Price: $5.00

MODEL D-79C POWER AMPLIFIER

OWNER'S MANUAL

10-1-82

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INTRODUCTION

Please take time to read this manual prior to attempting installation or use of this unit.

This latest version of the D79 amplifier series, the D79C, embodies a number of technical advances over the previous versions. In addition to extensive use of state-of-the-art audio materials (polypropylene and polystyrene dialectric capacitors; proprietary interconnect wires, etc.) "servo" coupling has been added to an advanced version of Audio Research's patented "cross coupled" circuitry. Additional electronic power supply regulation has been added so that all low level circuits are now regulated.

The "Rolls Royce" packaging and component concept of the D79 series has been maintained in the D79C so that you may expect (with only reasonable maintenance) many years of very High Definition® performance from your D79C.

WARRANTY STATEMENT

A Limited 90-Day Warranty (from date of purchase by the original purchaser; but must be within two (2) years of the date of manufacture) is provided by Audio Research Corporation. This includes vacuum tubes. This warranty is subject to the conditions and limitations stated within the documents attached to the outer shipping carton and is repeated in full on Page 8 of this manual. Please read the following WARRANTY REGISTRATION CAUTION as well as the WARRANTY TERMS on Page 8 of this manual to understand your responsibility as well as your rights regarding the warranties.

WARRANTY REGISTRATION CAUTION

It is your responsibility to register your unit. While it is true that Audio Research Corporation will provide warranty service for 90 days even if you do not (proof of purchase, such as a photocopy of your bill of sale, will be required), you will lose the extended Limited 3-Year Warranty unless you register the unit within 30 days of the date of your purchase. (Note that this extended warranty does NOT include vacuum tubes.)

Please note that it is not Audio Research's (or your dealer's) responsibility to insure this registration. It is yours, and yours alone. The warranty papers are attached to the carton. Do not delegate this responsiblity to anyone else. You can know that your unit is registered only if you do it yourself and if you receive back from Audio Research a validated Warranty Certificate. Audio Research wants you to have the extended Limited 3-Year Warranty; however, the validated warranty will not be issued if the unit is not registered within 30 days of date of purchase.

Take time now to read Paragraph 1 of the WARRANTY TERMS on Page 8 of this manual so that you will clearly understand what is required of you in order to accomplish the warranty registration.

USE CAUTIONS

1. Please be certain to read this manual over to familiarize yourself with your new amplifier before placing it in service.

2. Your D79C amplifier's power cord is equipped with a standard three-prong grounding plug which, if used normally, will ground the chassis to the power line. While this procedure undoubtedly provides the maximum possible safety in use, it will, in many cases, cause your audio system to have a residual hum.

It is usually best to keep the preamplifier "earth grounded" and "float" the grounds of power amplifiers and other equipment to eliminate ground loop hum. The audio interconnect cables then keep the power amplifiers at safe earth ground potential. If there is any question as to the safety of grounding procedures, be certain to seek competent help with the installation.

WARNING

1. To prevent fire or shock hazard, do not expose this equipment to rain or moisture.

2. This unit contains voltages which can be lethal. Do not operate this unit with its covers removed. Refer servicing to qualified personnel.

CAUTION

For continued protection against fire hazard, replace all fuses only with the same type and rating of fuse as specified at each fuse holder.

PACKAGING

Save all packaging. Your Audio Research® amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return it 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 or delay.

REMEMBER: Remove the five (5) 6550 tubes from their sockets and package in individual cartons to avoid damage in shipment. Mark each tube with its "V" number.

ACCESSORIES INCLUDED WITH YOUR D79C AMPLIFIER

1 1/4 nut driver (for cover removal)
1 Plastic screwdriver (for adjusting bias)
Spare Fuses:
- 4 - 3.2A AC line fuses
- 2 - 1A Plate fuses
- 2 - 1/2A Screen fuses
- 6 - Miscellaneous speaker fuses:
  - 2 - 1A
  - 2 - 2A
  - 2 - 5A

PREPARATION FOR USE

Your D79C amplifier is shipped with the matched pairs of output tubes removed and wrapped so that they will not be broken or internally damaged in shipment. It is necessary to install these before using your amplifier. Proceed as follows:

1. Locate the parts and tools of the accessory list that are included with the unit.

2. Using the 1/4" red handle nut driver provided, remove the top cover and temporarily set it and its screws aside.

3. Unwrap the 5 power tubes, noting that each is labeled.

4. Install them from left to right (viewed from the top front): V15, V17, V21, V18, V16 - taking care to note the orientation of the key on the plastic base. Do not force the tubes, and take care not to break them or the plastic base. Determine that they are fully seated. Use much care in this procedure so as not to damage or break the tubes or their bases.

5. Reinstall the cover. You may now proceed with INSTALLATION INSTRUCTIONS and OPERATING INSTRUCTIONS.

INSTALLATION

To insure normal component life and safe operation this unit must be operated only in a horizontal position. The three built-in fans will provide adequate forced air cooling only if there is unrestricted airflow available from below, behind and above the unit.

The 11 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 airflow above and below the unit is provided. The "ambient" operating temperature should never exceed 120°F or 50°C. Use the Audio Research Corporation RMV-3, Rack Mount Ventilators, above and below each unit.

It is normal for a vacuum-tube power amplifier to run "warm" to the touch. All components within are, however, operated at safe, conservative levels and will not be improperly affected thereby.

CONNECTION INSTRUCTIONS

The front panel has:

- 3 Meters (2 power and bias; 1 AC line voltage)
- 2 Switches (2 power and bias; 1 AC power on-off)
- 4 Fuses (2 line; 1 regulator; 1 screen)
- 4 Bias Adjustments (sub-panel screwdriver accessible)

The rear panel has:

- 2 Input Connectors
- 2 Level Control Knobs
- 2 Fuses (speaker lines)
- 2 Sets Double Banana Plug Jacks
- 2 Terminal Connector Barrier Blocks
- 1 Line Power Cord

To place the unit in operation the following procedure is recommended:

1. Install appropriate size fuses in the "Speaker Fuse Holders" located on the rear panel to protect your speakers. If you do not know the proper size fuses for your speakers, we strongly urge you to obtain the speaker manufacturer's recommendation for the appropriate fuse (both value and type).

2. Connect your speakers using the best available speaker wires. We cannot emphasize this enough. It has been determined that the better the component system, the more important it becomes to use the very best interconnect and speaker wires.

3. Your D79C has been provided with "banana" binding posts for convenience, which are to be connected to the appropriate output impedances via the wires with spade lugs provided. The black wire should be connected to "0" on the terminal barrier block. The white wire should be connect to "4," "8" or "16" as required by your speaker system.

   Note that the D79C is a "non-inverting" amplifier. It is important, sonically, that your entire system be connected so that the audio signal arriving at the speaker be "non-inverting."

   NOTE: It is important to use as close as possible an impedance match between amplifier and speaker so as to allow optimum transfer of power to the speaker while preserving minimum distortion operation of the amplifier. In the case of some complex speaker systems, including electrostatic types, the best impedance match may have to be determined empirically.

4. Turn both level controls fully counter-clockwise.

5. Connect the amplifier to the preamplifier or electronic crossover, using only the highest grade audio interconnect cables.

6. Place the power on-off switch in the "off" position and connect the power line cord to the AC power, observing Paragraph 2 under USE CAUTIONS, Page 2 of this manual.

7. Determine that both meter switches are in the "operate" position. Determine from the AC line meter that the available voltage is suitable. Place the power switch in the "on" position.

   CAUTION: Make certain the amplifier is installed according to the instructions under INSTALLATION on Page 3 of this manual. Contact your dealer for help if you have any questions on the above procedure.

OPERATING INSTRUCTIONS

1. As the amplifier is "warming up" (you have already determined that the AC line voltage is within the green arc operating range), switch the "bias operate" switches to each of the output tubes and notice the meter deflection. In approixmately 15 minutes the output tubes (V15, 17, V18, 16) should be stabilized and the meters should read approximately at the junction of the red and green arcs.

This point (the red and green junction) has been calibrated to indicate when the "cathode" currents of V15, 17, 16, 18 are at approximately 65 ma. This is the "nominal" minimum distortion operating point for an average matched pair of 6550 tubes in this circuit.

Operating the tubes at up to $\pm$1/4" of this calibration point will not appreciably effect either tube life or performance, so these bias adjustments do not require constant "fiddling" to achieve satisfactory operation.

2. Once the unit has "warmed up" to a stabilized operation condition the bias/operate switches should be returned to the "operate" positions.

CAUTION: Never operate the amplifier except with the "bias/operate" switches in the "operate" position.

3. At this point the amplifier is ready for use (and you have previously fully connected it into the system).

Play a record. Turn the preamplifier volume control to 12 to 1 o'clock, a good setting for your normal listening habit (the input level controls on the amplifier are fully counter-clockwise at this point), and advance the amplifier input level controls until you have achieved your normal listening level.

Enjoy!

ADJUSTMENT PROCEDURE AND DISCUSSION

The D79C utilizes very high quality, commercial grade components and this, together with conservative operation of all components and tubes, should provide long service life.

After long service, or after vacuum tube failure and replacement, or in a location with consistently low line voltage, it may be desirable to readjust the amplifier for optimum performance.

CAUTION: The following internal procedures should not be attempted by the owner unless he is technically qualified. There are high voltages and currents within this unit which can be lethal under certain conditions. Refer all internal adjustments to a qualified individual.

There are three (3) parameters which may be adjusted (in the following sequence) in the D79C. The DC and AC balance adjustments are internal, requiring removel of the rear cover.

1. OUTPUT TUBE IDLE CURRENT ("BIAS")
2. DC BALANCE
3. AC BALANCE

1. OUTPUT TUBE IDLE CURRENT ("BIAS")

The output stages of the D79C are partially cathode coupled "push-pull parallel Class AB_1," utilizing our tightly-coupled output transformers which provide low distortion and sonic accuracy.

As shipped from the factory, the output bias adjustments are set for a nominal 65mA cathode current per tube with a stable power line of 120 Volts. This point of operation provides "enriched" Class AB_1, and will satisfy most critical listeners.

Make sure adequate ventilation is provided to prolong tube life.

1A. "BIAS" ADJUSTMENT PROCEDURE

For best results operate and adjust the D79C at 120VAC line voltage, or at the line voltage that is typical in the final installation. Adjustments should be made under zero-signal conditions after at least 15-20 minutes of uninterrupted stabilization time. There may be a slight interaction between the 4 output tube bias adjustments, so recheck the first tube current after adjusting the other three, etc., until you are certain that all are correct and stabilized.
Select the desired tubes (V15, V16, V17, V18) with the Bias/Operate switches and adjust at the corresponding control at the lower edge of the front panel for identical readings between the 2 tubes on each channel, within about 1/16" of meter deflection. Use the plastic alignment tool supplied with the D79C. Each reading should be within $\pm$1/4" of the top of the green band on the meter scales. This adjustment usually corresponds to lowest 1kHz total distortion (typically less than 0.1% at 75 Watts) into 16 ohms. If identical cathode currents or low distortion cannot be achieved, change to a new matched pair of output tubes (matched within 5%).

CAUTION: Always return the "Bias/Operate" switches to "Operate" after completing the adjustments, before applying input signals to the unit. This will minimize meter "pinning" during large signal operation.

2. DC BALANCE AND ADJUSTMENT PROCEDURE

Because the direct and cross-coupled circuit is "servo" controlled, it is not normally necessary to readjust these parameters, even when changing tubes. Of course, a component failure within the servo circuit itself will cause readjustment to be required.

A batter-operated digital voltmeter having a 10 megohm or higher input impedance and 3½ digit resolution or better is best for these adjustments.

Allow at least one hour of uninterrupted stabilization time before final adjustment.

Check for a nominal +110 Volts at Pins 1 and 6 of V3 and V4 to the circuit "common." The actual voltage is not critical within the range of +105 to +115. The balance is critical. This is, if pin 1 has 106.7, for example, then pin 6 should also have 106.7. It is not necessary that the other channel have the same voltage, only that each channel balance is precise.

Adjustment of the individual servos is accomplished by the following:

V3	Test Point 1	RV3
V3	Test Point 3	RV5
V4	Test Point 2	RV4
V4	Test Point 4	RV6

These adjustments are very sensitive and require only the smallest of control movement.

3. AC BALANCE

Normally the AC Balance does not require readjustment. If the driver or output tubes are changed, you may want to recheck its setting; however, this adjustment should not be attempted unless low distortion measuring equipment is available.

First, determine that the output tubes are properly biased, and that the DC servoed voltages on the input circuit are correct as outlined in Step 2.

Using the plastic alignment tool supplied with the unit, adjust RV8 and RV7 for minimum 2nd harmonic distortion at about 1 Watt, 1kHz output into a 16 ohm load, typically less than .002%. As an approximation, the adjustments can be made for mimimum 1kHz total harmonic distortion and noise, typically less than .02%.

WARRANTY TERMS

This unit is offered with a limited warranty as follows:

1. 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. To obtain this Warranty, THE ORIGINAL PURCHASER MUST MAIL TO AUDIO RESEARCH WITHIN THIRTY (30) DAYS OF THE DATE OF PURCHASE THIS WARRANTY REGISTRATION FORM COMPLETED, DATED AND SIGNED BY BOTH THE PURCHASER AND THE SELLING DEALER TOGETHER WITH A COPY OF THE BILL OF SALE OR OTHER PROOF OF PURCHASE OF THE PRODUCT. Audio Research will then validate the Warranty and return the validated Warranty to the purchaser.

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. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THIS VALIDATED WARRANTY. Audio Research reserves the right to modify the design of any product without obligation to purchasers or previously manufactured products and to change the prices or specifications of 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 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 below).

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. During the first ninety (90) day period following the date of purchase by the original owner, the Audio Research Limited 90-Day Warranty supersedes this Warranty.

6. Vacuum Tubes. Vacuum tubes and replacement thereof are warranted for the original 90-day period only.

7. 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.

PRELIMINARY D79C SPECIFICATIONS (AC line set @120V 60Hz for these specifications)

Power Output:
75 watts per channel minimum RMS (both channels operating) at 16 ohms from 30Hz to 15kHz with less than 1% total harmonic distortion.

(Typically approximately .06% at rated power in midband.)

Approximate actual power available per channel at "clipping" (Both CH. OP, 1kHz): 87 Watts

Power Bandwidth:
(-3dB Points) 15Hz and 40kHz

Intermodulation Distortion:
Less than .5% at 1dB below rated output (90V p to p, 16 ohms)
(SMPTE method)

Input Sensitivity:
.75V RMS for rated output

Input Impedance:
75K ohms, nominal

Output Regulation:
Approximately .6dB, 16 ohm load to open circuit (damping factor approximately 15)

Negative Feedback:
21dB

Slew Rate:
Approximately 10 volts/microsecond

Rise Time:
5 microseconds

Noise:
Wideband, unweighted, more than 90dB below rated output.
Line components, more than 80dB below rated output.

Power Requirements:
105-125/210-250 VAC, 50/60Hz, 750 watts maximum
350 watts at "idle"
550 watts at rated power

Dimensions:
19" (48 cm) W (standard rack panel) x 10 1/2" (26.5 cm) H x 17 1/4" D (front panel back). Handles extend 1 5/8" (4.1 cm) forward of front panel.

Weight:
85 lbs. (38.8 kg) Net, 100 lbs. (45.7 kg) Shipping