Owner's Manual

Model LS5

STEREO LINE AMPLIFIER

audio research
HIGH DEFINITION®

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Model LS5

Preface

Please take the time to carefully read this instruction manual prior to installation or use of your LS5 Line stage Amplifier. Because it is a highly advanced electronic instrument, there are several facts and procedures you should know before you place it in operation.

Just as you would not purchase and attempt to operate an expensive camera, computer system or high-performance automobile without first learning something about performance parameters and correct operating procedures, so too your line stage amplifier requires some familiarization before you make it part of your music reproduction system. Your reward, in terms of maximum performance and a long services life, will be well worth the effort.

Warnings

1. To prevent fire, or shock hazard, do not expose your LS5 to rain or moisture.
2. This unit contains voltages which can cause serious injury or death. Do not operate with cover removed. Refer servicing to your authorized Audio Research dealer or other qualified personnel.
3. The power cord on your LS5 is equipped with a heavy gauge, 3-conductor cable and a standard three-prong grounding plug. For absolute protection, ***do not defeat the ground power plug.*** This provides powerline grounding of the LS5 chassis to provide absolute protection from electrical shock.
4. For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

Packaging

Save all packaging in a dry place away from fire hazard. Your LS5 line stage amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return your unit to the factory for service, but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your LS5 from unnecessary damage or delay.

Note that your LS5 has been shipped with the vacuum tubes installed in their proper high-retention sockets. You may do likewise if the complete, original packaging is used for shipment.

Model LS5

Description of Controls

GAIN CONTROL: A high-quality, metal-film segmented control with 41 steps and accurate tracking. Use it to control volume. Rotation to the left attenuates gain.

INPUT SELECTOR: Detents indicate selection of various source material options: "Tuner" for AM/FM radio tuners; "Video" for audio input from HiFi video tapes, disks or broadcasts; "Phono" for phono preamplifiers; "CD" for compact disc players or digital-to-analog processors; "Aux" for any additional high level source–tape, tuner, CD, video, etc.

The signal source chosen by the input selector is fed to the Tape outputs.

NOTE: See "Monitor/source" for primary tape recorder selection.

POWER SWITCH: Supplies power from AC wall outlet to LS5 when in "Power" position. Although not strictly necessary, it is nonetheless good practice to put the LS5 in "Mute" before turning on power for maximum protection of your power amplifier(s) and speakers.

+30dB/+12dB: Varies overall output level to optimize the setting of the gain control. Example: with a low output m/c cartridge and phono pre-amplifier, the control may need to be set to "+30dB"; with other, higher output sources (D/A convertors, video disc, etc.) the "+12dB" setting may be preferable.

MONITOR/SOURCE: In "Monitor" position this control selects the audio output of the primary tape recorder. "Source" accesses the input selector's five high-level sources.

MUTE/OPERATE SWITCH: In "Mute" position, shorts the main outputs of the line stage amplifier to allow listening interruptions for telephone answering or other reasons. This switch should always be activated between listening uses or switching of inputs, in addition to turning the Gain (volume) control counter-clockwise. These two simple precautions will prevent inadvertent misuse of your LS5 and help protect your power amplifier(s) and speakers from unexpected transient signal pulses. In "Operate" position, this switch allows the signal to pass normally to the outputs.

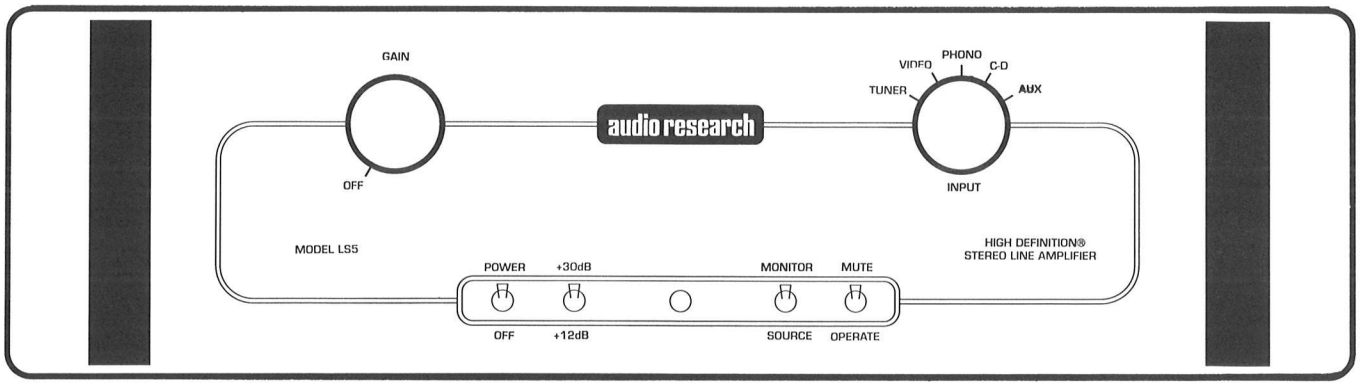
CAUTION: Do not turn up the gain control beyond normal listening positions when the LS5 is in the mute mode. Always turn the gain control down when changing program sources, even when it is muted.

POWER/MUTING CIRCUIT LED: Glows green to indicate unit is on and receiving power from the power supply. Note that for approximately 45 seconds after start-up or in "Mute" mode, this LED will glow more dimly, indicating proper operation of the muting circuit. In the "Operate" mode (after warm-up) the LED brightens and your LS5 is ready for normal operation.

Connections

INPUT CONNECTORS: All are clearly marked to indicate use. The inputs are 200k ohms impedance.

MAIN OUTPUT CONNECTORS: There are two sets of output connectors; They have (balanced) XLR type connectors. These should be connected to your crossover or amplifier(s) as necessary.



NOTE: The XLR connector pin leads are as follows: 1-shield; 2-positive; 3-negative. If used with a power amplifier which utilizes different pin leads for positive, negative and/or shield, the signal being fed to the loudspeakers will be incorrect. Please consult your Audio Research dealer.

At the performance level of the LS5, high-quality audio signal interconnect cables are critical to preserving maximum fidelity. Audio Research interconnect cables are highly recommended for connection to your power amplifier(s) and to other ancillary equipment. See your authorized Audio Research dealer for recommended lengths.

The main outputs of the LS5 may be adapted to single-ended operation with the use of plug-in adaptors available from Audio Research. See your authorized dealer for more information.

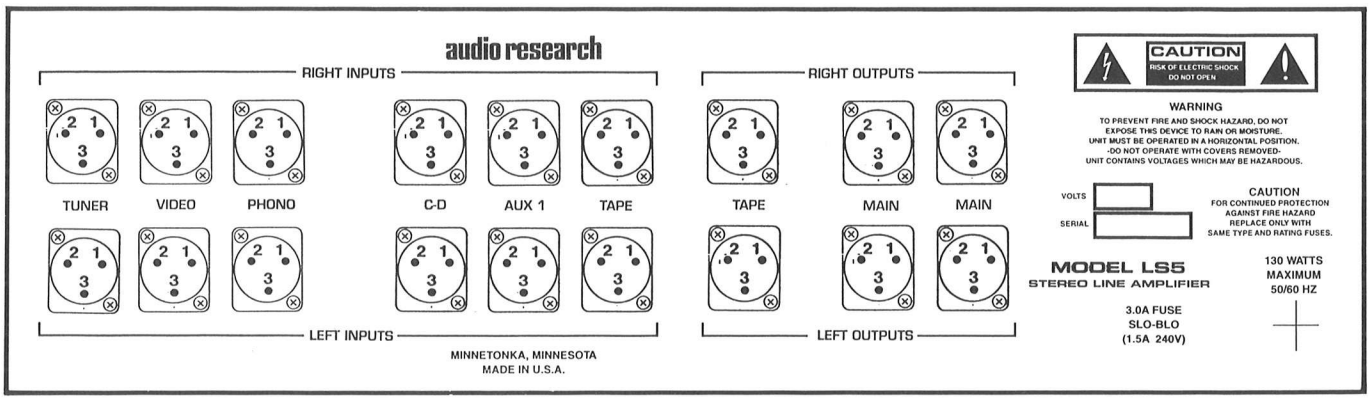
TAPE OUTPUT CONNECTORS: The LS5's Tape Outputs should be connected to your tape deck's "REC" or "LINE" inputs. These outputs supply whatever is selected by the Input Selector Control to the tape deck for recording. Level is non-variable and approximately the same as the selected input source.

Operating the LS5 by connecting a power amplifier to the "Tape" outputs instead of the "Main" outputs is not recommended. Sound quality will be degraded somewhat, instead of being enhanced, when routed in this manner.

Installation Instructions

While the LS5 does not dissipate an unusual amount of heat, it is important that it be provided with reasonable airflow to assure long, trouble-free operation. In addition, the following installation guidelines will help insure maximum sonic performance as well as reliable service.

1. Upright and horizontal mounting is suggested if extended operation (longer than one hour) is contemplated.
2. Do not "stack" the LS5 on top of a power amplifier: not only could this cause overheating, but "hum" may be introduced into the LS5 from the proximity of the amplifier's power transformer.
3. Do not place or operate your LS5 on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate your LS5 without the top and bottom covers installed. These are required both for safety as well as shielding from interference (except in service operations).
5. If rack mounting is employed, use Audio Research Rack Mount Ventilators (RMV-3) below and above your LS5.
6. If side-by-side mounting with other equipment is employed, place the LS5 to the left of the other chassis, so as to provide maximum spacing between the transformer of the LS5 and the other component.
7. In a cabinet or rack-mount installation which has an enclosed back, an exhaust fan is desirable so as not to operate the LS5 in overheated ambient air. Operation of vacuum tube equipment for long periods of time in hot ambient air will shorten tube life and increase chance of failure of other component parts.



Operating Procedure

Start-Up:

1. Make sure Power switch is set to "Off" position; Mute switch should be in "Mute" position; and "Gain" Control should be at minimum (full counter-clockwise rotation).
2. Secure all rear-panel connections between LS5, power amplifier(s) and input sources. Note: Given the advanced performance capabilities of the LS5, it is extremely important that high-quality interconnects be used for connection to ancillary electronics. Audio Research brand interconnects are strongly recommended. Your authorized Audio Research dealer can assist you in determining optimal lengths for your system.
3. Plug 3-prong powerline cord from rear of LS5 into grounded AC wall receptacle.
4. Turn Power switch to "On." Green LED will glow ***dimly*** for approximately 45 seconds while power supply stabilizes, indicating operation of automatic muting circuit. After this warm-up muting period, the LED will brighten when "Operate" is selected, indicating that your LS5 is ready for operation.

Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your LS5 may be safely left "on" continuously for maximum performance at all times, but at the expense of higher maintenance costs (more frequent tube replacement).

5. Rotate input selector to source desired; set switch options to positions desired.
6. Activate input source, then deactivate Mute switch and adjust Gain Control as necessary.

NOTE: Tube based circuitry, while highly linear, can produce a small amount of white noise or "Tube rush". In most situations, this will be inaudible to the listener. High-input-sensitivity amplifiers and very high efficiency speakers will make this effect more obvious.

Muting Provisions:

The LS5 has several provisions to help protect against misuse of the exceptional dynamic range and wide bandwidth that it offers. It is not subject to damage itself, but some power amplifiers and speakers are more limited in their ability to withstand signal extremes. These provisions, both manual and automatic, are designed not to interfere with a flawless listening experience of unprecedented realism, while giving reasonable protection against warm-up surges and power line interruptions. However, for absolute protection of associated equipment some operator understanding, and responsibility, is required.

Initial "settling" time of all circuit parameters within the LS5 requires approximately 5 to 10 minutes. The automatic muting circuitry timer is adjusted for about 45 seconds. (This is because recurrent interruption "settling" time is much less. You would not want to wait for 5 to 10 minutes each time such an interruption occurred.)

The Mute/Operate Switch allows manual disabling of the LS5 outputs during the switching of equipment. Use of this switch will minimize stress on your amplifier even if it is "off." It is also highly recommended that manual muting be employed during the initial 45 second warm-up period as well as during turn-off for maximum protection.

While it is true that the automatic muting will provide reasonably adequate protection against speaker burnout during these periods, it has limitations. At the 45 second point the automatic timer "releases" the output. Although this is normally adequate protection, utilization of the manual mute provision will completely avoid stress to your speakers.

Some solid-state power amplifiers have a DC offset present at their input connections. (This, of course, should not be.) Operation of the manual muting switch with such an amplifier connected will result in a "click" or "pop" in your loudspeaker (commensurate in level with the amount of the offset) each time the switch is activated. Repair or replacement of such amplifiers is suggested.

The automatic muting operates a follows:

1. The manual mute switch always disables all "main" outputs and overrides any automatic provisions, even when the LS5 is turned off. (The "Operate" position of the manual mute switch is functional only when the unit is not in the automatic mute mode.)

2. The 45 second warm-up timer will restart automatically and the LED will dim if the power is temporarily interrupted for 0.1 second or more.

Note: Power supply regulation of the LS5 is effective down to 100VAC without serious sonic degredation.

3. The automatic muting of the LS5 is designed to be effective only against power line interruptions and power line failures. It will not mute against subsonic signal transmissions from your input source. ***Proper Fusing of speakers is essential to protect against excessive audio level or power amplifier faults.***

Shut-Down:

1. Set "Mute" switch to "Mute" position.
2. Rotate "Gain" control counter-clockwise to minimum setting.
3. Turn off power amplifier(s).
4. Turn off all input sources.
5. Set LS5 Power Switch to "Off" position.

Servicing

Because of its careful design and exacting standards of manufacture, your LS5 should normally require only minimal routine service to maintain its high level of performance.

CAUTION: Your LS5 contains sufficient levels of voltage and current to be lethal. Do not tamper with a component or part inside the unit. Refer any needed service to your authorized Audio Research dealer or other qualified technician.

The vacuum tubes inside your LS5 are quality 6DJ8 and 12BH7 types, and with normal use should not need to be changed for approximately 5,000 hours of use. Replacement tubes should be of equivalent quality and are available from Audio Research.

Should service be necessary, please contact your Audio Research dealer, or Audio Research Customer Service (612) 939-0600.

Cleaning

To maintain the visual appearance of your LS5 line stage 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.

3-Year Limited Warranty

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).

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.

Specifications

Model LS5

FREQUENCY RESPONSE: ±.5dB, 1Hz to 100kHz -3dB points below 0.1Hz and above 250kHz.

DISTORTION: Less than .01% at 2V RMS output. (Typically less than .005% in midband)

GAIN: (Balanced Differential):
Main Output: 30dB/12dB switchable.
Tape output: 0dB.

INPUT IMPEDANCE: 200K ohms balanced. Inputs (6): tuner, video, phono, CD, aux, tape (XLR connectors).

OUTPUT IMPEDANCE: 400 ohms balanced main (2), 20K ohms minimum load and 2000pF maximum capacitance. Outputs (3): 2 main, 1 tape (XLR connectors).

MAXIMUM INPUT: 20V maximum.

RATED OUTPUTS: 2V RMS 1Hz to 100kHz into 100K ohm balanced load (maximum balanced output capability is 50V RMS at less than 0.5% THD at 1kHz)

CONTROLS: Gain, Quad detented, input selector. Toggle switches: power/off, +30/+12dB gain, monitor/source, mute/operate.

POWER SUPPLIES: Electronically-regulated low and high voltage supplies. Automatic 45 sec. warm-up/brown-out mute. Toroid power transformer. Line regulation better than .01%.

NOISE: 40uV RMS residual IHF weighted balanced noise output with gain control minimum, 12dB gain selected, (94dB below 2V RMS output).

TUBE COMPLEMENT: 4-6922/E88cc dual triode, 6-12BH7A dual triode. (Vacuum tube audio circuit, solid-state power supply)

POWER REQUIREMENTS: 100-135VAC 60Hz (200-270VAC 50/60Hz) 130 watts maximum

DIMENSIONS: 19" (48 cm) W x 5¼" (13.4 cm) H (standard rack panel) x 11¾" (29.8 cm) D Handles extend 1½" (3.8 cm) forward of the front panel. Rear chassis fittings extend ⅞" (2.3 cm).

WEIGHT: 19 lbs. (8.6 kg) Net; 29 lbs. (13.2 kg) Shipping.

Specifications subject to change without notice.

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Model LS5 Design Team

Conceptual / Circuit Design: William Z. Johnson
Project Engineer/ Development: Thad Early
Prototype Development: Ward Fiebiger
Mechanical / Power Supply Engineer: Richard Larson
Sonic Evaluation: William Z Johnson, John Hjelm, Terry Dorn, Michael Harvey, Leonard Gustafson Thad Early