



***Conrad-Johnson Owner's Manual:
LP70S Vacuum-Tube Amplifier***

conrad-johnson It just sounds right.

Thank you for selecting the LP70S to power your audio system. The LP70S draws on three decades of research at conrad-johnson into the reproduction of recorded music. The result is a power amplifier with a remarkable ability to recreate the dynamics, textures, tonalities, and ambience of live musical performances. With the LP70S, we believe that you will experience the excitement of discovery in hearing more from your favorite recordings than ever before.

At conrad-johnson, we expect our products to be a source of satisfaction and of pride to their owners for many years to come. Accordingly, circuit designs, parts and materials for all conrad-johnson products are selected with a view to maintaining optimal performance over the years. Our reputation for producing among the industry's most reliable components is a natural consequence of this engineering approach.

Although operation of the LP70S is quite straightforward, please take a few minutes to read this manual for useful information on its installation and operation.

In closing, we'd like to welcome you to the family of conrad-johnson owners. We want you to enjoy your conrad-johnson product to the fullest. To this end, our staff stands ready to answer any questions you may have about the function and application of your LP70S, and to provide any needed service both during, and after the warranty period. Our goal is to heighten your enjoyment of recorded music.

Limited Warranty For Conrad-Johnson Components

Conrad-Johnson Design, Inc. will provide service under warranty to the original owner on products sold new in the United States for the lesser period of three years from the date of purchase by the original purchaser, or five years from the date of shipment to the authorized conrad-johnson dealer. During the warranty period, conrad-johnson will repair defective units without charge for labor or parts (with the exception of vacuum tubes and batteries).

Exclusions. The following are not covered under this warranty:

- a) Units which have been damaged by misuse, abuse, or accident.
- b) Units which have been modified, altered, or improperly repaired by anyone not specifically authorized by conrad-johnson design, inc.
- c) Units not purchased from an authorized conrad-johnson dealer in the United States for use in the United States.
- d) Normal wear
- e) Incidental or consequential damages are not covered under this warranty. Some states do not allow the exclusion of incidental or consequential damages, so this exclusion may not apply to you.

Obtaining Warranty Service: To obtain warranty service, the unit must be shipped, along with evidence of purchase, in factory packing to conrad-johnson design (or designated service center) with freight and insurance prepaid by the owner. After repair, the unit will be returned with freight and insurance prepaid by conrad-johnson design to any destination in the United States.

All implied warranties, including merchantability and fitness for a particular purpose are limited in duration to the duration of this express warranty. Some states do not allow limitations on the duration of implied warranties so the above limitations 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.

Conrad-Johnson products purchased outside the United States are covered by warranty terms of the importing distributor in the country in which the product was originally purchased, which may differ from the terms set out herein. Importing distributors are not obligated to provide warranty service for products originally purchased outside their country. Conrad-Johnson will provide warranty service for products outside the United States, but in these cases, the customer must pay all shipping, handling and customs costs both to and from our Service Department.

Questions about this warranty should be addressed to:

Service Department
conrad-johnson design, inc.
2733 Merrilee Drive
Fairfax, VA 22031

The conrad-johnson service department can also be reached by e-mail at service@conradjohnson.com, by phone at 703-698-8581, or by fax at 703-560-5360.

Service

If your conrad-johnson audio component requires service, repack it using the original box and packing material and ship to the Service Department address above. Boxes and packing materials can be purchased through our service department if you no longer have yours. Include with the unit a note describing the problem you are having in as much detail as possible. It is especially important for our technician to know if the problem is intermittent. If you want an estimate of cost for out of warranty service, be sure to request it in this note. Be aware that requesting an estimate will delay service to your unit, as we will have to contact you for approval before commencing service.

Registering The Warranty

Please return the enclosed card to the factory within 30 days of purchase to register the warranty

Installation

As is the case with any vacuum-tube power amplifier, the LP70S dissipates a significant amount of heat. Provision must be made for adequate ventilation. Mount the unit on a flat, hard surface, taking care that the ventilation holes in the bottom are unobstructed. Maintain at least four inches of clearance above the unit, and at least three inches on the sides. The cabinet or shelf should be open at both front and back. For more restricted installations, cooling fans are essential.

All LP70Ss sold in the United States are configured for operation on a 60Hz ac power line producing between 108 and 126 volts. Export versions of the LP70S will have the correct operating voltage and frequency clearly marked on the back panel of the unit, near the ac power cord. In all cases, the actual line voltage should be within + 5/- 10% of the nominal rated voltage.

Electromagnetic Interference (EMI)

Considerable care has been taken in the design of the LP70S to minimize its susceptibility to radio frequency interference and other forms of EMI. Choice of materials, physical layout, grounding practice, and power supply design have all been specified with a view to reducing the impact of electromagnetic fields on the performance of this unit. At the same time, however, our primary goal is the accurate reproduction of recorded music in the normal home environment, and we have elected not to compromise this objective by the application of heavy-handed RFI filters, or by using grounding practices that reduce RFI at the expense of degraded audio performance. We find that the approach we have taken has worked extremely well, resulting in only rare instances of EMI problems which could be treated locally as needed, rather than compromising the performance of our product in the 99.9% of installations where EMI is not a problem.

Care in installation can often avoid EMI induced problems. The following practices should generally be observed in any application, and will be especially important where EMI may be a problem.

Interconnect cables should be kept as short as possible (3 meters or less), and shielded cable should be used (cable which has two center conductors, and a separate external shield connected at only one end).

Physical location and cable “dress” can be an important factor in minimizing hum pickup. The installation should situate the preamplifier well away from the power amplifier, and power (ac mains) cords should be dressed to remain at least 4" (100mm) away from input/output cables.

Connection

INPUT: Connect the preamplifier to your LP70S amplifier at the RCA type connectors located on the back of the amplifier.

OUTPUT: Five-way binding posts are provided for connection of your loudspeakers, with correct spacing to accept a standard "double banana" plug. They will also accept spade lugs, bare wire, or pin connectors.

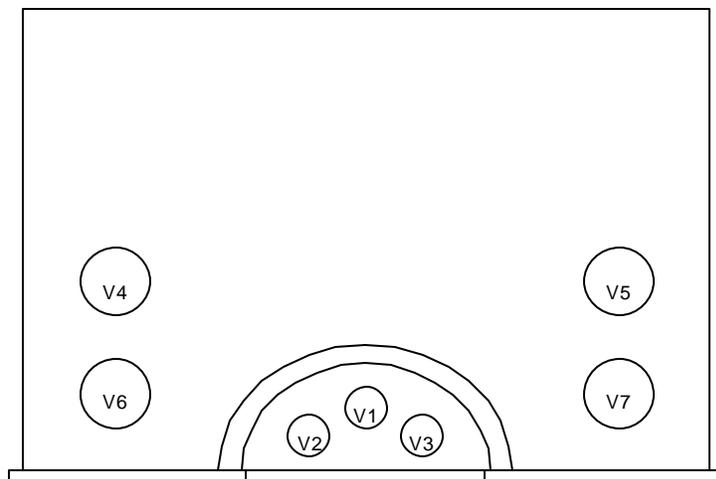
The two channels should be connected in correct "relative phase". This means that when the same signal is applied to both channels, the right and left channels speaker diaphragms will move synchronously - in and out together. Terminals on speakers are usually coded - one designated "C", "ground", "-" or black, the other designated "+" or red. "In phase" connection of the speakers can normally be achieved by taking care to connect the wire from the "+" amplifier terminal to the red or "+" coded terminal on each speaker, and connecting the "-" terminal to the black or "-" coded terminal on each speaker. In phase connection of the speakers can be readily ascertained by ear. Listen to a recording of a solo vocalist (use a mono recording if available). With the speakers in phase the voice should be clearly focused between the two speakers. With the speakers connected out of phase, the voice will be diffused, with no identifiable source. Relative phase may be reversed by switching the "+" and "-" leads at one speaker only.

Vacuum Tube Replacement

The LP70S uses seven vacuum tubes of two different types: three type 6922 (V1, V2 and V3), and four type 6550 (V4 through V7). The brands of tubes we supply have been chosen by first selecting those brands which are known to be most reliable, then by extensive auditioning of these acceptable brands with the final choices being made solely on the basis of sonic performance. We know of no vacuum tubes available which will improve the sonic performance of your LP70S. We highly recommend that you purchase replacement tube sets from conrad-johnson design.

We anticipate tube life to accommodate two to three years of operation without degradation in normal use - if the amplifier is switched off when not in use. If it is left on at all times, tube life can be exhausted in a matter of a few months.

The LP70S has been designed to make tube replacement as simple as possible. Because the output tubes are individually biased, replacement tubes need not be matched pairs. No a-c balance adjustment is necessary. It is necessary to re-bias the amplifier when the output tubes are replaced. The LP70S has built in bias indicators so that no instruments are required to make this adjustment.



Adjusting Output Tube Bias

Biasing the amplifier is a simple procedure that can easily be done by the owner. Only a plastic screwdriver is required (one has been included with your amplifier for this purpose). After replacing the tubes, the amplifier should be connected to a load (your loudspeakers will work fine) and there should be no signal applied to the amp. It should be connected to your preamplifier with the volume control turned fully down. Turn the amplifier on. After about one minute, turn each of the four screwdriver adjustable controls (located near the output tube sockets) counterclockwise until the associated indicator LED just goes off. Clockwise rotation may be necessary first to turn the LED on; do not turn the adjusting screw any further in the clockwise direction once the LED has come on.

After the amplifier has warmed up thirty minutes, the procedure just described should be repeated. NOTE: It is normal for these LEDs to flash or flicker when the amplifier is in use. This biasing procedure should be performed whenever the amplifier's output tubes are replaced and after each six months of average use.

PLATE FUSE: Your LP70S has been fitted with plate supply fuses that are installed to protect the amplifier circuitry in the event of output tube failure. The fuse holders are physically located on the back panel, near the speaker connectors. The cap unscrews counterclockwise to remove the fuse (KTK-1). An LED near the fuse holder will light when the fuse is blown.

What happens when the fuse blows? If one of these fuses should blow, it usually indicates a marginal output tube (one of two for each channel) and an attempt should be made to identify and replace it, by either (a) replacing the fuse and turning on the amp while watching the output tubes carefully; look for a bright white or blue flash inside the tube. If nothing happens, then (b) lightly tap the output tubes one by one with the plastic handle of a screwdriver while watching for flashes inside the tube. If efforts to identify the bad tube fail, the best course of action is to replace both tubes in the channel that blew the fuse. If the tubes are over two years old, or have more than 1,500 hours on them, a complete replacement tube set is probably in order.

The sonic effects of a blown fuse are very low, very distorted sounds from the speaker being driven by that channel.

TO AVOID SHOCK, ALWAYS TURN OFF THE AMPLIFIER BEFORE REMOVING THE FUSE HOLDER CAP

Replacement fuses are available from conrad-johnson dealers.

Getting The Most From Your LP70S

In a system of commensurate high quality components, the Conrad-Johnson LP70S offers an unparalleled level of sophistication and refinement in music reproduction. To get the best performance out of any audio system, there are a number of important details that must be attended to.

Absolute Phase

Musical notes are heard through the ear's response to waves of alternating rise and fall of air pressure. Musical transients are almost exclusively positive: that is, the initial effect is a rise in pressure. The ear is capable of distinguishing these positive transients from the musically unnatural alternative of a negative transient (an initial fall in air pressure). In terms of your stereo system, these transients are created by your loudspeakers. If the speakers respond to musical transients by first moving out, they are creating a rise in pressure, and the system is said to be phase correct. If they respond by moving in, they create a fall in pressure and the system is said to be phase inverting. Each component in the stereo system either preserves the phase of the incoming signal, and is said to be phase correct, or inverts the phase and is said to be phase inverting. It is unimportant whether an individual component is phase correct or phase inverting, as long as the system as a whole is phase correct. This will be the case if the number of phase inversions is even (or zero).

The LP70S is phase correct (non-inverting). If your system has an odd number of inversions, (for example, if you have a phase inverting preamplifier) then you must add one phase inversion. This is conveniently done by reversing the positive and negative connections to your speakers (be sure to reverse both channels). If you are not sure about the phase of every piece in your system, you can establish correct absolute phase by careful listening. When the system is in correct phase, transients will be noticeably cleaner and more sharply defined. The effect is especially apparent on plucked string sounds. A final warning - not all recordings are phase correct (including some "audiophile" recordings), so listen to several before concluding your investigation of absolute phase.

The Importance Of Wires

Interconnect and speaker wires are an important element in your stereo system. Interconnects are available which will permit a reference quality system to blossom and fulfill its promise of musical reality. Others will strangle the system to the point where it becomes little better than average. To complicate matters, our experience suggests that the choice of interconnects will be system dependent - those that are top ranked on one system may be a poor choice for a different system. Consult your conrad-johnson dealer for recommendations for your specific system.

Performance Tip

Warm up the LP70S before listening: The sonic performance of the LP70S improves noticeably as the unit warms up. The midrange becomes more lucid, the highs smoother, and the soundstage expands. The warm up period can be expected to last about fifteen minutes.

Questions: If you have questions about the installation or function of your LP70S do not hesitate to call Customer Service at (703) 698-8581.

Specifications

Power: 70 watts per channel RMS both channels driven into 4 ohms from 30Hz to 15KHz at no more than 1.5% total harmonic distortion or intermodulation distortion (can be re-connected internally for 8 or 16 ohm loads).

Sensitivity: .5 V rms to rated power

Small Signal Distortion: less than .2% at mid-band

Frequency Response: 20Hz to 20 kHz +0/- .25 dB

Hum and Noise: 102 dB below rated power output

Phase: phase correct

Input Impedance: 100 kOhms

Mechanical

Dimensions: 16.125"D x 19"W x 6.375"H

Net Weight: 54 lb net

Fuses

The LP70S power transformer is protected by a fuse on the ac power line (F5, located in a compartment in the ac line-cord receptacle mounted on the back of the amplifier), and by four separate internal fuses on the secondary circuits of the transformer (F1 – F4) located on the bottom of the pc board. A failure of any of these fuses is a symptom of a more serious problem, and a competent service technician should be consulted. In no event should fuses be replaced with a value or type different than that originally supplied. The correct fuse values and types are:

F5: 5x20mm 5 amp T-type if configured for 100 or 120V:
5x20mm 3 amp T-type if configured for 220 or 240V.

F4: 3AG type 4 amp, slow blow

F1, F2, and F3: ¼ amp, slow blow