Owner's Manual

Model LS3/LS3-B

LINE STAGE AMPLIFIER

audio research
HIGH DEFINITION®

3900 ANNAPOLIS LANE NORTH / PLYMOUTH, MINNESOTA 55447-5447 / PHONE: 763-577-9700 FAX 763-577 0323

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Preface

Please take the time to carefully read this Instruction Manual prior to installation or use of your LS3 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.

Introduction

The Audio Research LS3 is a completely new line stage amplifier designed to accommodate music lovers who exclusively use line level input sources—digital or analog—for the reproduction and enjoyment of music in their home audio systems.

For many years, Audio Research has been steadily developing engineering techniques that optimize the potential of solid state devices. Some of these techniques such as our D.E.C. (Decoupled Electrolytic Capacitor) circuit have been awarded patents and will only be found in Audio Research components.

An all-new circuit board in the LS3 incorporates extra wide traces and a minimum of point-to-point wiring to minimize crosstalk and keep the signal path as short and pure as possible. Thanks to a massive, tightly regulated power supply, the LS3 will reward its owner with a lifelike sense of ease and dynamic expression. To maximize the resolution of detail, all inputs are D.C. coupled, long-tail pair topology. The "Direct" and "Tape" inputs are selected via relays, the "Normal" input selector switch is mounted as close to the inputs as possible (directly on the circuit board), and the final output capacitor is included in the overall feedback loop. "Normal" input quality therefore comes closer to the well-known virtues of the "Direct" or "Bypass" inputs on other Audio Research preamps while retaining the flexibility of balance control and mono/stereo switching.

The front panel of the LS3 offers a useful range of controls and switching functions without extraneous "bells and whistles." Included are Gain, Balance, Mode and Input Selectors. Muting is automatic at turn-on and in brown-out conditions, as well as manually switchable. In addition, the LS3 includes an important new signal route called the Direct Gain Path. This set of inputs offers the user a high-purity signal path for audiophile-quality program sources (CD players, DAC processors, etc.)—a route which bypasses all controls and switching functions except for Gain. The Direct Gain Path is selectable from a front panel toggle switch, while other inputs are chosen through the Input Selector. See the appropriate sections of this Manual on Controls and Switches for detailed operating instructions.

Also included on the LS3 are two sets of main outputs for use with bi-wired systems, surround-sound or other signal processors. The optional LS3-B offers balanced XLR outputs as well.

In design and manufacture, the LS3 exhibits legendary Audio Research quality throughout. While it is inherently a simpler product than our traditional-format preamplifiers, the LS3 is in no way compromised—sonic performance and reliability will prove second-to-none as you enjoy your LS3 over the coming years.

With familiarity, you will find the LS3 capable of a degree of resolution never before encountered in a product in this price range. Source material will be revealed within a truly musical envelope. And, of course, the LS3 is backed by the 20-year reputation of Audio Research Corporation for excellence in product design, manufacture and customer support. In the LS3 it all adds up to superb value in a product you will find difficult to outgrow.

Warnings

1. To prevent fire, or shock hazard, do not expose your LS3 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 LS3 is equipped with an 18-gauge, 3-conductor cable and a standard three-prong grounding plug. In addition, your LS3 uses an isolating power transformer with 4 KV-rated insulation. For absolute protection, ***do not defeat the ground power plug.*** This provides powerline grounding of the LS3 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 the packaging in a dry place away from fire hazard. Your LS3 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 LS3 from unnecessary damage or delay.

Model LS3/LS3-B

Description of Controls

GAIN CONTROL: A high-quality, metal-film segmented control with 31 steps and accurate tracking. Use it to control loudness or volume. Rotation to the left attenuates gain, rotation to the right increases gain. Best sonic performance and best signal-to-noise ratio will result if the input signal and amplifier input sensitivity allow normal listening when GAIN is set between 10 o'clock and 2 o'clock.

BALANCE CONTROL: When rotated, adjusts the relative sound levels of the left and right channels. The 12 o'clock position marks the point of equal balance. Rotating the knob to the right decreases the level of the left channel proportionally, shifting the sonic image to the right. Rotating the knob to the left shifts the sonic image to the left.

MODE CONTROL: Allows selection of single-channel (mono) and two-channel (stereo) listening modes. Detents mark each selection option during rotation of knob. "Mono" reproduces identical sonic information in both right and left channels. "Stereo" is the normally preferred mode for most program material, producing the most realistic spatial image.

INPUT SELECTOR: Detents mark selection of various source material options: "CD" for compact digital disc players; "Tuner" for AM/FM radio tuners; "Video" for audio input from Beta or VHS videotape players; "Aux 1" and "Aux 2" for any additional high level sources—tape, tuner, CD, video, etc.

The signal source chosen by the Input Selector is fed to the Main and Tape outputs when the Monitor/Source switch is set to "Source," and the Direct/Normal switch is set to "Normal." (See description of Monitor/Source and Direct/Normal switches below.)

POWER SWITCH: Supplies power from AC wall outlet to LS3 when in "Power" position. Although not strictly necessary, it is nonetheless good practice to put the LS3 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 sessions or switching of inputs, in addition to turning the Gain (volume) control counter-clockwise. These two simple precautions will prevent inadvertent misuse of your LS3 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 LS3 is in the Mute mode. Always turn the gain control down when changing program sources, even when it is muted. The LS3 has an extremely wide dynamic range, and switching to Operate at loud levels may be too much for amplifiers, speakers or ears. Furthermore, at extremely high signal levels in the Mute mode, the LS3 may overload internally. This will not harm the LS3, but it may take 10-15 seconds to stabilize from the overload. If you switch to Operate before the LS3 has recovered from the overload, you will hear a "pop" when the mute switch is actuated, indicating the presence of unwanted subsonic energy that may damage some amplifiers and poorly-fused speakers, if the LS3 is left in Operate. If you hear a "pop," switch immediately back to Mute, turn down the gain control and wait 15 seconds or so and try again. Under normal conditions the LS3 muting has no "pops." Subsonic program energy may also cause small, harmless mute "pops." These "pops" may be eliminated by turning down the LS3 gain control before muting.

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 LS3 is ready for normal operation.

DIRECT/NORMAL SWITCH: Allows the use of either the "Direct Gain Path" set of inputs or the "Normal" inputs otherwise found on either the Input Selector or Monitor switch. The "Direct" position provides the highest possible resolution for the high level source (CD player, DAC processor, etc.) routed through it, bypassing the "Balance," "Mode" and "Input Selector" controls. Since the Direct Gain Path inputs are wholly independent from the other inputs and the (tape) Monitor loop, it is not possible to record off the "Direct" inputs (see also "Tape Dubbing Procedure).

MONITOR/SOURCE SWITCH: In "Monitor" position, this switch "bypasses" the Input Selector and presents the signal to the main outputs from sources (tape recorders, etc.) connected to the "Tape" input jacks on the rear panel. In the "Source" position, the program source is controlled by the Input Selector (Phono, Tuner, CD, etc.)

Connections

INPUT CONNECTORS: All are clearly marked to indicate use. The inputs are 50K ohms impedance, except the "Direct" input which is 100K ohms.

MAIN OUTPUT CONNECTORS: There are two sets of output connectors, which should be connected to your electronic crossover or power amplifier(s).

A balanced-output version of the LS3—known as the LS3B—is available as an extra-cost option. Owners with balanced-input amplifiers will notice increased resolution due to improved signal-to-noise ratios. LS3 owners can have their unit retrofitted with balanced outputs at additional cost; see your authorized Audio Research retailer or distributor for details.

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The input impedance (load) of the power amplifier or electronic crossover to the LS3 main outputs should be at least 20K ohms for maximum sonic benefit.

NOTE: At the performance level of the LS3, 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 and prices.

TAPE OUTPUT CONNECTORS: The LS3'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. The "Direct" inputs cannot be routed to the Tape Outputs in any way.

ENHANCED VIDEO CONNECTIONS: Using a video processor ("surround-sound," dolby Pro Logic, etc.) in conjunction with the LS3 and other quality audio components can provide an exciting new level of video enjoyment. Connection of a video processor to the LS3 should be accomplished as follows.

The video source (VCR, laserdisc, MTS video broadcast tuner, etc.) should be routed to the input(s) of your video processor. The video processor's main outputs (front L,R) should be routed to the video inputs of the LS3. Additional speakers intended for multi-channel sound should be connected to amplifiers (built-in or outboard) driven directly by additional outputs of the video processor.

Most processors manipulate the signal routed to the rear "effects" channels ***and*** the main front channels as well. This connection method maintains the full processing capability of your video processor for video sources without affecting normal stereo inputs.

In the case of processors with remote-controlled volume, the user can retain this feature by using the following technique. Find a segment of video source material that is loud and continuous; rotate the processor's volume control half-to-three-quarters toward fully open, then set the LS3 Gain control as high as would ever be necessary or desirable. Note this LS3 Gain control position, and return to it whenever video sources are selected; you can then use the processor's remote control as an attenuator.

"Hot rodding" the LS3 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.

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

Installation Instructions

While the LS3 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 LS3 on top of a power amplifier: not only could this cause overheating, but "hum" may be introduced into the LS3 from the proximity of the amplifier's power transformer.
3. Do not place or operate your LS3 on a soft or irregular surface such as a rug. This will prevent proper ventilation.
4. Do not operate your LS3 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 LS3.
6. If side-by-side mounting with other equipment is employed, place the LS3 to the left of the other chassis, so as to provide maximum spacing between the transformer of the LS3 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 LS3 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.

Model LS3/LS3-B

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 LS3, power amplifier(s) and input sources. Note: Given the advanced performance capabilities of the LS3, 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 LS3 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 LS3 is ready for operation.

   Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your LS3 may be safely left "on" continuously for maximum performance at all times.
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.

Tape Recording Procedure:

When using the LS3 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. (Check to make sure that your tape recorder does not short its inputs when not in the "record" mode. If it does, it may severely load or distort the LS3's output signal.) The "Direct" inputs cannot be routed through the Tape outputs at any time.

When the Monitor/Source switch is set to "Monitor," you can monitor the output of a tape deck during playback. When making a recording with a three head tape deck (and the deck set to "Tape" or "Monitor"), a true "A-B" comparison of signals before and after recording can be compared by switching from "Source" to "Monitor," respectively.

It is 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" (Spare 1 or 2, Video, etc.) on the LS3.

Muting Provisions:

The LS3 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 LS3 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 5-10 minutes each time such an interruption occurred.)

The Mute/Operate Switch allows manual disabling of the LS3 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.

The automatic muting operates as follows:

1. The manual mute switch always disables both "main" outputs and overrides any automatic provisions, even when the LS3 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 LS3 is effective down to 100VAC without serious sonic degradation.

3. The automatic muting of the LS3 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. Deactivate power amplifier(s).
4. Deactivate all input sources.
5. Set LS3 Power Switch to "Off" position.

Reducing Gain

If the overall gain of the LS3 is too great with some sources, a reduction of 10dB is possible. Please consult your Audio Research dealer or call Audio Research Customer Service (612-939-0600).

Servicing

Because of its careful design and exacting standards of manufacture, your LS3 should normally require only minimal routine service to maintain its high level of performance.

CAUTION: Your LS3 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.

At the back of the Manual you will find a schematic diagram for your LS3 which is fully annotated with operating voltages and component part values. Your service technician will require this information when servicing your unit.

Cleaning

To maintain the visual appearance of your LS3 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). For a period of one year from date of purchase, Audio Research will pay round-trip freight of the company's choice for any product requiring return to the factory for authorized warranty service; such product(s) must originate from and will be returned to the retail store where purchased.

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 LS3/LS3-B

FREQUENCY RESPONSE: ±.5dB, 2.0Hz to 100kHz
–3dB points below 1Hz and above 200kHz

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

GAIN: Main Output — 18dB
(optional 10dB gain reduction).
Tape Output — 0dB
Balanced Output (LS3B) — 24dB

INPUT IMPEDANCE: 50K ohms (100K ohms Direct)

OUTPUT IMPEDANCE: 250 ohms main output. 500 ohms balanced (LS3B). Recommended load 60K ohms and 100pF. (20K ohms minimum and 1000pF maximum).

MAXIMUM INPUT: 20V maximum

RATED OUTPUTS: 2V RMS 2Hz to 100kHz, all outputs, 60K ohm load (maximum output 35V RMS (70V RMS balanced [LS3B] at ½% THD at 1kHz into 100K ohms.)

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

NOISE: 18uV RMS maximum THF weighted noise at main output with gain control minimum (more than 100dB below 2V RMS output, or 4V balanced output [LS3B])

POWER REQUIREMENTS: 100-135VAC 60Hz (200-270VAC 50/60Hz) 25 watts maximum (35 watts maximum LS3B)

DIMENSIONS: 19″ (48 cm) W x 5¼″ (13.4 cm) H (standard rack panel) x 10¼″ (26 cm) D. Handles extend 1⅝″ (4.1 cm) forward of front panel. Rear chassis fittings extend ½″ (1.3 cm).

WEIGHT: LS3 —
11 lbs. (5.0 kg) Net; 20 lbs. (9.0 kg) Shipping
LS3B —
12 lbs. (5.5 kg) Net; 21 lbs. (9.5 kg) Shipping

Specifications subject to change without notice.