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# Owner's Manual

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## Model LS7

LINE STAGE AMPLIFIER

**audio research**  
HIGH DEFINITION®

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# Model LS7

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## Preface

Please take the time to carefully read this Instruction Manual prior to installation or use of your LS7 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 service life, will be well worth the effort.

## Warnings

1. To prevent fire, or shock hazard, do not expose your LS7 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 LS7 is equipped with an 18-gauge, 3-conductor cable and a standard three-prong grounding plug. In addition, your LS7 uses an isolating power transformer with a 4 KV-rated insulation. For absolute protection, *do not defeat the ground power plug*. This provides powerline grounding of the LS7 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 LS7 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 LS7 from unnecessary damage or delay.

Note that your LS7 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.

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## 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, rotation to the right increases gain.

**INPUT SELECTOR:** Detents indicate selection of various source material options: "Tape" for cassette DAT, or other tape formats; "Tuner" for FM/AM radio tuners; "CD" for digital disc players or processors; "Video" for audio input from Beta or VHS HiFi videotape decks; "Aux" for any additional high level source - tape, Tuner, CD, video, etc.

**POWER SWITCH:** Supplies power from AC wall outlet to LS7 when in "Power" position. Although not strictly necessary, it is nonetheless good practice to put the LS7 in "Mute" before turning on power for maximum protection of your power amplifier(s) and speakers.

**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 LS7 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.

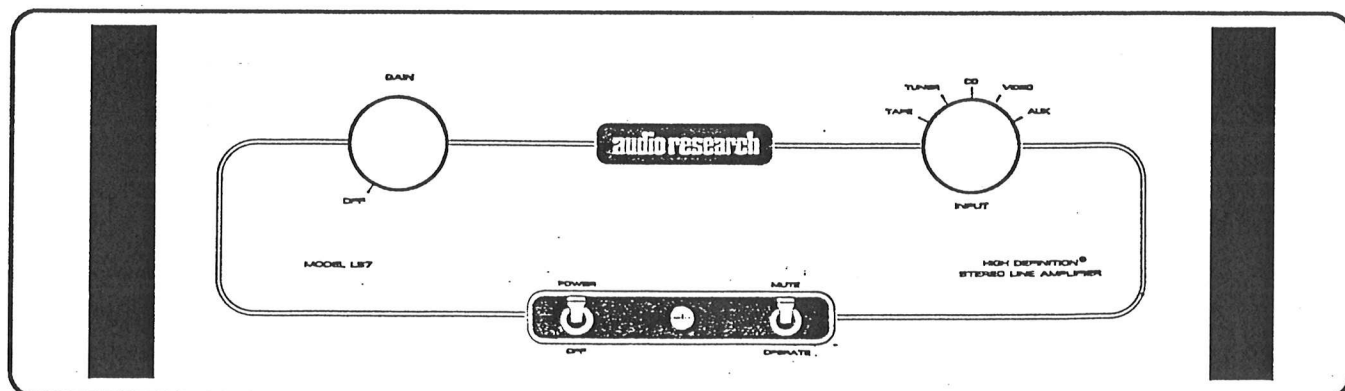
**POWER/MUTING CIRCUIT LED:** Glows green to indicate unit is on and receiving power from the power supply. Note that for approximately 45 seconds after start-up or in "Mute" mode, this LED will glow more dimly, indicating proper operation of the muting circuit. In the "Operate" mode (after warm-up) the LED brightens and your LS7 is ready for normal operation.

## Connections

**INPUT CONNECTORS:** All are clearly marked to indicate use. The inputs are 100K ohms impedance.

**MAIN OUTPUT CONNECTORS:** There is one set of main output connectors, using (unbalanced) RCA connectors; For the purpose of Bi-amplification, or to drive a second, remote amplifier, use a high-quality "Y" connector.

**NOTE:** At the performance level of the LS7, high-quality audio signal interconnect cables are critical to preserving maximum fidelity. Audio Research RFI-shielded or unshielded 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.



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**TAPE OUTPUT CONNECTORS:** The LS7'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.

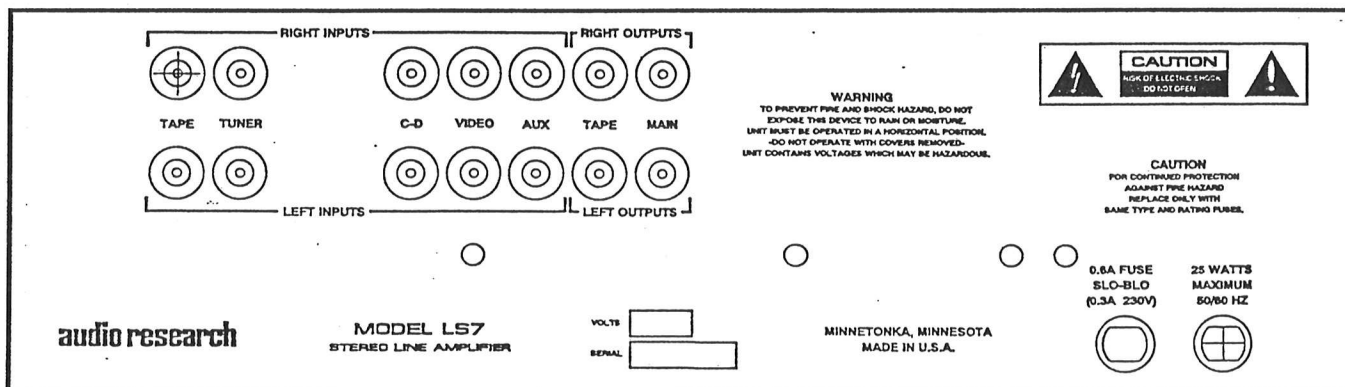
All input/output connectors have heavy gold plating and connect "ground" before "hot." (On disconnect, "hot" is first.)

## Installation Instructions

While the LS7 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 LS7 on top of a power amplifier; not only could this cause overheating, but "hum" may be introduced into the LS7 from the proximity of the amplifier's power transformer.

3. Do not place or operate your LS7 on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate your LS7 without the top and bottom covers installed. These are required both for safety as well as shielding from interference (except in service operations, obviously).
5. If rack mounting is employed, use Audio Research Rack Mount Ventilators (RMV-3) below and above your LS7.
6. If side-by-side mounting with other equipment is employed, place the LS7 to the left of the other chassis, so as to provide maximum spacing between the transformer of the LS7 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 LS7 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.



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## 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 LS7, power amplifier and input sources. Note: Given the advanced performance capabilities of the LS7, it is extremely important that high-quality interconnects be used for connection to ancillary electronics. Audio Research brand interconnects, in either unshielded or RFI-shielded configurations, 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 LS7 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 LS7 is ready for operation.
- Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your LS7 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.
  6. Activate input source, then deactivate Mute switch and adjust Gain Control as necessary.

## Tape Recording Procedure

When using the LS7 as a control center for recording, the program source to be recorded must be connected to one of the five inputs controlled by the "Input Selector." This routes the selected program to the Tape outputs.

It is also possible to dub from one tape deck to another. Simply connect the output from one tape deck to an unused set of inputs controlled by the "Input Selector" (Aux, Video, etc.) on the LS7. This signal will then be routed to the second tape deck and the appropriate input is selected on the Input Selector.

## Muting Provisions

The LS7 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 LS7 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 LS7 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, and since full subsonic stabilization has not yet occurred, some sonic unpleasantness may occur. Although this is normally adequate protection, utilization of the manual mute provision will completely avoid this stress to your speakers, as well as the associated sonic unpleasantness.

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.

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The automatic muting operates as follows:

1. The manual mute switch always disables all "main" outputs and overrides any automatic provisions, even when the LS7 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 LS7 is effective down to 100VAC without serious sonic degradation.

3. The automatic muting of the LS7 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.
4. Turn off all input sources.
5. Set LS7 Power Switch to "Off" position.

## Reducing Gain

If the overall gain of the LS7 is too high with some sources, please consult your Audio Research dealer or call Audio Research Customer Service, (612) 939-0600 (CST).

## Servicing

Because of its careful design and exacting standards of manufacture, your LS7 should normally require only minimal routine service to maintain its high level of performance.

**CAUTION:** Your LS7 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 LS7 are 6922 dual triodes, and with normal use should not need to be changed for approximately 5,000 hours of use. Replacement 6922 tubes need not be low-noise or matched for gain characteristics, and are available from Audio Research.

## Cleaning

To maintain the visual appearance of your LS7 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.



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# Limited Warranty

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## 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), and CD players or transports, which are warranted for two (2) years from date of purchase (four (4) years from date of shipment).

### 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 (second for CD players and transports) of the date of purchase or no later than the fifth anniversary (fourth for CD players and transports) of the date of shipment to the authorized Audio Research dealer, whichever comes first.

## 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 products sold by that retailer or distributor. Warranty service should normally be obtained from the importing retailer or distributor from whom you purchased your product.

### 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, or two (2) years in the case of CD players and transports. 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); this period of warranty is two (2) years in the case of CD players and transports. 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.

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.



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# Specifications

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## Model LS7

**FREQUENCY RESPONSE:**  $\pm 0.5$ dB, 1.0Hz to 100kHz  
-3dB points below 0.1Hz and above 300kHz.

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

**GAIN:** Main Output – 13dB unbalanced.  
Tape output – 0dB.

**INPUT IMPEDANCE:** 100K ohms. Inputs (5): tape,  
tuner, CD, video, aux.

**OUTPUT IMPEDANCE:** 200 ohms main output.  
Recommended load 60K ohms and 100pF (20K ohms  
minimum and 1000pF maximum).

**MAXIMUM INPUT:** 20V maximum.

**RATED OUTPUTS:** 2V RMS 1Hz to 100kHz, all out-  
puts, 60K ohm load (maximum output 25V RMS at  
1/2% THD at 1kHz into 100K ohms.)

**CONTROLS:** Gain, input selector. Toggle switches:  
power/off, mute/operate.

**POWER SUPPLIES:** Electronically-regulated low and  
high voltage supplies. Line regulation better than  
.01%.

**NOISE:** 15uV RMS maximum IHF weighted noise at  
main output with gain control minimum (more than  
102dB below 2V RMS output).

**TUBE COMPLEMENT:** (4)-6922/E88cc dual triode.  
Solid-state power supply.

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

**DIMENSIONS:** 19" (48 cm) W x 5 1/4" (13.4 cm) H  
(standard rack panel) x 10 1/4" (26 cm) D Handles ex-  
tend 1 1/2" (3.8 cm) forward of front panel. Rear chassis  
fittings extend 1/2" (1.3 cm).

**WEIGHT:** 9.8 lbs. (4.5 kg) Net; 18.8 lbs. (8.5 kg)  
Shipping.

Specifications subject to change without notice.

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