

Price: \$5.00

MODEL SP-12 PREAMPLIFIER

OWNER'S MANUAL

**audio research corporation**

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## INTRODUCTION

Please take the time to read this manual prior to attempting installation or use of this unit. Because it is a vacuum tube preamplifier with unconventional circuitry there are several points you need to understand prior to placing it in operation.

## DISCUSSION

The SP-12 preamplifier has become possible as a result of Audio Research's development work for the SP-10, our state-of-the-art advancing, top of the line preamplifier. The patent-pending cascode front-end circuitry has been adapted to allow much of the performance of the SP-10 to be translated into the SP-12, at less than one-third of the cost! Yet, at the same time, no compromise has been made in component quality and electro-mechanical execution of the SP-12. It utilizes the exact same electronic parts quality as found in other ARC products. An epoxy-fiberglass, 2-sided, plated-through-hole printed wiring board mounts all but rear chassis components and assures precise uniformity from unit to unit. Removable top and bottom covers provide simple access to all components and circuitry for vacuum tube changes and other servicing.

State-of-the-art audio materials, including polypropylene and polystyrene dielectric capacitors, are used exclusively in the signal paths as well as in power supply "reference" locations. A special proprietary interconnect wire utilizing a high purity copper "Litz" configuration with an outer polypropylene jacket is used for critical phono input and main output leads. Throughout the unit nothing that would materially affect performance has been spared to provide a level of state-of-the-art performance never before achieved except at several times the cost of the SP-12.

When the SP-12 is used with commensurate quality equipment, it will provide very wide dynamic bandwidth with great dynamic range, good musicality and unsurpassed stage "width" and "depth."

If low output moving coil cartridges are to be used, it is recommended that an Audio Research MCP-2 or MCP-3 (available January, 1983) or a good transformer be utilized. Most "competitive" pre-preamplifiers do not provide either adequate sound quality or the dynamic stability to be used with the SP-12.

If you have experienced feedback, hum, noise or instability problems with the turntable/arm/cartridge combination you are presently using, be sure to resolve these problems prior to placing your SP-12 in service. Your authorized ARC dealer can provide help with these kinds of problems.

When these use conditions are met, we believe you will enjoy a very satisfying experience in the reproduction of recorded music.

## 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 7 of this manual. Please read the following WARRANTY REGISTRATION CAUTION as well as the WARRANTY TERMS on Page 7 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 assure this registration. It is yours, and yours alone. The warranty papers are attached to the carton. Do not delegate this responsibility 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 the date of purchase.

Take time now to read Paragraph 1 of the WARRANTY TERMS on Page 7 of this manual so 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 preamplifier before placing it in service.
2. The power cord on your SP-12 is equipped with a standard three-prong grounding plug which, if used normally, will provide a safe earth ground connection of the chassis and all equipment plugged into its AC receptacles. While this procedure provides the maximum possible safety in use it will, in some cases, cause your audio system to have a small residual hum.

It is usually best to keep the SP-12 "earth grounded" and "float" the grounds of power amplifier and other equipment to eliminate ground loop hum. The audio interconnect cables then keep the power amplifiers at safe earth ground potential. For further information on grounding, see RECEPTACLES and GROUND TERMINAL on Page 5 of this manual. 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 the fuses only with the same type and rating of fuses as specified at the fuse holder.



## PACKAGING

Save all packaging. Your Audio Research® preamplifier 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.

## USE INSTRUCTIONS

The front panel has two rotary knobs and nine push buttons. From left to right they are:

GAIN: This controls "volume" or "loudness" and is a special metal-film detented control with approximately 31 steps and highly accurate tracking.

It is strongly urged that the user develop the habit of always turning the gain control to its fully counter-clockwise position (minimum) between any listening uses (between records, whenever switching inputs, prior to turning the unit "on" or "off," as examples). This will help assure no inadvertent misuse of the unit with possible resulting damage to amplifier and/or speakers.

PUSH BUTTONS: (In sequence from front left)

POWER OFF: A 15 ampere snap-action switch which turns the unit "on and "off." Also "overrides" the receptacle switch. The push button appears black in the "off" (out) position and appears green in the "on" (in) position.

RECEP OFF: A second 15 ampere snap-action switch which controls the "switched" AC power receptacle on the rear of the chassis. Will function only if "power off" switch is in the "on" (in-green) position. Also appears black in the "off" (out) position and green in the "on" (in) position.

Good operating habit would be to warm up the SP-12 for a few minutes prior to turning the power amplifier on, using the receptacle switch. Again, turn the power amplifier off using the receptacle switch prior to turning the SP-12 off using the power off switch. Time lapse between these two operations will vary from a few seconds to several minutes, depending on the energy storage capability of the power amplifier in use. A good rule of thumb would be 2 minutes.

MONO STEREO: Combines the channels for monaural operation in the "in" position. Should be left "out" for normal stereo operation.

LOW GAIN: Reduces overall gain by 6dB in the "in" position (from 60dB to 54dB maximum overall). Provides for better "bandspread" usage of gain control with certain high output phono cartridges, high gain amplifiers or high efficiency speaker systems. Does not materially affect sound quality.

OPER MUTE: This push button, the "operate-mute" switch, appears black in the "out" (muted) position and yellow in the "in" (operate) position.

It is important to note that the SP-12 is a high technology, high voltage vacuum tube preamplifier, and as such generates warmup and shutdown "surges" as a natural circuit function.

The mute switch is designed therefore so that the "normal" or "out" (black) position is the muted mode. ALWAYS HAVE THE SWITCH IN "MUTE" FOR TURN-ON AND TURN-OFF. This is necessary to prevent these "surges" from being transmitted through the amplifier to the speaker which would result in some loud noises and in some cases, without proper speaker fusing, also result in speaker damage.

Remember, the "in" position, with the button showing "yellow" for caution, is the operate position. The "operate" position may be used after allowing at least a one minute warmup period to stabilize circuit voltages. Return to "mute" before turning the SP-12 off.

It is always advisable to properly fuse your loudspeaker systems. No matter how careful an operator you may be, equipment failure (power amp, preamp) or power line interruption can (especially when using high energy storage power amplifiers) destroy your speaker unless it is properly fused.

Further important discussion about muting the SP-12 is on Page 6 under MUTING CAUTIONS.

MONITOR SOURCE: Normal operation of the preamplifier occurs in the "out" position. When this button is depressed, the monitor input is activated. This input bypasses the normal input selection push buttons. Primarily designed for use with tape recorders, but may be used with any line level source where bypassing the tape output, unused-input grounding and input selectors is desired. Obviously, may also be used as a 5th input.

The last three buttons (on the right) comprise the "input" selection switching and to a degree, function together as follows:

If all three buttons (PHONO AUX, TAPE AUX and TUNER AUX) are in the "normal" or "out" position, then the "Aux" (auxiliary or spare) input is selected.

If the "phono aux" button is depressed, then the RIAA compensated, magnetic phono input is selected.

If the "tape aux" button only is depressed, then the "tape input" is selected.

If the "tuner aux" button only is depressed, then the "tuner input" is selected.

If more than one of these three pushbuttons is depressed (the buttons are not mechanically "interlocked" but are each "push-activate" and "push-release"), then the furthest left of the depressed buttons will be the function selected. Inputs other than the activated one are grounded internally through isolating resistors, to minimize crosstalk.

As a matter of interest, it is to be noted that these pushbuttons (the contacts of which are gold-plated) are designed for very long electrical and mechanical life. In the event that one should fail, however, other buttons are not mechanically affected. Further, individual replacement is accomplished without circuit board removal of the entire switch assembly.

BALANCE: This control adjusts the level between channels. Such things as non-symmetrical room speaker placement, unbalanced phono pickup cartridges, etc., can be compensated to a degree with this control.

The circuitry utilized here is unconventional to provide a high degree of "band-spread" resolution of very fine adjustment for those appreciating small increments of unbalance which affect the recreated sound stage. This design also minimizes



The rear panel has the input, output and ground connectors, as well as the fuse, line cord and AC convenience receptacles:

GROUND TERMINAL: To be used for "grounding" associated input equipment, such as tonearms, turntables and the like. Should not be connected to tape recorders and/or power amplifiers.

INPUT CONNECTORS: These are clearly marked and are all 100K ohms, except phono, 50K ohms

OUTPUT CONNECTORS: Main outputs should be connected to your power amplifier inputs. Tape outputs should be connected to your tape recorder "AUX" or "LINE" inputs.

FUSE: Always use the same size and type as indicated on the rear of the chassis for safety. For best results use Buss MDL or Slo-Blo fuses.

RECEPTACLES: There is an unswitched receptacle which may be used for a turntable or the like, where switching is not needed or wanted.

There is also a "switched" receptacle controlled by the front panel receptacle switch. (also controlled by the front panel power off switch.) This receptacle should normally be used to provide power to the power amplifier.

In some locations, with low line voltage, connecting auxiliary equipment to these convenience receptacles will cause some degradation of sound quality. If this is experienced, it is recommended that the power amplifier be connected directly to an AC power receptacle separately from the SP-12.

## SERVICING

First of all, a very serious CAUTION: This unit contains around 400 volts of DC, with sufficient voltage and current available to be lethal. So, please do not poke around inside the unit. Refer any needed service to a qualified technician. (Even with the unit turned off a charge remains in the energy storage filter capacitor for some time.)

This unit is handcrafted to the highest of commercial standards and will require only reasonable maintenance and repairs to provide high definition service for many years.

The vacuum tubes furnished with the SP-12 are high quality 6DJ8 or ECC88 (5) vacuum tubes. Approximately 2000 hours or more of high performance service life can be expected.

It is the habit of many music reproduction system owners to leave their preamplifier "on" 24 hours a day. While we do recommend this procedure for most solid-state preamplifiers, we do not recommend this for ARC vacuum tube preamplifiers since thermal stability only takes a few minutes.

Two thousand hours at an average use of 3 hours a day would require tube replacement approximately only every two years, while 24 hour a day usage will provide only about three months of high quality service.



It is also important to remember that just as a chain can be no stronger than its weakest link, so also will the quality of vacuum tubes used in this unit have a direct effect upon the resultant sound quality.

A schematic diagram is appended hereto, fully annotated with operating voltages and component part values. Your service technician will require this information when working on your unit.

#### MUTING CAUTION

In addition to the information contained in the USE section under the MUTE OPERATE heading, it should be emphasized again how important proper fusing of your speaker system is. This is the only absolute protection that can be afforded your loud-speaker in the event of power line interruption or component failure.

For those who live in geographical areas in which power line interruption is common, an automatic mute kit (AMK-1) is available as an optional extra for field installation in your SP-12. (Speaker fusing is, of course, still recommended.)

#### INSTALLATION CAUTIONS

The SP-12 will function in any position. However, for long term, reliable service the following precautions should be observed.

1. Upright and horizontal mounting is required for proper ventilation if extended operation (over an hour) is contemplated.
2. Do not place and operate the SP-12 on a soft or irregular surface such as a rug. This will prevent the special non-marring elastometer "feet" from providing the spacing required to allow proper air flow through the unit.
3. Do not operate the unit without top and bottom covers installed. These are required both for safety as well as shielding from interference (except during servicing operations, obviously).
4. Do not "stack" the SP-12 directly above or below another unit such as a power amplifier. Excessive heat and hum will result.
5. If rack mounting is desired, a rack mount front panel kit is available as an optional extra from ARC (RMK-1). Also use the optional ARC Rack Mount Ventilators (RMV-3). Place one above and one below the unit.

## 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 of 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.



## SP-12 PRELIMINARY SPECIFICATIONS

### Frequency Response:

High level section:  $\pm .5\text{dB}$ , 4Hz to 30kHz  
-3dB points below 1Hz and above 70kHz

Magnetic phono:  $\pm .25\text{dB}$  of RIAA, 30Hz to 20kHz

### Harmonic Distortion:

Less than .02% at 2V RMS output, 20Hz to 20kHz

### Intermodulation Distortion:

Less than .07% at 2V RMS output

### Gain:

Magnetic phono input to tape output: 34dB      High level inputs to tape output: 0dB

Magnetic phono input to main output: 60dB      High level inputs to main output: 26dB

### Input Impedance:

50K ohms phono; 100K ohms high level

### Output Impedance:

Less than 4000 ohms main output and tape output from phono. Recommended minimum load for maximum audio quality 60K ohms and 300pF maximum capacitance.

### Maximum Inputs:

Magnetic phono, 600mV at 1kHz. (3V RMS at 10kHz) High level inputs essentially overload-proof.

### Rated Outputs:

2V RMS all outputs into 60K ohm loads (Main output capability is 50V RMS output at 1/2% THD at 1kHz into a 500K ohm load.)

### Power Supplies:

Electronically-regulated solid-state supplies. Frequency-compensated high-voltage supplies have a total equivalent low-frequency stability of 1 farad of capacitance. Line regulation .05%.

### Noise:

#### High Level:

- (1) 250uV RMS maximum residual unweighted wide band noise at main output with gain control minimum (86dB below 5V RMS output)
- (2) More than 90dB below 1V RMS input (less than 20uV equivalent input noise)

#### Magnetic Phono:

5uV maximum equivalent input noise, wideband RMS (-66dB reference 10mV input)  
(Less than 1uV above 200Hz or -80dB reference 10mV input)

### Tube Complement:

5 - ECC88/6DJ8 dual triodes

### Power Requirements:

100-135VAC 60Hz (200-260VAC 50Hz) 30 Watts Max.

### Dimensions:

15.6" (40 cm) W x 4.5" (11.4 cm) H panel x 8.9" (22.6 cm) D. Knobs extend .7" (1.8 cm) forward of front panel. Rear chassis fittings extend .9" (2.3 cm).

### Weight:

9 lbs. (4.1 kg) Net; 12 lbs. (5.5 kg) Shipping



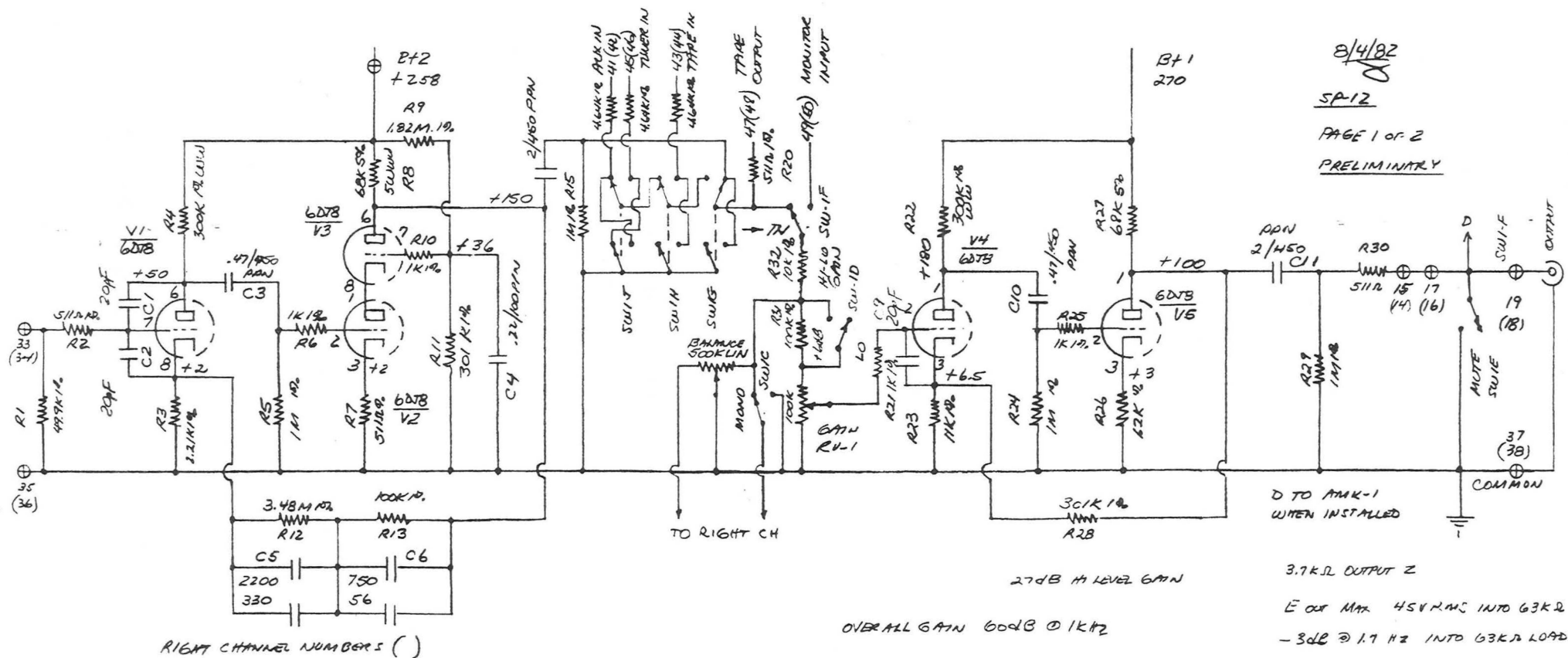
SP-12 PREAMPLIFIER

SCHEMATIC

8-10-82

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R1 - R33  
C1 - C11  
V1 - V5  
SW1C - SW1F

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POWER SUPPLY  
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PRELIMINARY

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ZD1 - ZD2  
U1 - U2

D1 - D16  
Q1 - Q3  
RES-1  
F1  
OTL1 - OTL2

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