Price: $5.00

MODEL D-79B POWER AMPLIFIER

OWNER'S MANUAL

6-1-81

audio research corporation
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INTRODUCTION

Congratulations on your purchase. The D-79B amplifier was conceived in response to demand from and for audio perfectionists. While it is not necessarily the "ultimate" amplifier, it will provide its intrinsic performance with most good speaker systems, and will provide a new standard of what we at Audio Research Corporation call High Definition® within its power capability throughout most of the audio range when used with suitable speaker systems.

Some of its features include near military quality components and construction with unsurpassed accessability for maintenance. Front panel controls and meters provide operating convenience. Three built-in fans provide forced air cooling of the output stage for extended tube and component life. A high energy, well regulated power supply and balanced cross-coupled vacuum tube circuitry are employed for High Definition® music reproduction.

WARRANTY STATEMENT

A Limited 90-Day Warranty (from date of purchase by the original purchaser - must be within 2 years of 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 5 of this manual.

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 photostatic copy 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 purchase. Be sure to read our warranty statement for complete information about this. Note that this extended warranty does NOT include vacuum tubes.

It is also important to register your unit so that Audio Research Corporation can contact you, if the need arises, for any possible modification news, etc.

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 D-79B 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.

The only known way to prevent this hum, especially noticeable in bi- or multi-amplified systems, or in rack-mount installation with common mounting of multiple components, is to "float" this ground (as well as probably any and all other components). If there is any question as to the safety of such a procedure, be certain to seek competent help with the installation.

And, of course:

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 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 never 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 D-79B AMPLIFIER

1 long conventional screw driver (to facilitate locking and unlocking control tube clamps)
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 D-79B 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.

D-79B CONNECTION INSTRUCTIONS

The front panel has:

- 3 Meters (2 power and bias; 1 AC line voltage)
- 3 Switches (2 power and bias; 1 AC power on-off)
- 4 Fuses (2 line; 1 plate; 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 (ie: Sound Connections "Silver," "Live Wire," FMI Gold, FMI Brown, Monster, etc). Take care to observe "polarity" (ie: red banana post to speaker +; black banana post to speaker -).

3. Connect the black wires to "0" on the terminal barrier blocks. Connect the red wires to 4, 8 or 16 ohms on the terminal barrier blocks, as required by your speaker system. The D-79B is a non-inverting amplifier when connected in this way. (Note that the D-79 was an inverting amplifier.)

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.

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 (ie: "Peterson," Sound Connections "Silver," etc.).

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, Pages 1-2 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.

D-79B OPERATING INSTRUCTIONS

1. As the amplifier is "warning 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 approximately 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 55 ma. This is the "nominal" 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.

The amplifier will also operate satisfactorily even if unmatched tubes are used; however, static distortion will increase somewhat.

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!

D79B ADJUSTMENT PROCEDURE AND DISCUSSION

The D79B 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 parameters which may be adjusted (in the following sequence) in the D79B. The DC and AC balance adjustments are internal, requiring removal 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 D79B 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 55mA cathode current per tube with a stable power line of 120 Volts. Under these conditions the tubes are dissipating approximately 33 Watts of their 48 Watt rating (42 Watt plate, 6 Watt screen). 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 D79B 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.

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 D79B. Each reading should be within ±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. It may be trimmed for lowest measured distortion after completing the DC and AC balance adjustments. 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

Because of the nature of the push-pull, direct-coupled input circuit the bias of the driver stage following is determined by the DC balance of the input stage. Best sonic operation occurs when these DC input plate voltages are the same within 0.1Volt DC or better. The actual voltage is not critical at about 108 to 112VDC. It is the balance that is important within each channel.

The balance adjustments are located on the rear vertical circuit board as follows, viewed from the rear of the unit:

V6 6FQ7	R18	R17	V2 E83CC	V1 E83CC	R18	R17	V5 6FQ7
(AC) RV8						(AC) RV7	
(DC) RV4						(DC) RV3	
(DC) RV6						(DC) RV5	
Channel 2 (right)						Channel 1 (left)	

Channel 1 DC Adjustment RV3 (upper) affects the voltage on R18, and
RV5 (lower) affects the voltage on R17.

Channel 2 DC Adjustment RV4 (upper) affects the voltage on R18, and
RV6 (lower) affects the voltage on R17

2A. DC BALANCE ADJUSTMENT PROCEDURE

A battery-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.

Using the plastic alignment tool supplied with the unit:
Adjust RV3 for about 110VDC to ground on top of R18 (Channel 1).
Adjust RV5 for about 110VDC to ground on top of R17 (Channel 1).

There is some interaction between these adjustments because of the nature of the circuit. Make final trim adjustment for as close as possible to 0 VDC difference between the voltages at the top of R18 and R17, with the DVM connected between these points.

Repeat the above for Channel 2 using RV4 and RV6.

It is not required that the left channel voltages be exactly equal to the right channel voltages. It is important that each channel's two voltages match and that they are nominally 108-112VDC. If balance cannot be achieved, replace V1 or V2 and allow at least one hour for restabilization.

For optimum performance it may be necessary to trim this adjustment after several hundred hours of operation.

3. AC BALANCE

Normally the AC balance does not require readjustment unless the output or driver tubes are changed. This adjustment should not be attempted unless the previous adjustments are checked first.

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 minimum 1kHz total harmonic distortion and noise, typically less than .02%.

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 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 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.

D-79B 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:
18.5dB

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