

# ALESIS

## REFERENCE SERIES

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## POWER AMPLIFIERS

# REFERENCE MANUAL

Alesis RA150-500 Reference Manual

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# INTRODUCTION

Thank you for purchasing this Alesis RA150, RA300, or RA500™ Reference Series power amplifier. To take full advantage of this amplifier's functions, and to enjoy long and trouble-free use, please read this user's manual carefully.

# HOW TO USE THIS MANUAL

This manual is divided into the following sections describing the various functions and applications for the RA series amplifier. Though we recommend you take time to read through the entire manual once carefully, those having general knowledge about amplifiers should use the table of contents to look up specific functions.

**Chapter 1: Introduction.** If you want to start using the RA150/300/500 right away, here's a one-page guide to hooking it up and trying it out.

**Chapter 2: Connections.** This chapter gives detailed instructions for connecting the RA150/300/500 to a variety of typical sound systems.

**Chapter 3: Operation.** This section explains how to run the Reference Series Amplifier properly.

**Chapter 4: Troubleshooting.** This chapter contains troubleshooting tips and service information should problems occur.



**When something important appears in the manual, an icon (like the one on the left) will appear in the left margin. This symbol indicates that this information is vital when operating the RA150/300/500.**

# IMPORTANT SAFETY INSTRUCTIONS

## SAFETY SYMBOLS USED IN THIS PRODUCT



This symbol alerts the user that there are important operating and maintenance instructions in the literature accompanying this unit.



This symbol warns the user of uninsulated voltage within the unit that can cause dangerous electric shocks.



This symbol warns the user that output connectors contain voltages that can cause dangerous electrical shock.

## PLEASE FOLLOW THESE PRECAUTIONS WHEN USING THIS PRODUCT:



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a damp cloth. Do not spray any liquid cleaner onto the faceplate, as this may damage the front panel controls or cause a dangerous condition.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Use only attachments or accessories specified by the manufacturer.

11. Unplug this apparatus during lightning storms or when unused for long periods of time.



**12. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.**

13. Use only with a cart, stand, bracket, or table designed for use with professional audio or music equipment. In any installation, make sure that injury or damage will not result from cables pulling on the apparatus and its mounting. If a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This unit produces heat when operated normally. Operate in a well-ventilated area with at least six inches of clearance from peripheral equipment.
16. This product, in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.

## INSTRUCTIONS DE SÉCURITÉ IMPORTANTES (FRENCH)

### SYMBOLES UTILISÉS DANS CE PRODUIT



Ce symbole alerte l'utilisateur qu'il existe des instructions de fonctionnement et de maintenance dans la documentation jointe avec ce produit.



Ce symbole avertit l'utilisateur de la présence d'une tension non isolée à l'intérieur de l'appareil pouvant engendrer des chocs électriques.



Ce symbole prévient l'utilisateur de la présence de tensions sur les raccordements de sorties, représentant un risque d'électrocution.

### VEUILLEZ SUIVRE CES PRÉCAUTIONS LORS DE L'UTILISATION DE L'APPAREIL:



1. Lisez ces instructions.
2. Gardez ces instructions.
3. Tenez compte de tous les avertissements.
4. Suivez toutes les instructions.
5. N'utilisez pas cet appareil à proximité de l'eau.
6. Ne nettoyez qu'avec un chiffon humide. Il est potentiellement dangereux d'utiliser des pulvérisateurs ou nettoyeurs liquides sur cet appareil.
7. Installez selon les recommandations du constructeur.

8. Ne pas installer à proximité de sources de chaleur comme radiateurs, cuisinière ou autres appareils (dont les amplificateurs) produisant de la chaleur.
9. Ne pas enlever la prise de terre du cordon secteur. Une prise murale avec terre deux broches et une troisième reliée à la terre. Cette dernière est présente pour votre sécurité. Si le cordon secteur ne rentre pas dans la prise de courant, demandez à un électricien qualifié de remplacer la prise.
10. Évitez de marcher sur le cordon secteur ou de le pincer, en particulier au niveau de la prise, et aux endroits où il sort de l'appareil.
11. N'utilisez que des accessoires spécifiés par le constructeur.
12. N'utilisez qu'avec un stand, ou table conçus pour l'utilisation d'audio professionnel ou instruments de musique. Dans toute installation, veillez de ne rien endommager à cause de câbles qui tirent sur des appareils et leur support.
13. Débranchez l'appareil lors d'un orage ou lorsqu'il n'est pas utilisé pendant longtemps.
14. Faites réparer par un personnel qualifié. Une réparation est nécessaire lorsque l'appareil a été endommagé de quelque sorte que ce soit, par exemple lorsque le cordon secteur ou la prise sont endommagés, si du liquide a coulé ou des objets se sont introduits dans l'appareil, si celui-ci a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.
15. Puisque son fonctionnement normal génère de la chaleur, placez cet appareil au moins 15cm. des équipements périphériques et assurez que l'emplacement permet la circulation de l'air.
16. Ce produit, utilisé avec un amplificateur et un casque ou des enceintes, est capable de produire des niveaux sonores pouvant engendrer une perte permanente de l'ouïe. Ne l'utilisez pas pendant longtemps à un niveau sonore élevé ou à un niveau non confortable. Si vous remarquez une perte de l'ouïe ou un bourdonnement dans les oreilles, consultez un spécialiste.

## BEIM BENUTZEN DIESES PRODUKTES BEACHTEN SIE BITTE DIE FOLGENDEN SICHERHEITSHINWEISE: (GERMAN)



1. Lesen Sie die Hinweise.
2. Halten Sie sich an die Anleitung.
3. Beachten Sie alle Warnungen.
4. Beachten Sie alle Hinweise.
5. Bringen Sie das Gerät nie mit Wasser in Berührung.
6. Verwenden Sie zur Reinigung nur ein weiches Tuch. Verwenden Sie keine flüssigen Reinigungsmittel. Dies kann gefährliche Folgen haben.
7. Halten Sie sich beim Aufbau des Gerätes an die Angaben des Herstellers.
8. Stellen Sie das Gerät nicht in der Nähe von Heizkörpern, Heizungsklappen oder anderen Wärmequellen (einschließlich Verstärkern) auf.
9. Verlegen Sie das Netzkabel des Gerätes niemals so, daß man darüber stolpern kann oder daß es gequetscht wird.
10. Benutzen Sie nur das vom Hersteller empfohlene Zubehör.
11. Verwenden Sie ausschließlich Wagen, Ständer, oder Tische, die speziell für professionelle Audio- und Musikinstrumente geeignet sind. Achten Sie immer darauf, daß die jeweiligen Geräte sicher installiert sind, um Schäden und Verletzungen zu vermeiden. Wenn Sie einen Rollwagen benutzen, achten Sie darauf, daß dieser nicht umkippt, um Verletzungen auszuschließen.
12. Ziehen Sie während eines Gewitters oder wenn Sie das Gerät über einen längeren Zeitraum nicht benutzen den Netzstecker aus der Steckdose.
13. Die Wartung sollte nur durch qualifiziertes Fachpersonal erfolgen. Die Wartung wird notwendig, wenn das Gerät beschädigt wurde oder aber das Stromkabel oder der Stecker, Gegenstände oder Flüssigkeit in das Gerät gelangt sind, das Gerät dem Regen oder Feuchtigkeit ausgesetzt war und deshalb nicht mehr normal arbeitet oder heruntergefallen ist.
14. Dieses Gerät produziert auch im normalen Betrieb Wärme. Achten Sie deshalb auf ausreichende Lüftung mit mindestens 15 cm Abstand von anderen Geräten.
15. Dieses Produkt kann in Verbindung mit einem Verstärker und Kopfhörern oder Lautsprechern Lautstärkepegel erzeugen, die anhaltende Gehörschäden verursachen. Betreiben Sie es nicht über längere Zeit mit hoher Lautstärke oder einem Pegel, der Ihnen unangenehm ist. Wenn Sie ein Nachlassen des Gehörs oder ein Klingeln in den Ohren feststellen, sollten Sie einen Ohrenarzt aufsuchen.

## **CE DECLARATION OF CONFORMITY**



**Manufacturer's Name:** Alesis Corporation

**Manufacturer's Address:** 1633 26th Street  
Santa Monica, CA 90404  
USA

*declares, that the product:*

**Product Name:** RA150/300/500

**Model Type:** Audio amplifier

*conforms to the following Standards:*

**Safety:** EN60065

**EMC:** EN55103:1997 Class B  
(all tests were performed with fully- shielded cabling.)

**European Contact:** Sound Technology  
17 Letchworth Point, Letchworth,  
Hertfordshire, SG6 1ND, England.  
Phone: +44.1462.480000  
Fax: +44.1462.480800

**October 2000**



# ABOUT THE RA150/300/500

## PRINCIPAL FEATURES



**Please remember that a power amplifier is a high-current, high-power device and should be treated with respect and care. Even if you are an audio veteran, we urge you to read the entire manual to make the best use of the RA150/300/500.**

Thank you for purchasing an Alesis Reference Series power amplifier, one of the most advanced and highest value amplifiers available.

The Alesis models RA150, RA300, and RA500 provide extremely accurate sonic quality as well as measured specifications, but their conservative design and careful attention to electronic protection means they will continue to operate at top condition without special attention, year after year.

### THE CHASSIS

The Alesis Reference Series amplifiers are constructed on rugged, heavy gauge steel chassis. All units feature rack mount faceplates. For maximum reliability and low-noise operation the amplifiers use convection cooling with massive extruded aluminum heat-sinks for reliable operation under all ambient and load conditions. The design of the external chassis protects rear panel connectors (except RA 150). All models feature detented front panel input level controls, and overload/protect indicators. The RA300 and RA500 amplifiers incorporate bar graph LED power metering.

### INPUTS AND OUTPUTS

The input sections of the amplifiers utilize precision electronically-balanced input circuitry for low noise balanced input operation. All units have 1/4" balanced TRS input connectors. The RA300 and RA500 also have XLR connectors. Unbalanced RCA (phono) style input connectors are also used. The output connectors are industry-standard, heavy-duty dual binding posts, which can accept large diameter wire or 3/4" (19 mm) spaced dual banana

plugs. A recessed rear panel switch allows easy selection of stereo or bridged monaural operating modes. AC power entry is via a detachable, grounded IEC connector cable.

### AMPLIFIER TOPOLOGY

The amplifier sections of the Reference Series utilize a direct coupled, fully complementary circuit topology. The input stages are a dual differential type with active current sources. Output from the differential amplifiers are coupled to balanced level shifters operating on isolated boost rails for improved efficiency and higher performance. These stages then drive discrete, high current, triple darlington output stages, fully rated for continuous 4 ohm operation with 2 ohm dynamic stability (stereo mode only). The output stages are biased for class AB operation. Emphasis is placed on maintaining wide bandwidth, linearity and stability under all operating conditions. An active DC servo circuit is employed to automatically null DC output voltage offsets. All models feature bridged mono operation.

### PROTECTION CIRCUITRY

Protection for the amplifier consists of active circuitry that continuously monitors the output stage for excessive DC offset, short circuits and thermal overload. In the event of an output fault, the protection circuitry will activate the output relay and disconnect the loudspeaker load. This circuitry will also mute the amplifier during power on/off transitions.

The power supplies of the amplifiers utilize heavy-duty stacked steel EI laminated transformers for maximum performance and reliability. High current bridge rectifiers, massive secondary capacitors and current in-rush limiters are used in all models. All models are designed for 120/230-volt operation with an external voltage selection switch.

All components are of high quality and mechanical construction and are optimized for high reliability under adverse physical and electrical conditions.

## Reference Series Features-

- DC coupled, fully complementary discrete amplifier topology
- Actively biased, dual differential input stages
- Wide bandwidth, low distortion design
- Fully protected from all fault conditions
- LED output level metering (RA 300, RA 500)
- Front panel level controls
- Overload/Fault indicators
- Bridged mono operation
- Balanced 1/4" & RCA single-ended input connectors
- XLR input connectors (RA 300, RA 500)
- Heavy-duty, dual binding post output connectors
- Relay-controlled turn on/off
- Silent, convection-cooled design
- Heavy-duty steel chassis

## **ABOUT THIS MANUAL**

In most respects, the three different amplifiers covered by this manual are similar except for their power ratings. Operational differences will be noted individually.

# CONNECTIONS

## UNPACKING AND INSPECTION

Your Alesis RA150/300/500 was carefully packed at the factory, and the shipping carton was designed to protect the unit during shipping. Do not discard the packing materials; they may be helpful in the unlikely event that you need to return your RA150/300/500 for servicing, or for transporting the amplifier when it is not mounted in a rack or other enclosure.

The shipping carton should contain the following items:

- RA150/300/500 amplifier
- This instruction manual
- Power cable
- Alesis Warranty card



**It is important to register your purchase; if you have not already filled out your warranty card and mailed it back to Alesis, please take the time to do so now.**

Carefully unpack the amplifier and inspect it for physical damage originating in shipping. If damage is discovered and the amplifier was shipped to you, immediately contact the transportation carrier and make certain that the packing materials are preserved for inspection. You as the consignee must make any shipping claims; neither your dealer nor Alesis can do this for you. If the amplifier was not shipped to you, i.e. you picked it up from your dealer, contact the dealer as soon as possible for assistance.

## POWER CONSIDERATIONS

### THE AC CORD AND GROUNDING

The RA150/300/500's IEC-spec AC cord (do not substitute any other type of AC cord) is designed to connect to an outlet that includes three pins, with the third, round pin connected to ground ("earth"). The ground connection is an important safety feature designed to keep the chassis of electronic devices such as the RA150/300/500 at ground potential. Unfortunately, the presence of a ground contact in an AC socket does not always indicate that an outlet is properly grounded. Use an AC line tester to determine this. If the outlet is not grounded, consult with a licensed electrician.

The audio ground (pin 1 of the XLR, the sleeve of the 1/4" jack) is not isolated from the chassis.

*Tip: You don't have to use the provided 6-foot long AC cord. Many electronic stores carry the standard "NEMA-to-CEE" cable in lengths from 6 inches to 20 feet. This is better than wrapping the cord in a coil if it is too long, or using extension cords if it is too short.*



**DO NOT OPERATE ANY ELECTRICAL EQUIPMENT WITH UNGROUNDED OUTLETS. PLUGGING THE RA150/300/500 INTO AN UNGROUNDED OUTLET, OR "LIFTING" THE UNIT OFF GROUND WITH A THREE-TO-TWO WIRE ADAPTER, CREATES A HAZARDOUS CONDITION. ALESIS CANNOT BE RESPONSIBLE FOR PROBLEMS CAUSED BY USING THE RA150/300/500 OR ANY ASSOCIATED EQUIPMENT WITH IMPROPER AC WIRING.**

## 120 VOLT/230 VOLT OPERATION

The Alesis Reference Series amplifiers feature dual-voltage operation. The AC input voltage is selected by a recessed switch on the back panel. The tab is recessed and a tool (small screw driver, pencil, pen, etc.) is required to shift from 120-volt to 230-volt operation. Units sold in areas with 120V power (as in the United States) should come with the switch already set to that position.



**Before connecting the amplifier to AC power for the first time, make sure that this switch is set correctly for the country you're using the amp in.**

**If you change the voltage when travelling, you must also replace the power fuse with the proper amperage (see page 10) and obtain the proper detachable IEC power cable for the country.**

## FUSE

If the fuse blows, replace with a fuse of the correct type only; use of any higher amperage value will void the warranty. **FUSES ARE FOR YOUR PROTECTION—NEVER SUBSTITUTE A FUSE OF A HIGHER RATING, OR BYPASS IT.**

All fuses are the "Slo-Blo" type, sized at 5mm diameter x 20mm:

Model	100-120 volt	220-240 volt
RA150	T3.15AL250V	T1.6AL250V
RA300	T6.3AL250V	T3.15AL250V
RA500	T10AL250V	T5AL250V

The fuse will not blow unless the unit is overstressed. Before replacing the fuse, correct the condition that caused it to blow in the first place.

## ELECTRICAL SERVICE TO THE RA150/300/500

One of the most important considerations for proper installation and operation of a power amplifier is the capacity of the circuit feeding the AC mains voltage to the amplifier. If the line does not have sufficient current and voltage capacity, the amplifier may not be able to deliver its full rated output, both steady state and peak, with the result that the sound character can dramatically suffer. In short, any amplifier will only sound good when connected to adequate AC power.

The maximum audio output rating of each amp (200 watts bridged for the RA150 to 1000 watts bridged for the RA500) does **not** represent the total AC power consumption by the unit. The following table shows the power consumption at rated output:

Model	Rated AC consumption	Maximum (peak)
RA150	270 watts	390 watts
RA300	500 watts	650 watts
RA500	840 watts	1080 watts

**Note that in typical studio applications the average power consumption will be much less.** When not being driven, current consumption is 30 watts or less. Under most circumstances, normal household or commercial power outlets will be adequate. (A standard 15-amp circuit is capable of supplying 1800 watts.) However, peak power consumption may momentarily be 100 to 200 watts higher on transient peaks; if you're connecting a lot of other equipment to the same circuit you should plan for an extra 20% headroom to avoid blowing a circuit breaker. Note that when multiple devices are plugged into a single AC outlet, the possibility of overheated connections can exist. Long AC extension cables may also degrade the supply power.

Electrical standards have taken enormous strides toward increased safety over the past few decades thanks to circuit breakers, ground fault interrupters, and improved wiring and insulation materials. Unfortunately, some clubs are situated in older buildings whose wiring may not meet current safety standards, or have wiring that has deteriorated over the years. Make sure the circuit supplying power to the RA150/300/500 can supply enough current to run it properly. If the circuit has to supply other high-powered consumption units such as

refrigerators, coffee pots, toasters, air conditioning, or stage lighting, plug the RA150/300/500 into a different circuit with a lesser load.

## OPERATING ENVIRONMENT

### TEMPERATURE CONSIDERATIONS IN RACK MOUNTING

The RA150/300/500 can be mounted in an equipment rack (taking up 2 rack spaces or 3 spaces for the RA500), placed on a shelf, tucked away in a vocal booth, etc. When you install it, keep in mind that *heat is the major enemy of electronic equipment*. Fortunately, the RA150/300/500's protection circuitry will not allow the unit to run hot enough to damage any of the circuitry. However, sustained high-temperature operation sufficient to cause limiting will adversely affect the sound quality, and eventually the amplifier will shut itself off for as long as the excessive temperature conditions exists.

The RA150/300/500 has extensive heat sinking to minimize overheating, as well as eliminate the need for a ventilating fan. The latter feature is crucial for the cramped control rooms typically found in smaller studios; any fan noise would interfere with the mixing or monitoring process.

**But the RA150/300/500 must be installed so that its heat sinking is allowed to do its job. Please observe the following:**

- The RA150/300/500 is designed to perform properly over a range of ambient temperatures from 0° C to +50° C (32° F to 122° F), in up to 80% non-condensing humidity. These are not absolute limits, but Alesis cannot guarantee that the RA150/300/500 will meet its published specs if operated outside of these ranges. If necessary, use a fan to blow air over the RA150/300/500 and promote cooler operation.
- Prevent the side heat sink fins from becoming obstructed. There should be enough airspace around the amplifier for it to "breathe."
- Always allow adequate ventilation behind the RA150/300/500. Do not seal any enclosure that holds the RA150/300/500.
- Never throw a coat or other flexible fabric or covering over the top of the amp when it's in use.

- You may wish to leave an empty rack space above or below the amp to promote good air flow. If multiple amplifiers are mounted in the same rack, there should be at least one rack space left between them; solid blank panels may be used to fill the spaces, but perforated grilles used as fillers will help exhaust the hot air from within the rack.

### OTHER RACK MOUNTING TIPS

- Due to the RA150/300/500's weight (from 15 to 28.5 lbs.), it's a good idea to mount it in the bottom of the rack frame. Support of the back of the unit may be necessary for portable or road use.
- Alesis Reference amplifiers are well shielded; however, mounting low-level electronics some distance away from power amplifiers is common practice to reduce the possibility of electromagnetic interference into the low level units, which may sometimes be unusually susceptible to picking up such radiation.

*When wiring a rack, it is good installation practice to route all AC wiring along one side of the rack and all audio wiring along the other side to avoid coupling AC-borne interference into the audio.*

## **MOUNTING ON A SHELF OR IN A NON-RACK ENCLOSURE**

To mount the amplifier on a shelf or other flat surface, Alesis recommends using the enclosed stick-on feet to avoid scratching the shelf's surface with the amplifier bottom. To properly mount the stick-on feet:

- 1 Place the amplifier upside down on a clean cloth or piece of cardboard so the amp top does not scratch your work surface.
- 2 Clean the bottom of the amp where you plan to stick the feet. Isopropyl alcohol is recommended as a cleaning agent. This step insures that no small amounts of oil or other substances will inhibit proper adhesion of the feet.
- 3 When the surface has dried, attach the feet.

Please observe the comments on thermal considerations given under "Temperature Considerations in Rack Mounting" no matter where or how the amp is mounted.

## **AVOIDING ELECTROMAGNETIC INTERFERENCE**

Because the RA150/300/500 contains a large power transformer, we recommend that you do **not**:

- Place the RA150/300/500 next to an unshielded video monitor, as the magnetic fields may distort the image.
- Place tapes, disks, or other magnetic media close to the RA150/300/500.
- Play guitar, bass, or any other instrument with magnetic pickups near the RA150/300/500. No damage will occur but AC fields may enter the pickups, causing hum.

# INPUTS

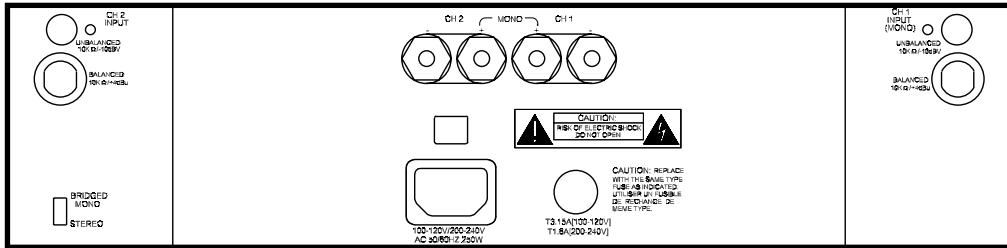
## INPUT JACK CHARACTERISTICS

The RA150/300/500 include two balanced, 1/4" TRS (tip-ring-sleeve, 3-conductor) phone jack inputs, and unbalanced RCA/phono inputs. The RA300 and RA500 feature combination XLR input jacks as well. The inputs are wired according to IEC standards, as shown in the table below.

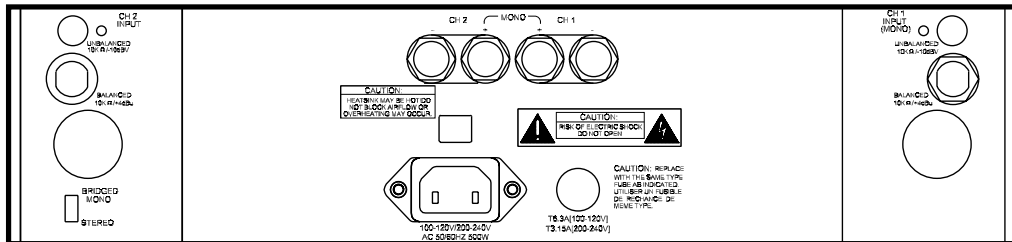
These are compatible with the low-impedance, unbalanced or balanced, line-level outputs typically emanating from equipment such as mixers, synthesizers, samplers, direct boxes, crossovers, etc. Electric guitars, microphones, and other low-level/high-impedance output devices require a preamp.

Connection	XLR	Phone Jack	RCA/phono jack
Audio Ground	Pin 1	Sleeve	Shell
High (+)	Pin 2	Tip	Pin
Low (-)	Pin 3	Ring	--

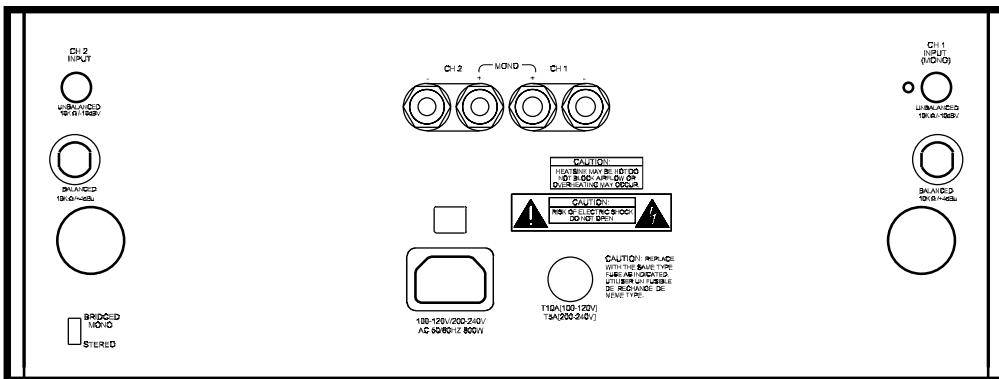
### RA150 Back Panel



### RA300 Back Panel



### RA500 Back Panel



**Warning: Be sure that the AC power is off prior to connecting or disconnecting any signal wiring.**

The input circuits of the Alesis amplifiers are electronically balanced. They may be fed from either symmetrical (“balanced”) or unbalanced sources. On the RA300 and RA 500, there are two combination XLR/1/4” (6.3 mm) jacks provided, one for each channel.

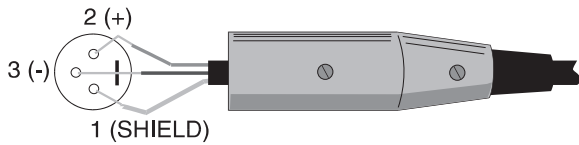


Figure 3. Balanced wiring of an XLR input connector.

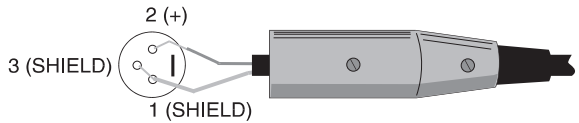


Figure 4. Unbalanced wiring of an XLR input connector.

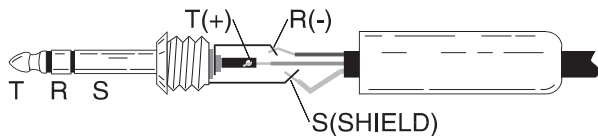


Figure 5. Balanced wiring of a 1/4” (6.3 mm) three-wire phone plug.

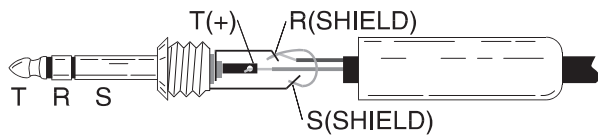


Figure 6. Unbalanced wiring of a 1/4” (6.3 mm) three-wire phone plug

All input wiring should be done with shielded cable.

**To use an unbalanced source with an Alesis amplifier:**

Connect the High (+) signal wire as shown in Table 1 and connect the shield wire to both the Low (-) and Audio Ground input connections. See Figures 4 and 6. If a two-wire (tip and sleeve only) phone plug is used for an unbalanced input, the sleeve of the plug will automatically connect the Low and Audio Ground connections together inside the amplifier.

Long input cable runs, particularly in areas with high electrical interference, should be done with symmetrical (“balanced”) configuration, if possible, to lessen the possibility of interference being picked up by the cables.

Only one input jack of a channel should be used at a time: don't use the 1/4”/XLR input jack and phono input jack simultaneously. Do not plug two different sources into the same amplifier channel. While this will not harm the amplifier, the sources may interfere with each other causing distortion.



## CABLES

Use only high quality cables when interfacing equipment with the RA150/300/500. These should be good quality shielded cables with a stranded (not solid) internal conductor. Although quality cables cost more, they do make a difference. Route cables to the RA150/300/500 correctly by observing the following precautions.

- Do not bundle audio cables with AC power cords.
- Avoid running audio cables near sources of electromagnetic interference such as transformers, monitors, computers, etc.
- Do not place cables where they can be stepped on. Although stepping on a cable may not cause immediate damage, it can compress the insulation between the center conductor and shield (thus degrading performance) or reduce the cable's reliability.
- Avoid twisting the cable or having it make sharp, right angle turns.
- Never unplug a cable by pulling on the wire itself. Always unplug by firmly grasping the body of the plug and pulling directly outward. If you experience difficulty in removing the plug, sometimes a slight rotating motion while unplugging will solve the problem.
- Keep the cable contacts clean at all time. Oxidation may lead to intermittent contacts, degraded sound quality, or even distortion. **DO NOT USE AN ABRASIVE TO CLEAN A DIRTY PLUG.** This may remove some of the plug's conductive plating. Instead, spray contact cleaner on a clean, lint-free cloth and vigorously rub the plug until the oxidation is removed.
- Although Alesis does not endorse any specific product, chemicals such as Tweek and Cramolin, when applied to electrical connectors, are claimed to improve the electrical contact between connectors.
- **NEVER PLUG OR UNPLUG INPUT CABLES UNLESS THE RA150/300/500 IS TURNED OFF, UNPLUGGED FROM THE AC LINE, OR HAS THE CHANNEL 1 AND CHANNEL 2 LEVEL CONTROLS TURNED TO MINIMUM LEVEL.** Failure to observe these precautions may result in damage to your speakers if the cable being plugged into the RA150/300/500 is carrying a signal, and the level is turned up.

## CABLE WIRING TIPS

If you decide to wire your own cables, Alesis recommends that you use three-conductor shielded cable (even in an installation that uses unbalanced wiring) with either a braided or foil-type shield. Connect one conductor to the phone jack tip connection to carry the hot signal, and the shield connection to the sleeve. The other conductor should also connect to the shield since it is not good practice to depend on the shield wire itself to complete the signal connection. This is because the shield wires are more subject to breakage, especially in portable installations, than the more protected internal insulated wires. By using a second "safety" conductor for ground, the worst that could happen with a broken shield would be a rise in noise or hum due to the lack of shielding. If the ground connection were completely lost, there would be either extremely loud hum or major loss of audio.

## BALANCED OR UNBALANCED?

With long cable runs (e.g., over 6 meters/20 feet) in noisy electrical environments, the cable itself can act as an “antenna” and pick up RF fields, AC hum, or other types of interference. To avoid these problems, many professional studios and live sound companies use balanced line connections. The average application will probably not require balanced lines, but using balanced connectors between the mixer and the RA150/300/500 means one less possibility for ground loops and hum elsewhere in the system.

Balanced lines carry a pair of signals, each out of phase with respect to the other but otherwise identical. To be converted back into a single, unbalanced line, both balanced lines feed a differential amplifier input or transformer that responds to the difference in levels between signals. Thus, the out-of-phase signals are recombined into an unbalanced signal, but interference induced into the cable will not be out of phase. Since there is no difference between these signals, the differential amplifier or transformer will reject the interference to a great degree. This tendency to ignore interference is called Common Mode Rejection.

### To connect a balanced line output to feed the RA150/300/500:

You have two options:

#### TRS-to-TRS cable

Most modern mixing consoles, such as the Alesis Studio 32, feature balanced outputs on 1/4" TRS jacks. This is the same balancing connector used by the RA150/300/500. Get a 3-conductor cable with a 1/4" male TRS connector at each end.

#### XLR-to-XLR cable

A slightly more expensive balanced connector is the XLR type, most commonly sold as a “microphone cable”. The main advantage of this is that the connector locks in place, making it more resistant to accidental disconnection. If your mixing console has XLR outputs, and you have the RA300 or RA500 amplifier, you may connect it with an XLR female to XLR male cable. (The mixer will have an XLR male jack, the amp has an XLR female jack.)

*If you have the RA150, which doesn't have an XLR input, you may use an XLR-F to TRS-M cable or adapter. The 1/4" input jack of the RA150 is balanced. (See Figure 5 on page 17.)*

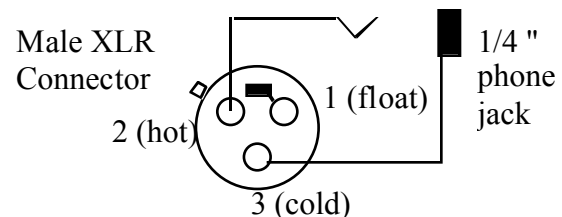
### To connect an unbalanced source to the amplifier input:

#### Unbalanced cable

Simply use a standard, shielded 1/4" patch cord. Or, if the source has an RCA/phono output, use a shielded phono-to-phono cable.

#### Unbalanced-to-balanced cable with telescoping shield

In some installations, you may be able to eliminate a ground loop even though the source is unbalanced by wiring a cable or adapter that has the shield connected at only the unbalanced end, using the inner conductor wires to carry the “hot” signal to pin 2 and the ground to pin 3 of the RA150/300/500. This may keep any ground potential difference between the source and the amplifier out of the signal path. The following diagram shows an adapter that assumes pin 2 of the XLR connector is “hot”; note that the shield of the phone jack is NOT connected to pin 1 (the ground of the amplifier), but is left floating (disconnected).



If you have an RA150 without an XLR input, then make a 1/4" mono to 1/4" TRS adapter. Wire the “hot” of the input signal to the tip, the shield/ground to the ring, and leave the sleeve disconnected at the RA150.

### Isolation transformer or direct box

If your mixer or other sound source doesn't have a balanced output, you may turn it into a balanced signal with an external device, either active (electronic, powered) or passive (a transformer). These commonly available audio accessories have a balanced line output, usually in the form of an XLR connector, and an unbalanced line input, usually in the form of a 1/4" phone jack.

A **line transformer** can also convert balanced signals to unbalanced signals. *Advantage of a transformer:* High signal carrying capacity, no power required, generates no hiss. *Disadvantages:* Inexpensive transformers may color the sound due to frequency response irregularities and can pick up hum due to inductive nature of transformers. Very high-fidelity models are expensive.

**Active direct boxes** use an active electronic circuit to drive a balanced line, but does not work in the other direction. *Advantages:* Good frequency response specs, no inherent hum pickup, less expensive than transformers. *Disadvantages:* Requires power, generates some noise.

### To feed the same source to several different amplifiers:

The input impedance of the Alesis amplifiers is 20 k $\Omega$  in balanced and 10 k $\Omega$  in unbalanced configuration. Thus, the inputs of several amplifiers may be connected in parallel if desired. The maximum number of amplifier channels will depend on the minimum output load impedance of the device feeding the amplifiers. For example, if the minimum output load impedance of the source device is 600  $\Omega$ , up to 30 amplifier channels may be connected to it in parallel without overloading the source device's output.

However, use of a distribution amplifier is recommended in large systems.

### To use the amplifier in Bridged Mono mode:

Connect the input signal to Channel A/Left only. Move the recessed slide switch under the right input connectors to the Bridged Mono position. **Do not connect any signal to the Channel B/Right input jack.** Leave the input level control for Channel B down. See page 20 for output wiring in Bridged Mono configuration.

## OUTPUTS

**Warning:** Be sure that the AC power is off prior to connecting or disconnecting any signal wiring.

### WHAT'S THE LOAD IMPEDANCE?

Alesis amplifiers can reliably drive 4 Ω loads in Stereo mode and 8 Ω loads in Bridged Mono mode. However, the impedance of a loudspeaker varies with frequency, and its nominal rated impedance is not necessarily its minimum impedance. Some loudspeakers carry both nominal and minimum impedance specifications, and some are supplied with impedance curves. When connecting multiple loudspeakers or systems to any amplifier, care should be taken that the actual load impedance does not drop below the amplifier's rated output load. The RA150/300/500 amplifiers will not be damaged by excessively low output load impedances, but they will not be able to provide full output power and their protection circuits may automatically cut off their outputs until the low load condition is removed.

### CONNECTORS

Each channel features a standard binding post connector (red = "hot" output, black = ground). The binding post or "banana" connectors are the preferred choice for permanent installations. There is greater surface area contact than with phone connectors, thus promoting a better electrical connection between the speaker wire and amplifier.

## SPEAKER CABLES

The cables you use between the RA150/300/500 and its speakers are very important. Speaker cables must deliver large amounts of peak current to a speaker. To complicate matters further, a speaker represents an inductive load, and is more difficult to drive than a purely resistive load. Speakers are also very low impedance devices. Any resistance between the amp output and speakers will degrade the damping factor, efficiency and ultimately, the sound quality.

Alesis recommends stranded, rather than solid, cables for flexibility and ease of installation. However, solid cables are equally usable.

*Never use shielded guitar cords as speaker cables. Because they lack sufficient current-carrying capacity, the amp and speakers will not perform properly and the sound may be degraded.*

If you make your own cables, use electrical zip cord, which is designed to handle several amps of current, or heavy-gauge speaker cables if possible. In any event, the thicker the cable, the lower the resistance and the better the current-carrying capability. Thin hookup wire is not acceptable; the minimum acceptable wire type is the common "zip cord" used to connect AC to appliances. The table below relates the wire gauge to the how many feet of cable will lead to a 1 dB power loss at different impedances. The lower the resistance, the better. For cables run up to about 25 feet, 16 to 18 gauge wire is satisfactory.

**Cable length that produces 1 dB of power loss**

wire gauge	at 4Ω		at 8Ω	
	feet	meters	feet	meters
6	1200	366	2425	740
8	800	244	1600	488
10	475	145	950	290
12	300	91	600	183
14	190	58	375	114
16	120	37	240	73
18	75	23	150	46
20	50	15	100	30
22	30	9	60	18

In recent years, expensive audiophile cables of high current capacity have appeared. These have been somewhat controversial; some feel the extra expense produces an audible improvement in sound quality, while others find no sonic difference between audiophile cables and other heavy-duty wiring. While Alesis does not endorse any particular brand of cable, we suggest that you investigate different cable types for yourself to discover if they improve the sound of your particular setup.

## CONNECTING SPEAKER CABLES TO BINDING POSTS

The RA150/300/500 connectors are perfect for studio installations, especially near field monitor usage, where an effective and reliable connector is required. In addition, these connectors are very easy to set up in several different ways.

### To connect speaker cable to the connectors:

1. Remove approximately 1/4" of insulation from the ends of the wires, being careful not to nick any of the strands.
2. Twist the strands together. Unscrew the speaker terminals on the amplifier.
3. Feed the strands through the exposed hole in the binding posts, with the negative connected to the black terminal and the positive to the red terminal. Be careful that:
  - The connector clamps down on the strands, not the insulation
  - No stray strands contact any part of the chassis other than the connector.
4. Tighten down the binding posts and check that the wires can't be pulled out.

**Tip:** *It may be easier to attach the speaker wires before the amplifier is mounted into a rack.*

### Using a banana plug:

Standard "dual banana plugs" (such as Pomona type MDP) should be used if the speaker cable will be removed from the amplifier often (for example, when used in a portable PA system).

In this case, simply:

1. Loosen the setscrews in the shaft of the plug until there is enough room to insert the wires in each side of the connector. (But be careful that the setscrew doesn't fall out.)
2. Remove approximately 1/4" of insulation from the ends of the wires, being careful not to nick any of the strands.
3. Determine the + and – conductors of the cable (by markings or moldings on the wire, or by the color of wire or insulation). Push the "-" side into the opening in the side of the connector marked "GND" or with a ridge sticking out the side.
4. Using a small screwdriver, tighten the setscrew against the wire.
5. Push the other "+" wire through the strain relief and into the other opening, and tighten it as well.

When plugging the banana plug into the amplifier, make sure that:

- The red and black wire nuts in the amplifier have been screwed down first.
- The side of the banana connector with the ridge or nub is plugged into the black connector.

### Using a crimp-on connector:

If a crimp lug terminal is used on the speaker wire and the lug is too small to fit onto the threaded post, one leg of the terminal may be inserted in the hole in the post. As with wire connections, make certain that the terminal is snugly attached by tightening the plastic insulator nut.

## THE IMPORTANCE OF SPEAKER POLARITY

The speaker cone's motion should mimic the instrument it's reproducing. For example, a kick drum pushes air toward you on the initial transient, so a speaker reproducing a kick drum should have its cone push air toward you. If the polarity is reversed, the cone will suck air away from you. Even though the same amount of air is moved in either case, many listeners report superior sound with proper polarity as opposed to reversed polarity.

An additional problem occurs if the polarity of one speaker is reversed with respect to the other. This can cause phase-related problems such as thin bass, poor stereo imaging and frequency response anomalies.

With the RA150/300/500, polarity is a function of correctly hooking up the output cables. Usually, for proper polarity, the tip of the output phone plug or the red terminal of the output connector must connect to the speaker's positive (+) terminal. This will ensure that polarity from the RA150/300/500 input to speaker cone motion will be consistent. Check your speakers' polarity, however, because not all brands follow this wiring convention.

Please note that polarity reversal can occur in devices (such as mixers or effects units) "upstream" of the RA150/300/500. To test for proper speaker and system polarity, see page 22.

## OUTPUT CONNECTIONS FOR BRIDGED OPERATION

Instead of using the RA150/300/500 as a stereo 2-channel amplifier, it is possible to use it as a mono amplifier with twice the power. This uses both sides of the amplifier in a push-pull configuration, so the speaker must be wired to the amp differently.

However, note that the minimum load impedance is 8 ohms, instead of the 4 ohms in stereo operation.

### To connect a speaker in bridged mono mode:

Following the instructions on the previous page for binding post or crimp-on connection, connect the "+" wire to the red binding post for the Channel 1/Left and the "-" wire to the red binding post for Channel 2/Right.

You may use a dual banana plug in this situation. If present, remove the protective caps from the top of the binding posts for the two red terminals. Plug the banana connector into the two center red terminals with the ridged/GND side on Channel 2/Right.

The single input is connected ONLY to the Channel 1/Left input jack, and the stereo/mono switch under the right input connector should be set to BRIDGED MONO. Don't plug any input into the Channel 2/Right input jack, and leave the Channel 2 volume control all the way down.

### Should you use bridged mode?

In a typical PA system with two speakers, in most cases you'll be better off running the RA150/300/500 in stereo mode, because most speakers are 8 ohms and if they were wired in parallel the total load would be 4 ohms, too low for bridged mode. In any case, the total system volume doesn't rise if you were to connect 2 speakers to a single 500-watt amp instead of to two 250-watt amps.

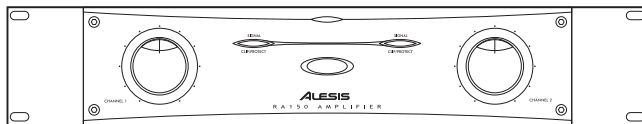
But if you are connecting to a single speaker (such as a subwoofer) in a biamped or triamped setup, bridged mono mode will give you the chest-thumping headroom you need.

# OPERATION

## FRONT PANEL CONTROLS

The following diagram shows the various front panel controls, as described next.

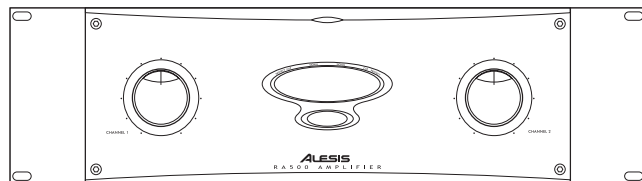
### RA150



### RA300



### RA500



## VOLUME CONTROLS

Detented level controls are on the front panel, where they can be easily adjusted if necessary. These regulate the input signal going into the RA150/300/500. Always turn the volume controls all the way down (counterclockwise) when making input or output connections to the RA150/300/500. Power should be off as well. It's also good practice to turn the volume controls all the way down when turning on power just in case a signal source feeding the RA150/300/500 is "live."

## ON-OFF SWITCH

Press the switch to turn the amplifier on, and again to turn the amplifier off.

Upon turning on the amplifier, the power indicator LED will light. Note that in direct sunlight, this light may not be easily visible.



**When powering a system on or off, it is usually advisable to turn on the power amplifiers last and to turn them off first, so that any turn on or turn off transient signals generated by other equipment in the system are not amplified and sent to the loudspeakers.**

However, the RA150/300/500's output protection relays have a 4.5 second turn-on delay which keeps the loudspeakers disconnected while the system is powering up. These relays also disconnect the load very quickly when power is removed from the amplifiers, thus minimizing the chance that turn-off transients originating elsewhere in the system will be sent to the speakers. So, if the RA150/300/500 power switch is left on and the entire system is powered up on a single master AC switch, transient "thumps" should not be a problem.

## MUTE SWITCH

Because turning the RA150/300/500 on and off generates no spikes within the amplifier, the power switch doubles as a mute switch or "panic button." For example, if there is a serious feedback problem, you can simply turn off the RA150/300/500, then chase down the source of the problem.

## **PROTECT/CLIP INDICATORS**

Clip lights for each channel indicate the onset of actual clipping. Even if the problem occurs for only a few microseconds, a pulse-stretching circuit will allow the LED to light long enough for you to see that a problem is occurring.

Because of the RA150/300/500's ability to enter and exit clipping with as few audible artifacts as possible, you may not hear any distortion even if the indicator flashes. In general, a few flashes every now and then will not be a problem. However, if the LEDs flash often or remain on for any extended period of time, then turn down the volume controls to reduce the signal level going to the RA150/300/500. If this doesn't solve the problem, check your output cables and speakers.

## **METERS (RA300 AND RA500 ONLY)**

In the center of the front panel are two meters that show the total power output of each channel. The highest (red) LED indicates the unit is at maximum output, at the onset of clipping. The orange PROTECT LEDs come on when the unit is 6 dB below rated output. Operation with the PROTECT LED on continuously will lead to amplifier overheating and eventual thermal shutdown to protect the circuitry. The two green LEDs closest to the PROTECT LED will actually light at higher levels than -6 dB, but before clipping. Lower green LEDs indicate signal in a normal operating range. No LEDs will light if the amplifier is operating 33 dB or less below maximum rated output.

The PROTECT LEDs will light in two other cases:

- For 4.5 seconds at initial turn-on while the output relay is connected.
- When the thermal protection circuitry is activated because the amplifier is overheating. Thermal protection will stop automatically when the amplifier cools down.

## **BACK PANEL CONTROLS**

### **AC VOLTAGE SWITCH**

Located near the power inlet is a recessed switch that allows voltage conversion from 120 volt to 230 volt operation. Use a small tool or pen to change the setting of this switch **only** if it is set to the wrong value for the country the amplifier will be used in.

**When changing voltages the fuse must be changed to the correct rating as shown on page 10.**

### **STEREO/BRIDGED MONO SWITCH**

Underneath the right input jack, this switch converts the RA150/300/500 from its normal operation as a two-channel amplifier to operation as a single-channel amplifier with approximately twice the power. Make sure this switch is set properly for your application. See page 20.

**If this switch is accidentally switched to Mono while wired for stereo, you will hear out-of-phase audio as the Channel 2/Right control is turned up.**

## **CHECKING FOR PROPER POLARITY**

To check for correct speaker polarity, briefly connect the + terminal of a 1.5V battery to the speaker cable's "hot" or + lead, and the battery's - terminal to the speaker cable's "cold," ground, or - lead. You will hear a "pop" from the loudspeaker as you connect the battery, and another as you disconnect it. Observe the direction of the speaker cone movement. If the speaker cables are wired in the common manner (and the speakers themselves are not mislabelled), the speaker cone will move forward (toward you) when you connect the battery and away from you when the battery is disconnected.

If the speaker cone moves in the opposite direction, reverse the wires going to the speaker and re-test for proper polarity. Always check your speakers' polarity as not all manufacturers follow the same wiring convention.



## USING THE RA150 AS A HEADPHONE AMPLIFIER

The RA150 is particularly suited for use driving high-impedance headphones in studio applications. However, the power is considerably greater than that provided by most "headphone amplifiers", which are often rated at 1 watt or below.



**Due to the high efficiency of headphones and the power of the amplifier, serious hearing damage may result from misuse of this product. Exercise caution regarding sound levels.**

Keep the following in mind:

- Many studio-quality headphones feature impedances of 600 ohms or greater. This means that many headphones of the same type may be plugged in parallel to the output of the RA150/300/500 before the 4-ohm limit is reached.
- If you plug in a headphone with a lower 8-ohm impedance, it will be dramatically higher in level than the others, and the high-impedance headphones may drop to inaudibility.
- The TRS 1/4" jack used in headphones will tie together the grounds of the left and right amplifier channels. **Use caution and only connect or disconnect headphones when the amplifier is powered off.**
- Keep the RA150's front panel volume controls at a very low level and the controls of the headphone send near maximum. This will prevent accidental "blasting" during a session.

## CHOOSING THE CORRECT SPEAKERS

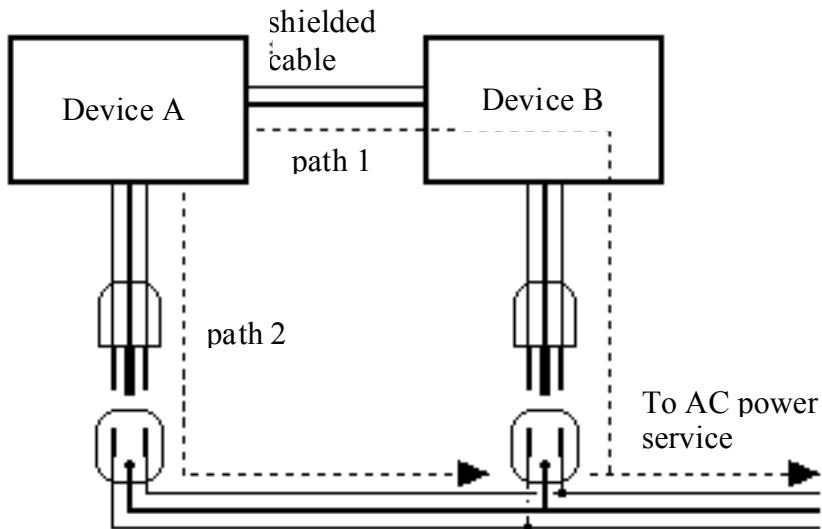
Near-field monitoring through "reference" speakers has become the preferred way to monitor and mix music. With near-field monitoring, small speakers are placed so that they are a few feet from the engineer's ears. As a result, room acoustics become less important since the primary acoustic interaction involves direct sound from the speakers rather than reflected sounds from the room. Since few home and project studios have good acoustics, near-field monitors can provide realistic monitoring in a small space at relatively low levels.

Near-field monitors offer other advantages compared to large studio speakers, including smaller size, lower cost, and easier transportability to other studios for reference purpose.

Because of its moderate power rating, excellent fidelity, and lack of a noise-generating fan, the RA150/300/500 "Reference Amplifier" excels in driving reference near-field monitor speakers in smaller studios. However, you should choose speakers that can handle the power the RA150/300/500 can generate. Speaker wattage ratings are often confusing, and standards by which ratings are obtained vary from manufacturer to manufacturer. If a speaker can handle 100 watts RMS continuous power, it should be able to handle the RA150/300/500. However, under conditions of clipping or other abuse of the RA150/300/500, damage to speakers is possible. For best results, use speakers designed for medium- to high-power applications.

## ABOUT GROUND LOOPS

A hum or buzz may be introduced into some audio systems by a phenomenon known as a ground loop. This can occur if a piece of equipment “sees” two or more different paths to ground, as shown below.



One path goes from device A to ground via the ground terminal of the three-conductor AC power cord, but A also sees a path to ground through the shielded cable and AC ground of device B. Because ground wires have a small amount of resistance, small amounts of current can flow through ground and generate a voltage along the cable shield. This signal may end up getting induced into the hot conductor.

The loop can also act like an antenna into which hum is induced, or can even pick up radio frequencies. Furthermore, many components in a circuit connect to ground. If that ground is “dirty” and contains noise, it might get picked up by the circuit. Ground loops cause the most problems with high-gain circuits, since massive amplification of even a couple millivolts of noise can give an audible signal.

Most ground loop problems can be solved by plugging all equipment into the same grounded AC source. However, it is important to make sure that the AC source is not overloaded and is properly rated to handle the gear plugged into it.

For really tough cases, you may need to break the connection that causes the loop condition. Although some do this by using a ground lifter and breaking the AC ground, THIS IS A DANGEROUS OPTION WHICH YOU SHOULD NOT USE

because it sacrifices the safety factor the AC ground wire provides. In the previous diagram, a better option would be to interrupt the cable shield. There are two ways to do this: one is to simply break the shield at some point, usually by disconnecting it from ground at one jack. (The other end should remain connected so that the shielding properties are retained, even if there is no direct path for ground.)

The other is to use a balancing transformer or direct box as mentioned on page 16 “Adapting the RA150/300/500 to Balanced Lines,” to provide isolation in the audio line between the two pieces of gear. Transformers generally have no ground connection between the input and output connections.

## SYSTEM SETUP AND TESTING

Before applying power for the first time, double check the wiring to insure that everything is firmly connected and that the proper signals are being fed to the proper places. If a low frequency signal in a multi-amplified system is applied to a high frequency transducer, the transducer can be damaged, and a loose connection can cause noise which can damage any transducer.

Be certain that the amplifier front panel gain controls are set to minimum when the system under test is first powered up. After the power is applied, slowly advance each gain control to confirm that there are no driver-destroying hums or buzzes present—if there are, turn the power off and locate the source of the difficulty.

When first applying program material to the system, it is also advisable to keep the gain controls turned down to confirm, once again, that the wiring is correct. Once the system wiring is determined to be correct, the gain controls can then be set to an appropriate level for the system gain structure.

## SETTING THE GAIN PROPERLY

Setting the system gain is fairly straightforward, but if it is not properly adjusted, the system's distortion and noise characteristics may be less than optimum.

*The most common cause of noisy operation, especially in studio use, is that the amplifier's gain controls are left all the way up, while the mixer's output is turned down. This can lead to blown speakers if the mixer is accidentally turned up, but more importantly, it amplifies the noise floor of the mixer output stage or wiring unnecessarily. Keeping the source level as high as possible and lowering the amplifier input gain will keep the noise level at a minimum.*

The input sensitivity of the RA150/300/500 amplifiers at the 1/4" input or XLR input is 1.23 volts (+4 dBu) for rated output with the amplifier gain controls at maximum. If you're plugged into the phono jacks, the sensitivity is -10 dBV (.316 volts). If the signal at the amplifier input is higher than this, the input gain controls of the RA150/300/500 must be turned down to avoid amplifier clipping. Most mixers output +4 dBu at nominal level/0 VU; that means if you go "into the yellow" on the meter of most mixers, the amp will be clipping its outputs or distorting the speakers unless you turn down the input gain controls.

It is generally best to try to keep the gain of the source device set for best signal-to-noise ratio consistent with distortion, and to then set the amplifier inputs for the desired SPL level.

*A good way to set levels is to use a test tone or pink noise with a sound level meter. Set the mixer's controls at nominal levels, increase the test tone until the mixer is exercising its dynamic range without clipping itself. The mixer's meter should read from +10 to +15. Then slowly raise the RA150/300/500's input level controls until the desired peak sound pressure level is achieved.*

### **Amplifier input clipping**

On the other hand, the maximum level at the amplifier's input terminals is +26 dBu, regardless of the setting of the channel input level controls. It is possible that the output signal from the source may be too high and, thus, distorted before it reaches the amplifier gain control, either because the source device is clipping or the amplifier input stage is overloaded. In either case, no amount of level control adjustment at the amplifier can remove this distortion, and you should lower the output level of the device feeding the amplifier until the distortion stops.

### **OUTPUT RELAYS/THERMAL CYCLING**

Reference Series amplifiers have high-current output protection relays which disconnect the output in the event of overheating, DC offset, audio signals below 5 Hz on the output terminals or excessively low line voltage. When this happens in the RA300/500, the PROTECT indicators of both channels will glow. Additional protection circuitry keeps RFI out of the audio circuits, assuring clean, stable operation in difficult environmental conditions.

If the unit shuts off, turn off the power and check for problems with the wiring, input level, or ventilation of the amplifier.

Continued high-temperature operation may also trigger an internal thermal fuse, which will shut the unit off entirely until it has cooled off. In this case, the PROTECT indicators and POWER indicators will turn off as well.

*Overheating is the most common cause of amplifier shutdown. You must ensure that the heat sinks of the amplifier are not blocked and can receive a supply of cooler air.*

# TROUBLESHOOTING

## TROUBLESHOOTING INDEX

Once all gain adjustments are made and proper operation is confirmed, no special considerations are required for Alesis Reference Series amplifiers. Aside from the front panel gain controls, there are no user adjustments or routine maintenance operations necessary (or available). If you experience problems while operating your RA150/300/500, please use the following table to locate possible causes and solutions before contacting Alesis Product Support for assistance.

Symptom	Cause	Solution
No audio from outputs	No input audio	Hook up inputs
	Bad cables	Replace the cables.
	Amplifier is turned down	Set levels to "12:00" or above
	Is the amplifier very hot? Is the ambient temperature and/or the air flow in the rack high? If so, the amplifier may be in thermal protect mode (PROTECT LEDs on)	Normal operation will resume when its internal temperature has dropped to reliable levels.
	Power is not connected	Time for a coffee break.
Low output power	Line voltage set improperly	Set the switch on the back panel to the "120 V" position
Bass disappears, speakers sound out of phase	Amplifier accidentally set to "Bridge Mono" mode when wired for stereo	Set the switch on the back panel to the "stereo" position
Buzz from outputs	Input cables are crossing a power cable or near a transformer	Make sure that the RA150/300/500 and its audio cables are kept away from power cables, other power transformers and wall warts.
		Use balanced inputs instead of unbalanced
	Bad cables	Replace the cable with a new, high-quality cable.
	Problem with the source	Try plugging a known line-level source to the amplifier inputs to see if the problem remains.
	Noise induced from a bad AC ground or noisy AC circuit	Connect to a different electrical circuit; use balanced inputs or plug amp and source into the same AC circuit

Symptom	Cause	Solution
Audio cuts in and out	Intermittent amplifier input signal	Clean input connectors, check wiring
	If the sound cuts out for a minute or two and then returns, the amplifier may be overheating and cycling through thermal protect mode	Check for short circuits in the output wiring or excessive ambient temperature
	Dirty volume pot	Move volume pot up and down several times
Unit shuts down, all lamps are off	Blown fuse	Obtain the proper size fuse (see page 10) and replace it
	Internal thermal fuse activated	Shut off power and let amplifier cool down
Thin or Muffled Sound	Defective loudspeaker drivers	Replace drivers
	In a multi-amplified system with a low level crossover network, bad outputs from the network, or improperly connected loudspeakers	Check crossover and connections. Check speaker connections.
	Balanced connector with one side disconnected, or no ground with an unbalanced input	Make sure input cables are connected to ground as required

## CARE AND MAINTENANCE

### CLEANING

Disconnect the AC cord, then use a damp cloth to clean the RA150/300/500's metal and plastic surfaces. For heavy dirt, use a non-abrasive household cleaner such as Formula 409™ or Fantastik™. DO NOT SPRAY THE CLEANER DIRECTLY ONTO THE FRONT OF THE UNIT AS IT MAY DESTROY THE LUBRICANTS USED IN THE SWITCHES AND CONTROLS! Spray onto a cloth, then use cloth to clean the unit.

### REFER ALL SERVICING TO ALESIS

We believe that the RA150/300/500 is one of the best amplifiers that can be made using current technology, and should provide years of trouble-free use. However, should problems occur, DO NOT attempt to service the unit yourself. Service on this product should be performed only by qualified technicians. NO USER-SERVICEABLE PARTS INSIDE.

## OBTAINING REPAIR SERVICE

Before contacting Alesis, check over all your connections, and make sure you've read the manual.

**Customers in the USA and Canada:** If the problem persists, contact Alesis USA at [www.alesis.com](http://www.alesis.com) & find the Product Support web page. Make sure you have the unit's serial number with you. If necessary contact one of our technicians; if appropriate, you will be given a return order (RO) number and instructions on how to return the unit. All units must be shipped prepaid and COD shipments will not be accepted.

For prompt service, indicate the RO number on the shipping label. **Units without an RO will not be accepted.** If you do not have the original packing, ship the unit in a sturdy carton, with shock-absorbing materials such as Styrofoam pellets (the kind without CFCs, please) or "bubble-pack" surrounding the unit. Shipping damage caused by inadequate packing is not covered by the Alesis warranty.

Tape a note to the top of the unit describing the problem, include your name and a phone number where Alesis can contact you if necessary, as well as instructions on where you want the product returned. Alesis will pay for standard one-way shipping back to you on any repair covered under the terms of this warranty. Next day service is available for a surcharge. Field repairs are not authorized during the warranty period, and repair attempts by unqualified personnel may invalidate the warranty.

## CUSTOMERS OUTSIDE THE USA AND CANADA:

Contact your local Alesis distributor for any warranty assistance. The Alesis Limited Warranty applies only to products sold to users in the USA and Canada. Customers outside of the USA and Canada are not covered by this Limited Warranty and may or may not be covered by an independent distributor warranty in the country of sale. Do not return products to the factory unless you have been given specific instructions to do so.

**Internet Address:** Important information and advice is available on our web site:

<http://www.alesis.com>

Email may be addressed to:

[Support@alesis.com](mailto:Support@alesis.com)

# SPECIFICATIONS

## Reference 150

<b>Size</b>	18.9" W x 3.9" H x 10.25" D (480mm x 99 mm x 260 mm)
<b>Rack units</b>	2RU height
<b>Weight</b>	15lbs = 6.8Kg
<b><u>Rated output, per channel</u></b>	
4 ohms @ 1kHz, .02% THD+N	75 watts RMS per channel
8 ohms @ 1kHz, .05% THD+N	45 watts RMS per channel
8 ohms, bridged mono mode	150 watts RMS
<b>Signal to Noise Ratio</b>	>105dB, 22Hz-22kHz bandwidth referenced to rated output
<b>Frequency Response</b>	10Hz – 70kHz +0, -3dB
<b>Damping Factor</b>	200
<b>Slew Rate</b>	60 V/μs (two channel), 120 V/μs (bridged mono)
<b>Input Sensitivity</b>	+4dBu (1.23 V) for rated output with input control at maximum
<b>Maximum input level</b>	+26 dBu
<b>Input impedance</b>	20k Ω, balanced, 10 kΩ unbalanced
<b>Crosstalk</b>	-85dB, 1kHz
<b>Output offset</b>	+/- 50 mV, Servo controlled

## Reference 300

<b>Size</b>	18.9" W x 3.9" H x 10.63" D (480mm x 99 mm x 270 mm)
<b>Rack units</b>	2RU height
<b>Weight</b>	19lbs = 8.6Kg
<b><u>Rated output, per channel</u></b>	
4 ohms @ 1kHz, .02% THD+N	150 watts RMS per channel
8 ohms @ 1kHz, .05% THD+N	90 watts RMS per channel
8 ohms, bridged mono mode	300 watts RMS
<b>Signal to Noise Ratio</b>	>105dB, 22Hz-22kHz bandwidth referenced to rated output
<b>Frequency Response</b>	10Hz – 70kHz +0, -3dB
<b>Damping Factor</b>	200
<b>Slew Rate</b>	60 V/μs (two channel), 120 V/μs (bridged mono)
<b>Input Sensitivity</b>	+4dBu (1.23 V) for rated output with input control at maximum
<b>Maximum input level</b>	+26 dBu
<b>Input impedance</b>	20k Ω, balanced, 10 kΩ unbalanced
<b>Crosstalk</b>	-85dB, 1kHz
<b>Output offset</b>	+/- 50 mV, Servo controlled



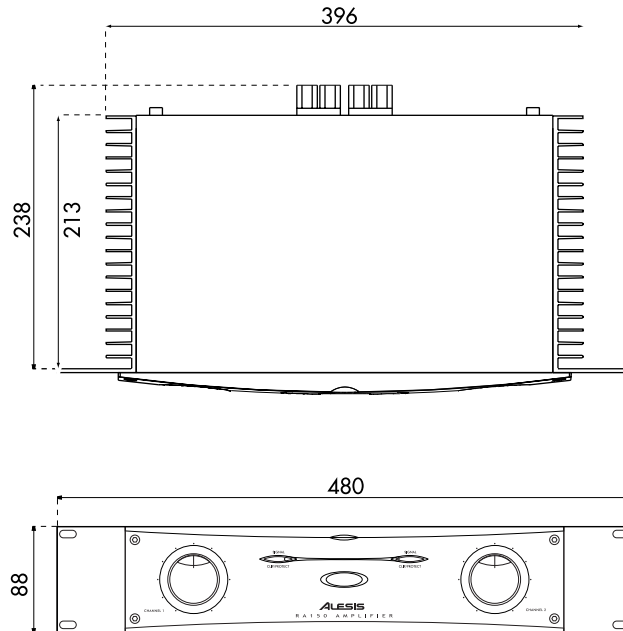
Reference 500

<b>Size</b>	18.9" W x 5.63" H x 10.71" D (480mm x 143 mm x 272 mm)
<b>Rack units</b>	3 RU height
<b>Weight</b>	28.5lbs = 13.0Kg
<b><u>Rated output, per channel</u></b>	
4 ohms @ 1kHz, .02% THD+N	250 watts RMS per channel
8 ohms @ 1kHz, .05% THD+N	150 watts RMS per channel
8 ohms, bridged mono mode	500 watts RMS
<b>Signal to Noise Ratio</b>	105dB, 22Hz-22kHz bandwidth referenced to rated output
<b>Frequency Response</b>	10Hz – 70kHz +0, -3dB
<b>Damping Factor</b>	200
<b>Slew Rate</b>	60 V/μs (two channel), 120 V/μs (bridged mono)
<b>Input Sensitivity</b>	+4dBu (1.23 V) for rated output with input control at maximum
<b>Maximum input level</b>	+26 dBu
<b>Input impedance</b>	20k Ω, balanced, 10 kΩ unbalanced
<b>Crosstalk</b>	-85dB, 1kHz

All measurements done over a 20Hz-22,000Hz range with 1kHz sine wave at Full Scale, except for the dynamic range which was done with a -60dBFS 1kHz sine wave.

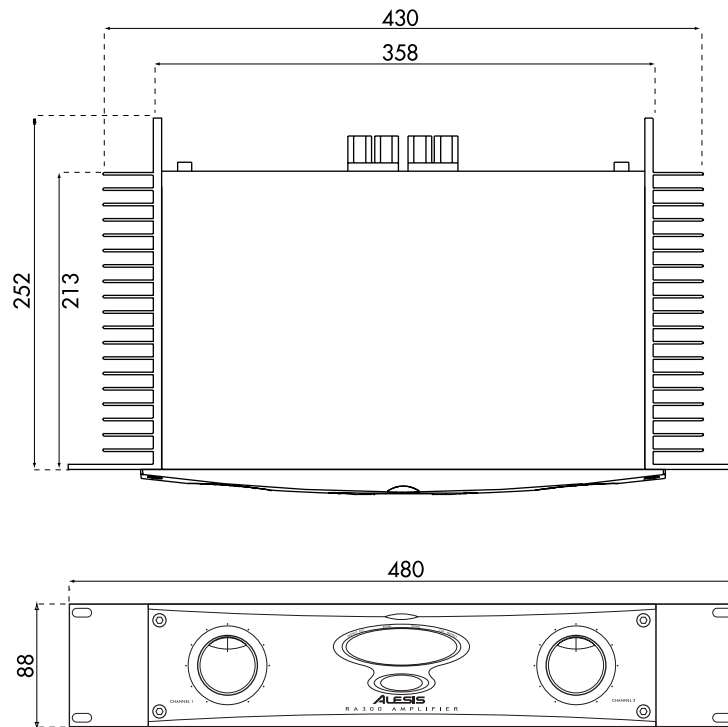
Dimensioned drawings

RA150

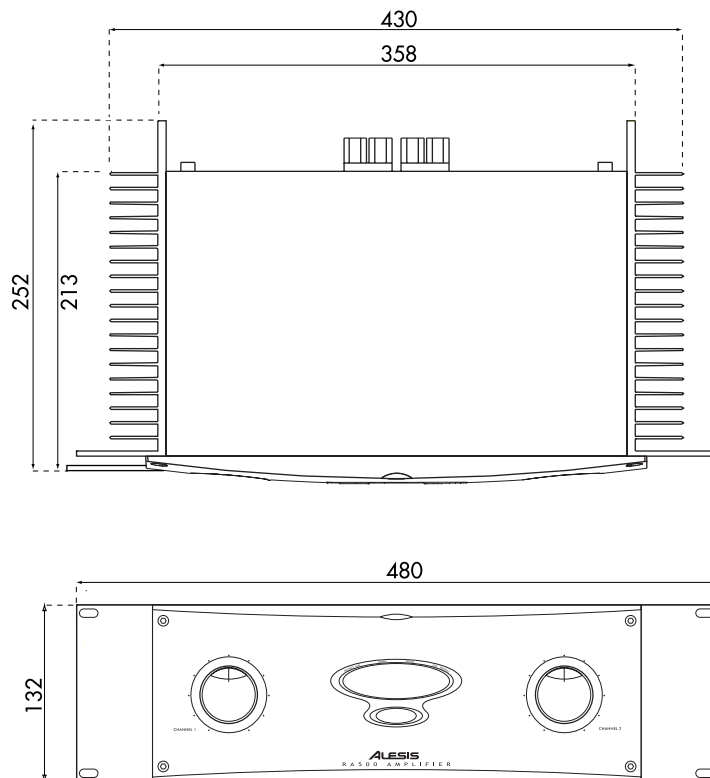


# Specifications

## RA300



## RA500



## Architect's and Engineer's Specifications

The power amplifier shall be a two-channel unit capable of being switched to single-channel bridged mode operation. All components shall be of high quality and mechanical construction and optimized for high reliability under adverse physical and electrical conditions. Cooling shall be convection-type only, with no fan mounted inside the amplifier.

The inputs shall be differentially balanced with active current sources for rejection of electromagnetic interference. The input connectors shall be 3-conductor 1/4" TRS jacks mounted on the back panel. Additional unbalanced RCA/ phono inputs shall also be mounted on the back panel. [RA300 and RA500: There shall also be provision for female XLR input jacks on each channel.]

The output stages of the amplifier shall be a high current, triple darlington type biased for class AB operation, fully rated for continuous 4 ohm operation with 2 ohm dynamic stability (stereo mode only). An active DC servo circuit is to be employed to automatically null DC output voltage offsets. The amplifier shall feature active circuitry that continuously monitors the output stage for excessive DC offset, short circuits and thermal overload. In the event of an output fault, the protection circuitry will activate the output relay and disconnect the loudspeaker load. This circuitry will also mute the amplifier during power on/off transitions.

The power supplies of the amplifier shall utilize heavy-duty stacked steel EI laminated transformers for maximum performance and reliability, with high current bridge rectifiers, massive secondary capacitors and current in-rush limiters. An external voltage selection switch on the back panel shall allow the user to switch between 120-volt and 230-volt AC power input. A power switch shall be provided on the front panel with an on/off indicator lamp.

The front panel of the amplifier shall feature two detented volume controls capable of delivering full rated power at full clockwise rotation with a +4 dBu input, and turning the amplifier down **at least 70 dB** or to silence at full counterclockwise rotation.

The chassis shall be rack mountable in a standard 19" EIA equipment rack. Output connectors shall be two-way binding posts capable of accepting heavy gauge wire or banana-type connectors.

The power output of the amplifier shall be 75 watts per channel (RA150), 150 watts per channel (RA300) or 250 watts per channel (RA500) into a 4-ohm load, with no more than .02% total harmonic distortion. The units shall be capable of 150 watts (RA150), 300 watts (RA300), or 500 watts (RA500) into an 8-ohm load when operated in bridged mono mode with no more than .05% total harmonic distortion.

The amplifier shall be an Alesis RA150/300/500 Reference Series power amplifier.

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# ALESIS LIMITED WARRANTY

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ALESIS ("ALESIS") warrants this product to be free of defects in material and workmanship for a period of one (1) year for parts and for a period of one (1) year for labor from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned.

The purchaser should register their product online @ [www.alesis.com](http://www.alesis.com) within 14 days of purchase.

During the warranty period ALESIS shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by ALESIS or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law.

To obtain warranty service, the purchaser must first call or write ALESIS at the address and telephone number printed below to obtain a Return Authorization Number and instructions concerning where to return the unit for service. All inquiries must be accompanied by a description of the problem. All authorized returns must be sent to ALESIS or an authorized ALESIS repair facility postage prepaid, insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale, canceled check or some other positive proof that the product is within the warranty period. ALESIS reserves the right to update any unit returned for repair. ALESIS reserves the right to change or improve design of the product at any time without prior notice.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

THE ABOVE WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTIES OR REPRESENTATIONS WHETHER EXPRESS OR IMPLIED OR OTHERWISE, WITH RESPECT TO THE PRODUCT, AND SPECIFICALLY EXCLUDE ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OR OTHER IMPLIED WARRANTIES. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT WILL ALESIS BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER DAMAGES RESULTING FROM THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING, AMONG OTHER THINGS, DAMAGE TO PROPERTY, DAMAGE BASED ON INCONVENIENCE OR ON LOSS OF USE OF THE PRODUCT, AND, TO THE EXTENT PERMITTED BY LAW, DAMAGES FOR PERSONAL INJURY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

THIS CONTRACT SHALL BE GOVERNED BY THE INTERNAL LAWS OF THE STATE OF CALIFORNIA WITHOUT REFERENCE TO CONFLICTS OF LAWS. This warranty gives you specific legal rights, and you may also have other rights required by law which vary from state to state.

This warranty only applies to products sold to purchasers in the United States of America or Canada. The terms of this warranty and any obligations of Alesis under this warranty shall apply only within the country of sale. Without limiting the foregoing, repairs under this warranty shall be made only by a duly authorized Alesis service representative in the country of sale. For warranty information in all other countries please refer to your local distributor.

ALESIS

Los Angeles, California USA

[www.alesis.com](http://www.alesis.com)

**PLEASE REGISTER YOUR PRODUCT ONLINE:**

**[WWW.ALESIS.COM](http://WWW.ALESIS.COM)**

Alesis, Los Angeles, CA USA

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7-51-0097 11/00

