

# ALESIS RA-100

## Reference Manual

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**DO NOT REMOVE THE RA-100 TOP COVER. THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO A QUALIFIED REPAIR TECHNICIAN.**

# CHAPTER 1: MEET THE RA-100

## 1.1 INTRODUCTION

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### Principal Features

Congratulations on your purchase of the Alesis RA-100 Reference Amplifier. With all the wondrous advances in both analog and digital electronics in the past few years, it's easy to forget that an audio chain is only as good as its weakest link. With low-cost digital devices now offering sound quality unheard of only a few years ago, Alesis has applied its expertise toward creating a sonically accurate, stable, and affordable stereo power amplifier that's suitable for the digital age. Optimized for studio monitoring applications and moderate-power live performance setups, the amp's main features include:

- 100 watts per channel into 4Ω, 75 watts per channel into 8Ω
- Dual clipping indicators alert you of *any* type of non-linear operation, not just clipping
- Output short circuit protection to minimize down time and protect the amplifier's circuitry
- Massive, conservatively rated, custom-designed extruded heat sinks (individual for each channel) for cool operation
- No ventilation fan is needed, allowing for quiet operation and reduced ambient noise in the studio
- Extremely low noise and distortion; suitable for quiet applications such as recording studios, church installations, and museums

However, some of the RA-100's most important features are hard to put on a spec sheet. In a quest for a "musical" sounding power amp that can stand up to a tough life on the road as well as continuous operation in the studio, Alesis has made some changes—some minor, and some very significant—to the standard power amp.

- The RA-100 doesn't produce any audio transients during power-up or

power-down. Nonetheless, there's a 2-second mute on power-up to compensate for any pieces of equipment plugged into the RA-100 that produce transients upon power-up, and receive power at the same time as the RA-100. Also, because the amp doesn't produce power on/off thumps itself, the mute circuit can be pre-power amp. This allows simpler circuitry than what would be required for shutting down the power amp stages.

- The RA-100's power supply has plenty of reserve capacity to handle percussive transients, but if someone kicks the RA-100's plug out of the wall, you want all amplification to cease immediately. Therefore, if the amp senses any loss of power, it instantly mutes the audio.
- Because power-up and -down are noiseless, the on/off switch doubles as a mute or "panic" button.
- The output stage uses full complementary-symmetry circuitry throughout. Although there are cheaper ways to design an output stage, this time-tested approach is generally considered superior to non-complementary-symmetry types. The output devices are rated at 30 Amps of peak current, and boast a 20 MHz FT (transition frequency) for superior bandwidth.
- Extremely good stability with reactive loads (e.g., speakers and crossovers). Stable operation is essential when presented with the changing load characteristics of typical speakers; the RA-100 uses several stabilization techniques to maintain consistent feedback network characteristics.
- Alesis recognizes that amplifiers will sometimes be driven into clipping—even though this is not good practice—during a recording session or under the pressures of live performance. As a result, a great deal of research went into creating the best possible clipping entry/recovery characteristics. Amps with lots of overdrive and saturation tend to create overshoot and ringing during the clipping process, which degrades the sound; the RA-100 has been designed so that it exhibits very little saturation, even when overloaded. As a result, it enters and exits clipping very cleanly. Clean clipping allows the RA-100 to be driven harder, which makes the overall perceived sound louder.

Monitoring a sine wave being clipped confirms this action. With the RA-100, the amp will follow the original input signal as soon as clipping ceases (a). With some conventional amp designs, the signal will "hang" at the clipped level for a while before catching up with the input signal (b). This saturation-caused overshoot can sometimes sound worse than the clipping itself.

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- No “speaker stress” during shutdown. With traditional protection circuitry, the act of clamping the output devices to a safe value can make the amp unstable with particular notes that interact with the speaker resonance, thus producing oscillation or “motorboating.” This could damage your speakers. The RA-100 uses an elegant clamping design that observes the load at all times but also integrates the signal characteristics into the clamping action. Thus, the clamping action is gentle and, after clamping to the maximum current encountered in normal operation, will slowly (over 1 to 2 seconds) clamp based on the load and signal characteristics. If the source of the problem (e.g., a short across the speaker terminals) is removed, the signal recovers instantly.
- Alesis also recognizes that whatever else, “the show must go on.” As a result, under conditions of extreme abuse (such as ultra-low speaker impedances or mounting that allows for no ventilation), the RA-100 will limit its signal rather than simply shut down. Taken to an extreme, this will produce distortion but sound will still come out.

To acquaint yourself with the RA-100’s operation, and to use it properly in various applications, carefully read this manual. Power amplifiers are high-current devices that are the next-to-last link in the audio chain. Proper attention to cabling, power distribution, ground loops, and other topics covered in this manual is vital to have the RA-100 live up to its full potential.

As always, we welcome your suggestions and comments concerning this product, or any other product in the Alesis line.

## **Unpacking and Inspection**

Your new Alesis power amplifier was carefully packed at the factory, and the container was designed to protect the unit during shipping. Please retain this container in the highly unlikely event that you need to return the RA-100 for servicing.

Upon receiving the RA-100, carefully examine the shipping carton and its contents for any sign of physical damage that may have occurred in transit. If you detect any damage, do not destroy any of the packing material or the carton, and immediately notify the carrier of a possible claim for damage. Damage claims must be made by you. If you picked up your amplifier directly from an Alesis dealer, contact the dealer.

The shipping carton should contain:

- This instruction manual

- Alesis RA-100 power amp with the same serial number as shown on the shipping carton
- Power cord.
- Four stick-on rubber feet (for shelf mounting, to prevent the RA-100's bottom surface from scratching the shelf)
- Alesis warranty card. It is important to register your purchase; if you have not already filled out your warranty card, please do so now.

## **About This Manual**

The manual presents information in a logical order. Chapter 2 covers installation, and Chapter 3, how to use the RA-100. Chapter 4 covers several typical applications. The manual closes with information on maintenance/servicing, troubleshooting, and operating specifications.

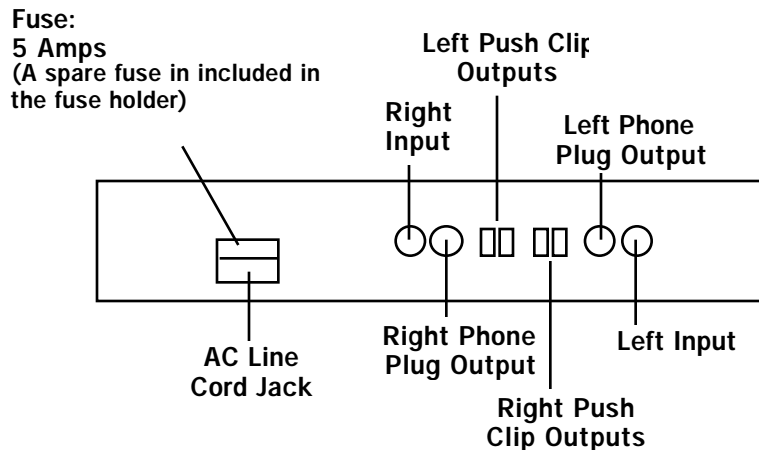
Please remember that a power amplifier is a high-current, high-power device and should be treated with respect and care. Even if you are an audio veteran, we urge you to read the entire manual to make the best use of the RA-100.

# CHAPTER 2: INSTALLATION

## 2.1 REAR PANEL CONNECTIONS

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The following diagram shows the various rear-panel components. Please refer to this diagram during the procedures described in this chapter.



## 2.2 POWER CONSIDERATIONS

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### Fuse

Replace with a 5 Amp, slow-blow 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.**

### The AC Cord

The RA-100's IEC-spec AC cord (do not substitute any other AC cord) is designed to feed an outlet that includes three pins, with the third, round pin connected to ground. The ground connection is an important safety feature designed to keep the chassis of electronic devices such as the RA-100 at ground potential.

**DO NOT OPERATE ANY ELECTRICAL EQUIPMENT WITH UNGROUNDED OUTLETS. PLUGGING THE RA-100 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 RA-100 OR ANY ASSOCIATED EQUIPMENT WITH IMPROPER AC WIRING.

## **Electrical Service to the RA-100**

Although the RA-100 has a maximum audio output rating of 200 watts total into  $4\Omega$ , this does not represent the total current consumption since there are certain inefficiencies inherent in linear amplifier design. As a result, the fuse is rated at 5 Amps, implying that the maximum current the RA-100 can draw is around 500 watts. However, in typical studio applications the average power consumption will be much less. However, when multiple devices are plugged into a single AC outlet, the possibility of overheated connections can exist.

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 RA-100 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 RA-100 into a different circuit with a lesser load.

## **2.3 OPERATING ENVIRONMENT**

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### **Thermal Considerations in Rack Mounting**

The RA-100 can be mounted in an equipment rack (taking up 2 rack spaces), 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 RA-100'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 for as long as the excessive temperature conditions exists.

The RA-100 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. The RA-100 should be installed so that its heat sinking is allowed to do its job. Please observe the following:

- The RA-100 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 RA-100 will meet its published specs if operated outside of these ranges. If necessary, use a fan to blow air over the RA-100 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 RA-100. Do not seal any enclosure that holds the RA-100.
- 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.
- Due to the RA-100’s weight (13.5 lbs.), it’s a good idea to mount it in the bottom of the rack frame.

## **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 “Thermal Considerations in Rack Mounting” no matter where or how the

amp is mounted.

## **Avoiding Electromagnetic Interference**

Because the RA-100 contains a large power transformer, we recommend that you do not:

- Place the RA-100 next to an unshielded video monitor, as the magnetic fields may distort the image.
- Place tapes, disks, or other magnetic media close to the RA-100.
- Play guitar, bass, or any other instrument with magnetic pickups near the RA-100. No damage will occur but AC fields may enter the pickups, causing hum.

## **2.4 INPUTS**

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### **Input Jack Characteristics**

The RA-100 includes two unbalanced, 1/4" phone jack inputs. These are compatible with the low-impedance, unbalanced, high level outputs typically emanating from equipment such as mixers, synthesizers, samplers, direct boxes, crossovers, etc. Guitars, microphones, and other low-level/high-impedance output devices require a preamp.

The input jack wiring convention is:

- Tip: signal hot
- Sleeve: shield and ground

### **Cables**

Use only high quality cables when interfacing equipment with the RA-100. 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 RA-100 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 RA-100 IS TURNED OFF, UNPLUGGED FROM THE AC LINE, OR HAS THE LEFT AND RIGHT 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 RA-100 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 two 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.

## **Adapting the RA-100 to Balanced Lines**

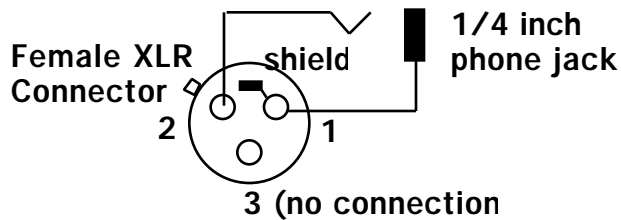
With long cable runs (e.g., over 6 meters/20 feet) in noisy electrical environments, the cable itself can act as an “antenna” and pick up RF fields, AC hum, or other types of interference. To avoid these problems, many professional studios and live sound companies use balanced line connections. The average application will probably not require balanced lines, so try unbalanced connectors first and convert to balanced line operation only if warranted.

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 adapt a balanced line output to feed the RA-100, you have four options.

- **Balanced line to unbalanced line transformer.** These commonly available audio accessories have a balanced line input, usually in the form of an XLR connector, and an unbalanced line output, usually in the form of a 1/4" phone jack. The same transformer can also convert unbalanced signals to balanced signals. *Advantages:* 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 balanced-to-unbalanced converter.** This uses an active electronic circuit to convert balanced lines to unbalanced lines, 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.
- **1622 mixer.** Inputs 1-8 of the Alesis 1622 mixer include balanced line inputs as well as direct-to-tape unbalanced outputs and unbalanced signal send points. You can plug a balanced line signal into the balanced XLR input, then patch either the direct out or send connection to the RA-100. *Advantages:* Available “free” if you have a 1622, flat frequency response, no inherent hum pickup. *Disadvantages:* Generates some hiss, optimized primarily for low level signals.
- **Wire your own adapter.** It is possible to feed just one of the balanced lines,

along with ground, into the RA-100. The following diagram shows an adapter that assumes pin 2 of the XLR connector is “hot.”



If pin 3 is hot, then do not connect pin 2 to anything, and connect the wire from the 1/4" phone jack tip to pin 3 of the XLR female connector. If your system uses stereo phone jacks to carry balanced line signals (the tip and ring should carry the in-phase and out-of-phase signals, respectively, although this may be reversed in some systems), then an adapter is not necessary. Simply plug a stereo cord from the balanced phone jack into the RA-100's input; it will ignore the ring connection and amplify only the tip connection.

*Advantages:* Inexpensive, simple. *Disadvantages:* No inherent hum and noise rejection; defeats advantages of balanced line operation

## 2.5 OUTPUTS

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### Connector Options

The RA-100 is intended to drive loads of  $4\Omega$  or greater. There are two speaker connection output options for each channel: 1/4" mono phone jack, and push clip terminals (red = “hot” output, black = ground). Push 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.

Phone jack connections are used for sound reinforcement or any situation when quick setup and breakdown are important. You are also less likely to accidentally reverse the wires if they are permanently connected to phone plugs.

### Output Cables

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. Therefore, the cables you use between the RA-100 and its speakers are very

important.

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

Never use 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/affordable.

In any event, the thicker the cable, the lower the resistance and the better the current-carrying capability. Standard hookup wire is not acceptable; the minimum acceptable wire type is the common “zip cord” used to connect AC to appliances. The following table relates the wire gauge to the how many feet of cable is required at different impedances to produce a 1 dB power loss. . 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 feet	at 4Ω meters	at 8Ω feet	at 8Ω 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 Cables to Push Connectors**

The RA-100 push connectors are perfect for studio installations, especially near field monitor usage, where an effective and reliable connector is

required that still maintains the great cost/performance ratio of the RA-100's design. In addition, push connectors are very easy to set up. To connect cable to the push connectors, remove approximately 1/4" of insulation from the end of the wire, being careful not to nick any of the strands. Twist the strands together, press the push terminal button, and feed the strands through the exposed hole in the push connector. Be careful that:

- The push connector grabs the strands, not the insulation
- No stray strands contact any part of the chassis other than the push connector.

## **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, 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 RA-100, 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 push connector must connect to the speaker's positive (+) terminal. This will insure that polarity from the RA-100 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 RA-100. To test for proper speaker and system polarity, see section 3.2.

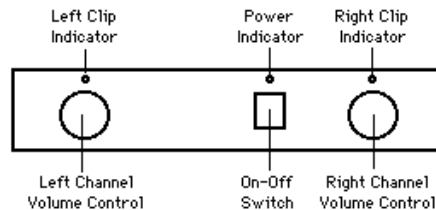


# CHAPTER 3: USING THE RA-100

## 3.1 FRONT PANEL CONTROLS

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



### Volume Controls

These regulate the input signal going into the RA-100. Always turn the volume controls all the way down (counterclockwise) when making input or output connections to the RA-100. 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 RA-100 is "live."

### On-Off Switch

Press the upper half of this rocker-type switch to turn the amplifier on, and the lower half to turn the amplifier off.

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

**WHEN TURNING ON AND OFF THE GEAR IN A SYSTEM, IT IS IMPORTANT TO TURN ON THE POWER AMP LAST AND TURN IT OFF FIRST.** Devices that are amplified by the RA-100 may generate thumps or other transients on power-up; if the RA-100 is on, these transients could be of sufficient amplitude to damage your speakers, especially if system levels were inadvertently set too high. Conversely, some units also create transients when turned off. For this reason, the RA-100 should always be turned off first.

However, Alesis realizes that in many applications the RA-100 power switch will be left on and the RA-100, along with other gear, will be switched on by a master AC switch. As a result, there is a brief delay to allow other equipment in your system to settle down after receiving power. After this delay, during which the other units will have presumably made all the noises they were going to make, the RA-100 will be ready for operation.

## Mute Switch

Because turning the RA-100 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 RA-100, then chase down the source of the problem.

## Clip Indicators

These improve on conventional clipping indicators by showing whenever *any* conditions occur that could lead to non-linearity, such as an extremely out-of-spec load (e.g., too many speakers connected in parallel or a short across the speaker terminals). 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 RA-100’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 RA-100. If this doesn’t solve the problem, check your output cables and speakers.

## 3.2 CHECKING FOR PROPER POLARITY

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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.

## 3.3 CHOOSING THE CORRECT SPEAKERS

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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.

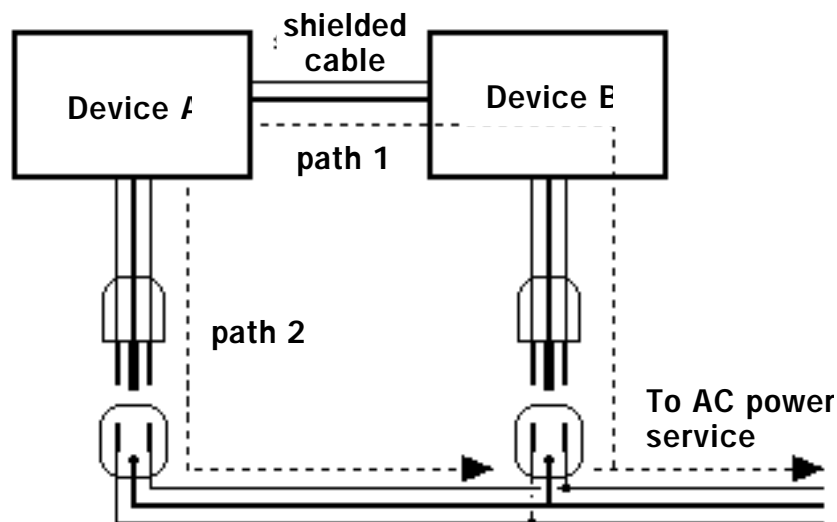
Near-field monitors offer other advantages compared to large studio speakers, including smaller size, lower cost, and easier transportability to other studios for reference purpose.

Because of its moderate power rating, excellent fidelity, and lack of a noise-generating fan, the RA-100 “Reference Amplifier” excels in driving reference near-field monitor speakers in smaller studios. However, you should choose speakers that can handle the power the RA-100 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 RA-100. However, under conditions of clipping or other abuse of the RA-100, damage to speakers is possible. For best results, use speakers designed for medium- to high-power applications.

## 3.4 ABOUT GROUND LOOPS

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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.

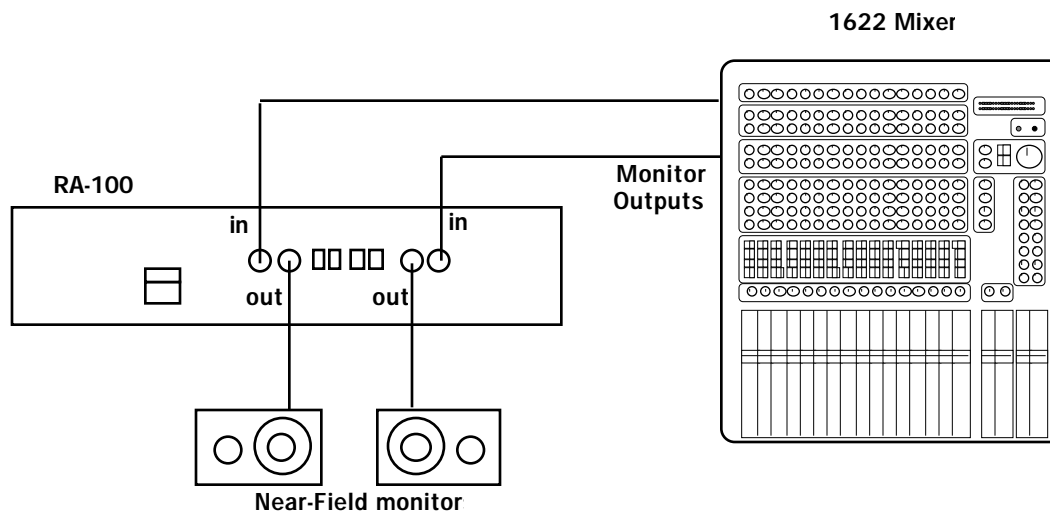
For really tough cases, you may need to break the connection that causes the loop condition. Although some do this by using a ground lifter and breaking the AC ground, **THIS IS A DANGEROUS OPTION WHICH YOU SHOULD NOT USE** because it sacrifices the safety factor the AC ground wire provides. In the previous 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 transformer as mentioned in section 2.4, “Adapting the RA-100 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.

# CHAPTER 4: TYPICAL APPLICATIONS

## 4.1 STUDIO MONITOR AMP

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In the studio, the RA-100 is ideal for driving near-field or other reference speakers. In this example, an Alesis 1622 mixer feeds the RA-100, which provides power amplification. The RA-100 outputs feed a set of near-field monitor speakers.

## 4.2 SOUND REINFORCEMENT

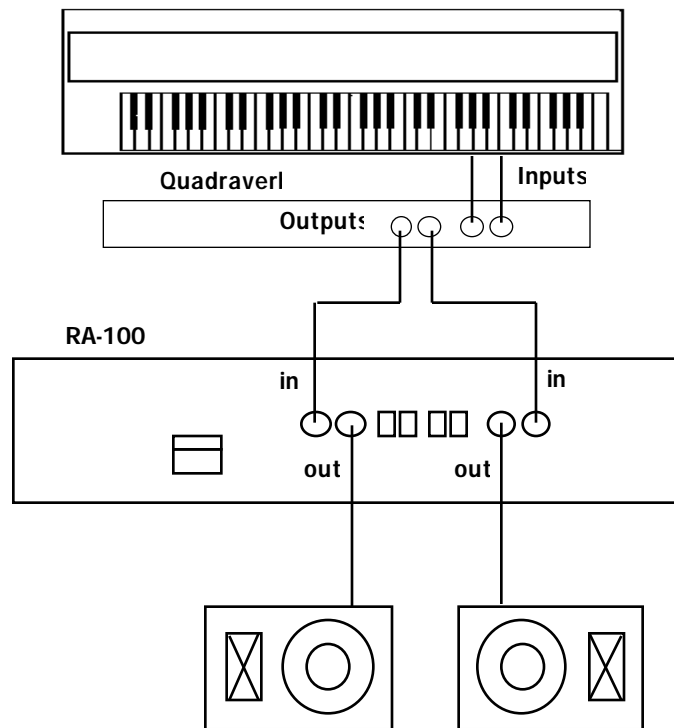
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For auditorium and live music use, the RA-100 has sufficient power to drive a set of small-to-medium size club speakers. The hookup diagram is the same as above, with an Alesis 1622 mixer feeding the RA-100, and the RA-100 driving the speakers.

Bi-amplification often provides better live sound and greater efficiency by splitting the audio signal into two different channels. One channel drives a low frequency speaker system and the other, a high frequency speaker system. See Section 4.5.

## 4.3 KEYBOARD AMPLIFICATION SYSTEM

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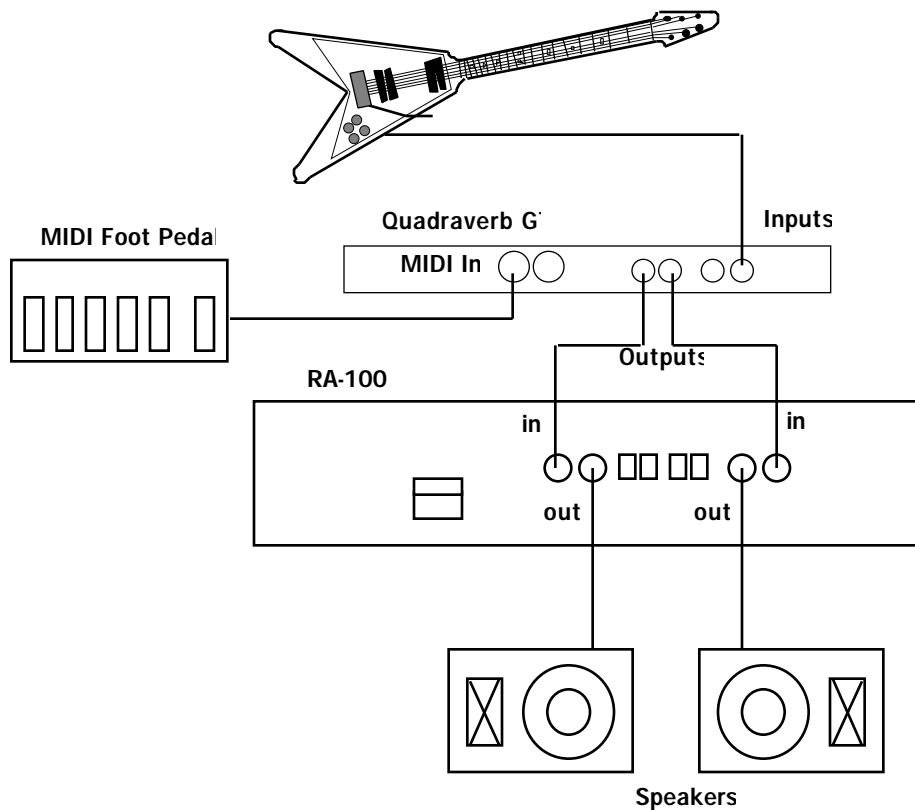
A stereo keyboard feeds the Alesis QuadraVerb, which provides reverberation and other signal processing effects. The QuadraVerb outputs feed the RA-100, which then drives a set of small-to-medium size club speakers.

With multiple keyboard setups, you may need a mixer to combine the keyboard outputs into a single stereo feed. The Alesis 1622 Mixer is ideal for this type of application. The QuadraVerb can either process the 1622's outputs on the way to the power amp as shown, or be inserted into the 1622 and use the 1622's send/return effects capabilities. In this case, the 1622 master outputs would go directly into the RA-100.

Remember that synthesizers require full-range speakers to accommodate the extremely low and high frequencies some keyboards can generate.

## 4.4 GUITAR AMPLIFICATION SYSTEM

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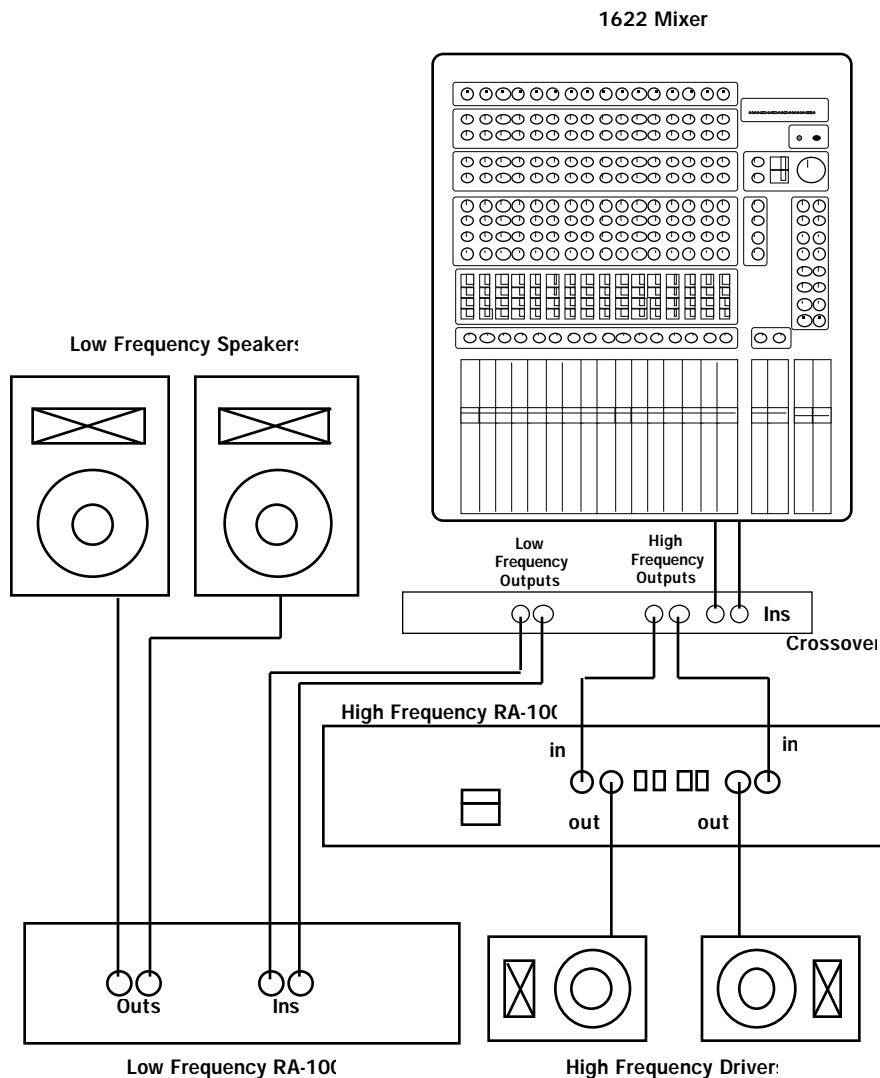
Many guitarists now use rack mount, component systems for greater flexibility compared to “all-in-one” amps. In this system, a guitar goes through a QuadraVerb GT to provide distortion, chorusing, reverb, and other effects. Its outputs feed the RA-100, which then drives a set of small-to-medium size club speakers.

Note that mono sound sources should plug into the *right* QuadraVerb GT input jack, as show in the diagram.

An optional MIDI Program Change footswitch calls up different programs in the QuadraVerb GT.

## 4.5 BIAMP SOUND REINFORCEMENT

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Biampification splits a signal into two separate lines. One carries low frequency signals and the other carries high frequency signals. Each split feeds its own power amp and set of speakers. The main advantages of biampification are greater efficiency and lower intermodulation distortion since low frequency speakers need not carry high frequencies (and high frequency speakers won't receive low frequencies).

In this setup, an Alesis 1622 mixer feeds a crossover that generates the separate high and low frequency splits. The low frequencies go to one RA-100 which drives the low frequency speaker system; the other RA-100 handles the higher frequencies and drives a set of high frequency speakers.



# CHAPTER 5: MAINTENANCE/SERVICE

## 5.1 GENERAL INFORMATION

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### Cleaning

Disconnect the AC cord, then use a damp cloth to clean the amplifier'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 the cloth to clean the unit.

### Maintenance

Here are some tips for preventive maintenance.

- **Do not remove the RA-100 top cover. There are no user serviceable parts inside. Refer servicing to a qualified repair technician.**
- Periodically check the AC cord for signs of fraying or damage.
- If you use the push connector output terminals, check that the cables are securely in place and that no strands short to the chassis or any other terminal.
- Periodically rotate the volume controls (make sure power is off). In many applications the volume controls will be set to a particular point and not adjusted. Occasional rotation of the volume controls will minimize build-up of dust on the potentiometer wiper, thus minimizing scratchiness as the unit gets older.
- Place a dust cover over the RA-100 when it is not in use.

### Refer All Servicing to Alesis

Alesis has spent a great deal of effort researching power amplifier reliability. We believe that the RA-100 is one of the most reliable amplifiers that can be made using current technology, and should provide years of trouble-free use.

**WARNING:** The full AC line voltage, as well as high voltage/high current DC voltages, are present at several points within the chassis. Service on this product should be performed only by qualified technicians. **THERE ARE NO USER-SERVICEABLE PARTS INSIDE.**

# CHAPTER 6: TROUBLESHOOTING

Begin the troubleshooting process by re-reading the manual to make sure you didn't miss some important point regarding the unit's operation. After that, try the following techniques for specific problems.

## **Hum**

Turn down the volume controls. If the hum goes away, then the source of the hum is either in a unit feeding the RA-100, or in the input cables feeding the RA-100. Check your cables and other units.

If the hum persists, there may be a ground loop. Follow the advice given in section 3.4. Also, check to see that the RA-100 is not situated near other devices with large external hum fields.

If a loud hum continues, there may be a problem within the RA-100.

## **No Volume**

Turn up the volume controls with no signal feeding the RA-100, and listen very carefully to the speakers. If you hear any hum or noise, no matter how low level, then the RA-100 is receiving power and the problem probably lies in the equipment or cables feeding the RA-100.

If the speakers are absolutely dead and make no noise whatsoever, check the speaker cabling.

## **Distorted or Low Level Sound**

If either of these problems occurs after the RA-100 has been on for a long time and running under a heavy load, it is possible that the output protection circuitry has kicked in. Let the unit rest for a minute by turning off the power and see if the problem goes away. If it does, check for thermal problems such as obstructed air flow around the unit.

Bad cables can also cause distorted or low level sound—yet another argument for using the best cables you can afford.

## **Thin Sound/Sound that Changes Unpredictably in a Room**

This is generally the result of mismatched speaker polarity. Refer to section 3.2 for information on how to test for proper polarity.

# CHAPTER 7: SPECIFICATIONS