Price: $5.00

MODEL D-40 POWER AMPLIFIER

OWNER'S MANUAL

6-1-81

audio research corporation
6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MINNESOTA 55430

TABLE OF CONTENTS

SECTION	PAGE
INTRODUCTION	1
WARRANTY STATEMENT	1
WARRANTY REGISTRATION CAUTION	1
USE CAUTIONS	1-2
PACKAGING	2
ACCESSORY LIST	2
PREPARATION FOR USE	2
INSTALLATION	2-3
CONNECTION INSTRUCTIONS	3
ADJUSTMENT PROCEDURE AND DISCUSSION	3-5
WARRANTY TERMS	6
SPECIFICATIONS	7
ADDENDUM: SCHEMATIC & PARTS LIST	

INTRODUCTION

Congratulations on your purchase. The D-40 amplifier was conceived in response to the need for a totally "musical" amplifier at an affordable price for the 80's. This has been achieved, together with state-of-the-art electromechanical execution.

Our patented cross-coupled circuitry has been combined with other innovations and a high energy, well regulated power supply, to provide a significantly wider musical bandwidth together with ARC's traditional High Definition® music reproduction.

The two-sided, plated through-hole circuit board mounts all of the components (except chassis parts). This makes all components readily accessible for replacement, if ever necessary, without mechanical disassembly (except for top and bottom cover removal)!

Push-pull output tubes are used at approximately 70% of their dissipation ratings, thus insuring long service life.

With proper installation and reasonable maintenance, this amplifier should provide musical satisfaction indefinitely.

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 6 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 your 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-40 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 the ground of any and all other components). (ARC manufactures all its products so that there is no direct chassis connection to the power line except for the line cord's grounding wire. This is to say that all of our units have a power transformer which isolates the power line from all active circuitry. The only current that can flow between the chassis and some other line potential is the leakage of the transformer. Under any normal use applications this does not present any hazardous shock potential.) However, 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.

ACCESSORIES INCLUDED WITH YOUR D-40 AMPLIFIER

Spare Fuses: 2 - 3.2A MDL Slo-Blo AC line fuses (2A MDX Slo-Blo for 220V)

PREPARATION FOR USE

Your D-40 is shipped with all the vacuum tubes installed. A visual inspection (to determine that shipping has not caused any to break or become unseated) is recommended prior to placing the unit in service.

INSTALLATION

To insure normal component life and safe operation, this unit must be operated only in a horizontal position.

The 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 because airflow will be restricted and will be inadequate for proper cooling.

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. Audio Research manufactures a "Rack Mount Ventilator" (RMV-3). The use of these in rack mount installations will assure proper ventilation.

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

D-40 CONNECTION INSTRUCTIONS

The front panel has only an on-off (LED) indicator.

The rear panel has:

2 Input Connectors
2 Output Connection Terminal Barrier Blocks
1 Line Power Cord
1 Line Fuse

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

1. 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: 4,8 or 16 ohms to speaker +; "0" ohms to speaker -). Note that the D-40 is a "non-inverting" amplifier when connected in this manner.

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.

2. Connect the amplifier to the preamplifier or electronic crossover, using only the highest grade audio interconnect cables (ie: "Peterson," Sound Connections "Silver," etc.).

3. Connect the power line cord to the AC power, observing Paragraph 2 under USE CAUTIONS on Pages 1-2 of this manual.

CAUTION: Make certain the amplifier is installed according to the instructions under INSTALLATION on Pages 2-3 of this manual.

D-40 ADJUSTMENT PROCEDURE AND DISCUSSION

The D-40 utilizes very high quality commercial grade components and this, together with conservative operation of all components and tubes, should provide long adjustment-free 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 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 such adjustment to a qualified individual.

There are three parameters which may be adjusted (in the following sequency) in the D-40 after removing the top cover:

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

1. OUTPUT TUBE IDLE CURRENT ("BIAS")

The output stages of the D-40 are partially cathode coupled "push-pull Class AB_1," which operates the tubes in "pentode" efficiency with the low distortion of "triodes" and at the same time providing better coupling than either conventional circuit.

As shipped from the factory, the output tubes are adjusted for a nominal 60mA. per tube with a stable AC line voltage of 120 Volts. Under these conditions the tubes are each dissipating approximately 25 watts of their 35 watt rating (30 watt plate, 5 watt screen). This point of operation provides "enriched" class AB_1, and will satisfy most critical listeners.

1A. "BIAS" ADJUSTMENT PROCEDURE

A digital voltmeter capable of accurate measurement of .05 to .1 Volt DC is required to accomplish this adjustment.

There is a 1 ohm 5% wirewound resistor in the cathode circuit of each output tube, and test connections (test points referred to schematically and on the PWB as TPs) are provided on either end of these resistors so that a voltage measurement can be conveniently made across each resistor. These test points are accessible from the top side of the PWB.

Because the resistor is 1 ohm, you can conveniently "direct" read the total cathode current in each tube. A .05 Volt reading equals 50 mA. A .1 Volt reading equals 100 mA. A .075 Volt reading equals 75 mA., etc.

TUBE	TP COMMON	TP	ADJUST
V7	2	1	RV7
V8	6	5	RV8
V9	4	3	RV9
V10	8	7	RV10

It is important that all 4 output tubes be reasonably matched (with 5%) for highest performance operation. Observe the following:

1. These adjustments should be accomplished under no signal conditions and with line voltage at its "normal" for your location.

2. The D-40 should be thoroughly "warmed up" (thermal equalibrium) prior to adjustment (at least 1 hour).

3. Move each adjustment slowly, allowing time for circuit equalibrium as you make your readings.

2. CROSS COUPLER DC BALANCE

Because of the nature of the "cross coupled" circuit, the bias of the driver stage following is determined by the DC balance of the cross coupler. Best sonic operation occurs when these DC voltages (found at TPs 9, 10, 11, 12) are the same within 0.1 Volt DC. The actual voltage is not critical at approximately 110 Volts. It is the balance that is important.

2A. CROSS COUPLER DC BALANCE ADJUSTMENT

A digital voltmeter having a 10 megohm input impedance and 3 1/2 digit resolution or better is required for this adjustment.

RV1 and RV3 adjust the left channel (TP9 & TP11)
RV2 and RV4 adjust the right channel (TP10 & TP12)

Adjust RV1 and RV3 to achieve identical voltages at TP9 and TP11. There is some interaction because of the nature of the circuit, so repeat the adjustment as necessary to achieve identical voltages.

Repeat the above using RV2 and RV4 to achieve identical voltages at TP10 and TP12.

It is <u>not</u> required that the left channel voltages be equal to the right channel voltages. It <u>is</u> important that each channel's two TP voltages match and that they be within the range of 105 to 115 Volts DC.

This adjustment procedure is essential after changing V3 or V4 tubes. The DC balance normally does not change with varying line voltage conditions. However, it may be desirable to check the DC balance after hundreds of hours of operation to insure optimum performance.

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.

Adjust RV5 and RV6 for minimum 2nd harmonic distortion at approximately 30 watts 1kHz output into a 16 ohm load, typically about .06%.

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.

D40 SPECIFICATIONS (AC line set @ 120V 60Hz for these specifications)

Power Output:
35 watts per channel minimum continuous (both channels operating) at 16 ohms from 25Hz to 20kHz with less than 1% total harmonic distortion

Typically approximately .06% at 30 watts @1kHz

Approximate actual power available per channel at "clipping" (Both CH. OP, 1kHz): 42 Watts

Power Bandwidth:
(-3dB Points) 12Hz to 54kHz

Intermodulation Distortion:
Less than .5% at 1dB below rated output (64V p to p, 16 ohms) (SMPTE method)

Input Sensitivity:
.75V RMS for rated output

Input Impedance:
75K ohms, nominal at maximum gain

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

Negative Feedback:
19.5dB

Slew Rate:
8 volts/microsecond

Rise Time:
5 microseconds

Noise:
1Hz-30kHz, unweighted, more than 90dB below rated output
Line components, more than 85dB below rated output

Power Supply Energy Storage:
100 joules

Power Requirements:
105-125VAC 60Hz (210-250VAC 50Hz) 300 watts maximum
150 watts at "idle"
230 watts at rated power

Dimensions:
19" (48cm) W (standard rack panel) x 7" (18 cm) H x 16.5" (42 cm) D (front panel back). Handles extend 1 5/8" (4.1 cm) forward of front panel

Weight:
44 lbs. (20 kg) Net, 56 lbs. (25.5 kg) Shipping