High Voltage" LED should also light fully, indicating the proper operation of the high-voltage circuits. Three distinct relay clicks may be heard during the start-up. NOTE: If the "Power" or "High Voltage" indicator lamps fail to light, turn the "Power" switch to "Off" and check the appropriate fuses for possible failure. Extra fuses for both powerline and high-voltage circuits are packed with your V35.
5. Your V35 should now operate satisfactorily. However, a full stabilization or warm-up time of approximately one hour is recommended for best sonic performance.

## Adjustment Procedure

The V35 utilizes very high quality, commercial and computer grade components which, together with conservative operation of all components and tubes, will provide long service life, if installed and operated within the parameters outlined in this Manual.

The output tubes, for example, are operated with electronically regulated "bias" voltage, that includes compensation for varying plate voltage as the line voltage changes. The resulting output tube current is essentially immune to line voltage variation within the normal range of 105-125VAC, or equivalent export line voltages.

After vacuum tube replacement, it is desirable to make a single internal "bias" adjustment to optimize performance and tube life.

**CAUTION:** The following internal procedure should not be attempted by the owner unless he is *technically qualified*. There are high voltages within this unit which can be *lethal* under certain conditions. The internal "bias" adjustment should be accomplished by a qualified individual. It is necessary to remove the top and bottom covers from the V35 for this adjustment. The unit should be off before removal of the covers.

Normally, only the output tube idle current (bias voltage) requires adjustment in the V35. Use the plastic alignment tool provided for this adjustment.

The triode output stages of the V35 are partially cathode-coupled "push-pull Class AB<sub>1</sub>," utilizing our tightly coupled output transformers which provide low distortion and sonic accuracy.

## Output Tube Bias Adjustment

As shipped from the factory, the output "bias" adjustments are set for a nominal 75mA per KT90 tube. Under these idle conditions the tubes are each dissipating approximately 32 watts of their 50 watt rating (42 watt plate, 8 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 V35 at 120VAC. Adjustment must be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time.

A digital voltmeter capable of accurate measurements with 0.1mVDC resolution is preferred for accurate adjustment (must have 3½ digit display). Use the plastic alignment tool provided to make the adjustment. The four test points are accessible from the bottom of the circuit board, near the front edge. Test points TP1, TP2 on the schematic diagram are for tube V5, and TP3, TP4 are for tube V6. (Automatic servo balance circuits take care of tubes V3, V4.)

**WARNING.** This adjustment involves measurements of circuits that are 420 volts DC above chassis potential, with large energy storage. Use extreme care to avoid shock hazard and to avoid damage to the V35 or to your meter due to careless use of test leads. All meter test leads connections must be isolated from chassis or earth ground. Start with the meter on its highest range before making connections, and then select the 200mVDC range. Do not attempt current measurements.

Adjust the "bias" for an average reading of 37.5mVDC (.0375 Volt DC) between TP1-TP2 and between TP3-TP4. The two readings may differ by up to 10% because of minor variations in tubes.

## Servo Balance Calibration

Verify the bias adjustment before setting the servo. The servo adjustments are factory set and should not require readjustment except in the event of a circuit malfunction or component replacement. They are not user adjustments and are not required when changing tubes.

Allow 2-3 hours undisturbed warmup with top and bottom covers in place, to fully stabilize tube currents and servo circuit temperatures. The unit should be in a normal horizontal position, with its rubber feet resting on a hard surface for normal ventilation.



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Tip the unit vertically on its handles, and remove the bottom cover. Connect a 3½ digit DVM between TP2 and TP5. **WARNING:** high voltage.

Adjust the 15-turn trimmer through the guide on the left side of the chassis. Use the *plastic alignment tool* supplied with the unit (not a metal screwdriver). Adjust for a null of less than 0.2mVDC indication. Response is very slow and it may take 20-30 seconds for the reading to stabilize after adjustment. Some fluctuation is normal, so use the average reading. For best results, the line voltage should be stable at about 120VAC, although the actual line voltage is not critical. Repeat for the right channel, using TP4 and TP6, and the right side trimmer.

## Servicing

Because of its careful design and exacting standards of manufacture, your V35 amplifier should normally require only minimal service to maintain its high level of performance.

**CAUTION:** The V35 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 six (6) vacuum tubes inside the V35 are high-quality KT90 and 6FQ7 tubes. Replacement output tubes should be matched for best sonic performance. (Your V35 comes from the factory with a matched set installed.) Reliable, matched, low gas KT90 tubes — such as those available from Audio Research — are strongly recommended for maximum performance and longevity. Check bias adjustment after replacing tubes.

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

## Cleaning

To maintain the visual appearance of your amplifier, 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.



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# 3-Year Limited Warranty

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## Terms and Conditions

### 1. LIMITED WARRANTY

Audio Research warrants the product designated herein to be free of manufacturing defects in material and workmanship, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser or no later than five (5) years from the date of shipment to the authorized Audio Research dealer, whichever comes first, excepting vacuum tubes which are warranted for 90 days only (See 6).

### 2. CONDITIONS

This Warranty is subject to the following conditions and limitations. The Warranty is void and inapplicable if the product has been used or handled other than in accordance with the instructions in the owner's manual, abused, or misused, damaged by accident or neglect or in being transported, or the defect is due to the product being repaired or tampered with by anyone other than Audio Research or an authorized Audio Research repair center. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THE ORIGINAL PURCHASE RECEIPT. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and authorized dealer and the price paid by the purchaser. Audio Research reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.

### 3. REMEDY

In the event the above product fails to meet the above Warranty and the above conditions have been met, the purchaser's sole remedy under this Limited Warranty shall be to return the product to Audio Research or an authorized Audio Research repair center where the defect will be rectified without charge for parts or labor, except vacuum tubes (See 6). For a period of one year from date of purchase, Audio Research will pay round-trip freight of the company's choice for any product requiring return to the factory for authorized warranty service; such product(s) must originate from and will be returned to the retail store where purchased.

### 4. LIMITED TO ORIGINAL PURCHASER

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not be transferred to a subsequent purchaser of the product.

### 5. DURATION OF WARRANTY

This Warranty expires on the third anniversary of the date of purchase or no later than the fifth anniversary of the date of shipment to the authorized Audio Research dealer, whichever comes first.

### 6. VACUUM TUBES

Vacuum tubes are warranted for the original 90-day period only.

### 7. DEMONSTRATION EQUIPMENT

Equipment used by an authorized dealer for demonstration purposes is warranted to be free of manufacturing defects in materials and workmanship for a period of three (3) years from the date of shipment to the dealer. Vacuum tubes are warranted for 90 days. After the first year, demo equipment needing warranty service must be packed and returned to Audio Research by the dealer at his sole expense. Audio Research will pay return freight of its choice. A returned product must be accompanied by a written description of the defect on an AUDIO RESEARCH RETURNED GOODS AUTHORIZATION form. Dealer-owned demonstration equipment sold at retail within three (3) years of date of shipment to the dealer is warranted to the first retail customer to be free of manufacturing defects in materials and workmanship for the duration of the 3-Year Limited Warranty remaining (as measured from the date of shipment of the equipment to the dealer). Vacuum tubes are not warranted for any period under these conditions of sale. In the event warranty service is needed under these conditions, the owner of the equipment must provide a copy of his purchase receipt, fulfilling the requirements described under "2. Conditions" above. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice.

### 8. MISCELLANEOUS

ANY IMPLIED WARRANTIES RELATING TO THE ABOVE PRODUCT SHALL BE LIMITED TO THE DURATION OF THIS WARRANTY. THE WARRANTY DOES NOT EXTEND TO ANY INCIDENTAL OR CONSEQUENTIAL COSTS OR DAMAGES TO THE PURCHASER. Some states do not allow limitations on how long an implied warranty lasts or an exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

### 9. WARRANTOR

Inquiries regarding the above Limited Warranty may be sent to the following address:

**Audio Research**  
5740 Green Circle Drive, Minnetonka, Minnesota 55343-4424.  
ATTN: Customer Services

## Warranty Outside the U.S.A.

Audio Research has authorized distribution in many countries of the world. In each country, the authorized importing retailer or distributor has accepted the responsibility for warranty of our products. Warranty service should normally be obtained from the importing retailer or distributor from whom you purchased your product.

In the unlikely event of service required beyond the capability of the importer, Audio Research will fulfill the conditions of the warranty. Such product must be returned at the owner's expense to the Audio Research factory, together with a photocopy of the bill of sale for that product, a detailed description of the problem, and any information necessary for return shipment.

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# Specifications

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## Model V35

**POWER OUTPUT:** 30 watts minimum continuous at 16 ohms from 17Hz to 20kHz with less than 1.0% total harmonic distortion (typically below .005% at 1 watt)

Approximate actual power available at "clipping": 32 watts (1kHz) (Note that actual power output is dependent upon both line voltage and "condition" ie: 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) 15Hz to 50kHz

**INPUT SENSITIVITY:** .8V RMS balanced for rated output

**INPUT IMPEDANCE:** 400K ohms balanced

**OUTPUT REGULATION:** Approximately 0.4dB 16 ohm load to open circuit (Damping factor approximately 23)

**NEGATIVE FEEDBACK:** 19dB

**SLEW RATE:** 15 volts/microsecond

**RISE TIME:** 3.5 microseconds

**HUM & NOISE:** Less than 0.5mV RMS — 93dB below rated output (20kHz bandwidth unweighted, inputs shorted)

**POWER SUPPLY ENERGY STORAGE:** Approximately 150 joules

**POWER REQUIREMENTS:** 105-125VAC 60Hz (210-250VAC 50Hz) 300 watts at rated output, 400 watts maximum, 200 watts at "idle"

**TUBES REQUIRED:** 2 – Matched pair KT90 – Power Output;  
2 – 6FQ7/6CG7 – Drivers.

**DIMENSIONS:** 19" (48 cm) W (standard panel rack) x 7" (18 cm) H x 14½" (37 cm) D (front panel back). Handles extend 1⅝" (4.1 cm) forward of the front panel. Output connectors extend 1" behind rear panel.

**WEIGHT:** 45 lbs. (20.5 kg) Net; 60 lbs. (27.3 kg) Shipping

Specifications subject to change without notice.

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