INNERSOUND

# *Eros*

# OWNERS MANUAL

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# SETTING UP YOUR SPEAKERS

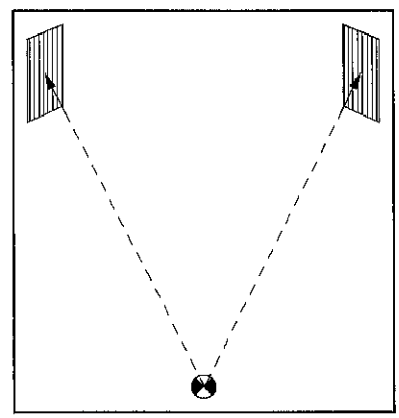
Setting up your new speakers is a three-part process that includes the following:

- Unpacking/positioning
- Electrical connections
- Adjustment of the balance between the woofers and electrostatic loudspeaker (ESL).

## *UNPACKING/POSITIONING*

Unpacking and positioning is best done with two people. It is easier to lift the box off the speaker than to lift the speaker out of the box.

Lay the speaker down, open one side, roll the box over, and lift the box off the speaker. Note how the packing foam is fitted as you may want to use it and the box later.



Equidistant to speakers

**Positioning tips:**

✓ All speakers sound best when they are equidistant from you. Because the *Eros'* imaging is so much more precise than conventional speakers, they will reveal errors in equidistant placement more than conventional speakers. The section of this manual called "Advanced Positioning Techniques" will assist you in obtaining the exact positioning needed.

✓ Aim InnerSound speakers *directly* at your listening location — do not place them parallel to the wall.

✓ The *Eros* is designed to have a hard, reflective wall behind them — this will disperse the high frequencies throughout the room so they sound good when you are out of the sweet-spot. So do not put damping material on the wall behind the speakers unless you only listen at the sweet-spot and do not care about the sound when you are off-axis.

✓ The speakers are designed to be positioned close to a wall — any wall, side or rear walls work equally well. You do not have to place them out in the room.

✓ Corner placement exaggerates undesirable bass and room resonances — it is usually best to avoid corner placement for all speakers.

## FEET

There are two types of feet supplied with your new speakers:

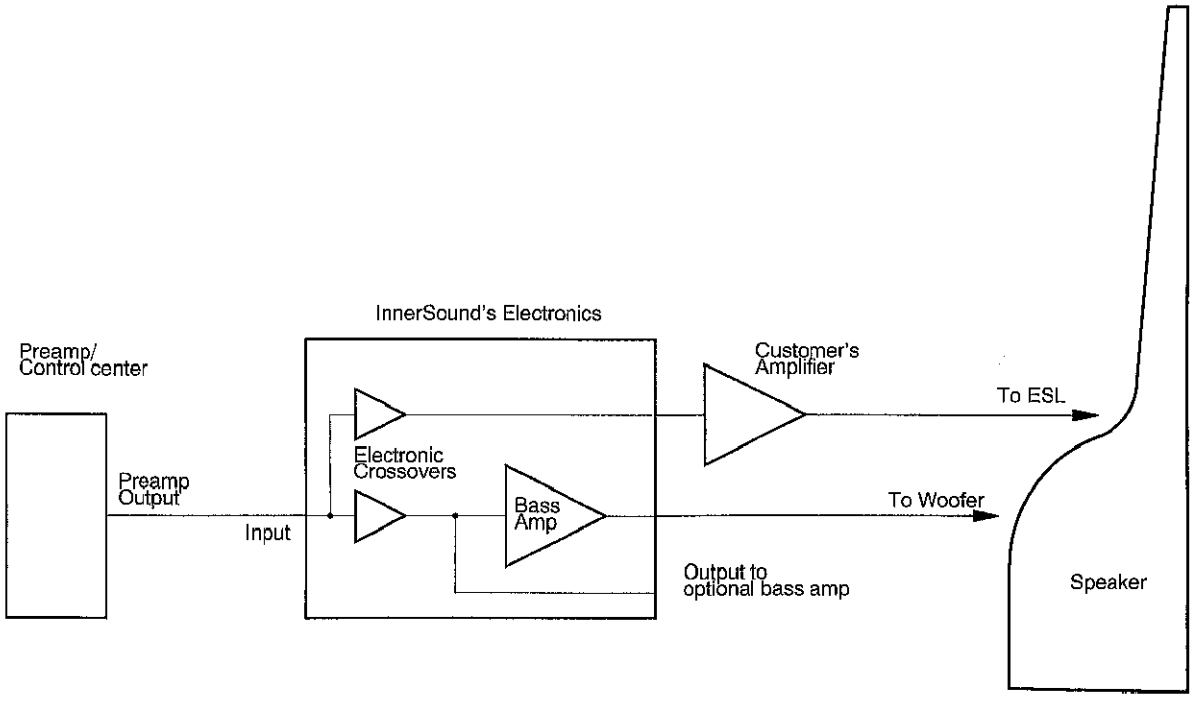
- Smooth feet
- Spikes

The smooth feet are for use on floors, while the spikes are for use on carpet. Speakers are not stable on carpet, so spikes can be used to reach through the carpet and rest firmly on the floor below. You may prefer to install the smooth feet first, even on carpet, so you can easily move the speakers around to find the location you prefer — then install the spikes.

Both types of feet screw into steel inserts on the bottom of the speaker and can be adjusted by rotating them in or out to get the speaker level and stable. Note that the speaker is designed so that when the bottom is level, the front of the speaker will tilt back slightly.

Lock nuts are provided to insure the feet or spikes won't shift position or rattle. Put them on the threaded shaft of the foot or spike before screwing it into the bottom of the speaker. Once you have the feet or spikes adjusted to your satisfaction, gently tighten the nut against the bottom of the speaker to lock the foot or spike into position.

## ELECTRICAL CONNECTIONS




The block diagram above shows how to connect the electronics to the speakers. Also, you may refer to page six for a drawing of the connections on the rear of the amplifier.

**INTERCONNECTS** may be either the balanced XLR types or the single-ended RCA type. There are jacks on the crossover for either type. If you use RCA jacks, you must use jumper wires between pins 1 and 3 on the input XLR connectors. If you look very closely, you will see numbers on the XLR connector. The correct pins are also identified on the drawing on page 6 of this manual. These come factory installed. To use balanced interconnects, remove the jumpers. Save them for later use in case you want to return to single-ended operation.

Surprisingly, some expensive interconnects are poorly designed in that they lack shielding. Avoid these as they often cause buzzing sounds in electronics. Properly shielded interconnects will have an outer covering made of fine braided wire that forms a metal shield around the wire(s) inside the shield. This is known as *coaxial* wire.

InnerSound speakers use electronic crossovers and bi-amplification, so each driver is connected directly to its own amplifier. This is far superior to the usual method of using just one amplifier to power a crossover system that, in turn drives each speaker in the enclosure.

A bi-amp system requires two amplifiers. To save you the expense of purchasing a second amplifier, InnerSound has supplied you with a high-quality, 200 watt/channel amplifier that you may use to drive the woofers.

Use your own amplifier to drive the electrostatic part of the system. Although the Eros is very efficient, and can be driven with a small amplifier, it is always best to use a powerful amplifier to avoid clipping so that the sound is effortless and has ultra low distortion.

Attach the output of **your** power amplifier to the "ESL" terminals on the rear of each enclosure. Connect the output of InnerSound's bass amplifier to the "BASS" terminals on each enclosure. Connect the red (positive) terminals to red terminals and black terminals to black.

> Be certain that you have the phasing correct by connecting the cables the same way on each speaker and amplifier.

**SPEAKER CABLES** exert most of their influence on the sound of speakers by interacting with passive, high-level crossovers present in most speaker systems to change the frequency response of the speaker. Because *EROS* speakers do not have passive crossovers, cables will have little if any effect. The only requirement is that the cables be large — at least 12 gauge, so that the amplifiers will not be isolated from their drivers by excessive impedance.

Note that some expensive speaker cables are high capacitance designs. Such cables tend to induce high frequency oscillation in many amplifiers, which can cause amplifier overheating and harsh sound. So avoid these types of cable. If your speakers sound harsh, suspect cable problems. You can recognize this type of cable by the fact that the two conductors are very close together. The most obvious way this is done is by making the cable in the form of a ribbon. Another technique braids the two conductors together.

If you have an **EXTRA AMPLIFIER,** you may use it to drive the woofers instead of InnerSound's amplifier. Connect it to the bass output jack on the rear of InnerSound's electronics. The bass level control on InnerSound's electronics controls this output jack in case your amplifier doesn't have level controls. You can switch off the "Amps" switch to avoid running InnerSound's amplifiers.

Your **PREAMP/CONTROL CENTER** ***must*** feed InnerSound's electronics. Do not connect the preamp directly to your amplifier or to any other electronic crossover. You will find jacks on the back of InnerSound's electronics to which you connect your preamp and amplifier. The output jacks labeled "BASS" will only be used if using your own bass amplifier. If you use InnerSound's amplifier to drive the woofers, the "BASS" jacks are not used.

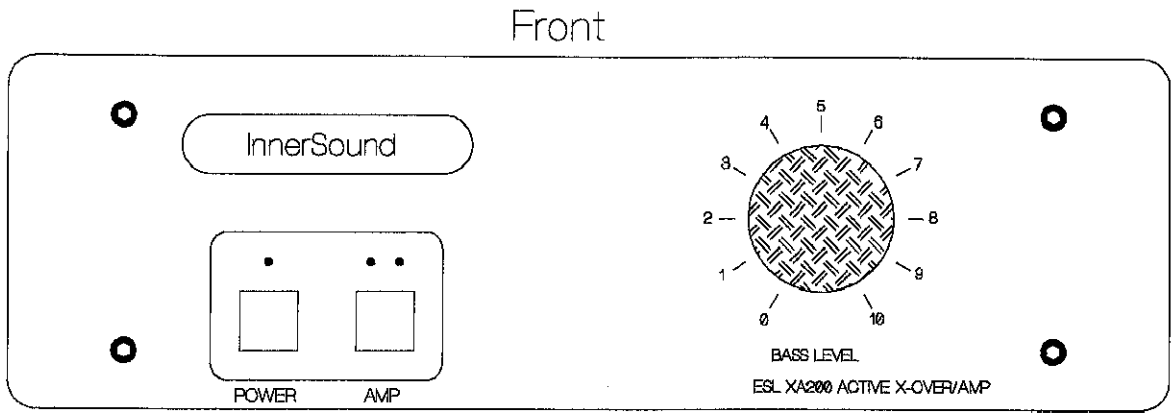
To use an **INTEGRATED AMPLIFIER or RECEIVER** as your ESL amplifier, connect its "preamp output" to InnerSound's electronics. Then connect InnerSound's ESL output to your integrated amplifier or receiver's amplifier input.

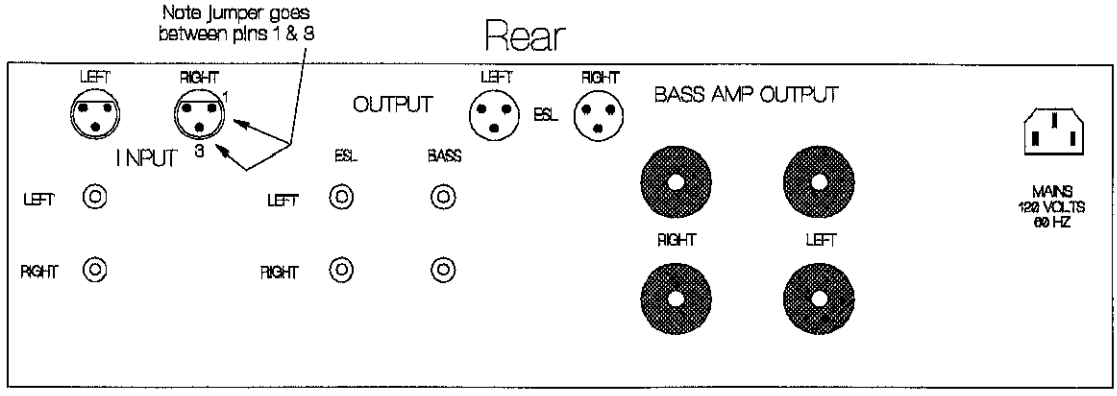
Some inexpensive receivers and integrated amplifiers do not have preamp outputs. Such units can be modified easily to add preamp outputs, or you can use just the amplifier section with a separate control center. Because such units vary, it is not possible in this manual to explain what jacks to use for every possible situation. Please contact your dealer or InnerSound for assistance.

Each speaker has an internal **POWER SUPPLY** to energize the electrostatic panels. There is a socket on the back of each enclosure that plugs into your house power with the supplied ten-foot power cord. The power supplies consume very little power, so there is no need to turn them off. If you turn your system on with a master switch, you may also use it to switch the speakers' power supply. The speakers charge up and work normally within about two seconds of turn-on.

Because it's easy to make a wiring error, you should check that the connections are correct by running just the ESL amplifier (leave the bass level control fully down) and check that your balance control shifts the sound in the appropriate direction. Listen in mono (or use a single singer) and see that the image is solidly centered between the speakers. If it isn't, you may have one of the speaker cables reversed.

## ELECTRONIC CONTROLS




The electronic chassis consists of two sections: a stereo power amplifier and stereo electronic crossovers.

POWER — This switch controls the power to both the electronic crossovers and amplifiers.

AMP — This switch controls the power to InnerSound's amplifiers only; it does not affect the electronic crossovers. Leave it off when and if you use your own bass amplifiers.

LIGHTS — The single indicator light above the *Power* switch shows that the unit is on. The two indicator lights above the *Amps* switch are fed by the power supplies for each of the bass amps. If an amplifier loses power for any reason, its associated light will go out. Of course, if you have the amps switched off, the lights will remain off also.

BASS LEVEL — The knob labeled "Bass Level" controls the output of the bass amplifier. It allows you to adjust the bass level so that you can match it to the ESL. This knob also controls the output to the *Bass Output* jack on the back panel.

## ESL/WOOFER BALANCE

Getting the correct balance between the ESL and woofer is extremely important. The following suggestions will help you optimize this critical adjustment. Surprisingly, the best way to find the right bass level is by listening to the *MIDRANGE*, not the bass. Think of the bass level control as a midrange balance adjustment rather than a bass control.

**Think of the bass level control as a MIDRANGE balance adjustment, not a bass control!**

Most listeners tend to adjust the bass level too high. The midrange will not be clear if the bass level is excessive.

Adjust the woofer level so the midrange is full; but completely clean, clear, and detailed. If there is even a suggestion of lack of definition or muddiness in the midrange, you have the woofer level too high. The idea is to get the speakers to have the full, rich sound of the best magnetic speakers, but with the superior detail, imaging, and delicacy of electrostatics. Conversely, these speakers do not have the thin and anemic sound of many electrostatics. If the midrange sounds distant or weak, or the sound generally is too bright, increase the woofer level.

The type of source material you use for this adjustment is important. Good recordings of male voice or symphonic orchestra work well. Highly processed or electronic music is not suitable because such music doesn't exist in nature, so you don't know what it should sound like. Unfortunately, it is rare to find source material that is recorded so naturally that you can rely on it as your sole reference. It's best to listen to many different recordings initially, then make slight adjustments over time as you become more familiar with your new speaker system.

Although InnerSound speakers are designed to have plenty of deep bass, keep in mind that you probably have been listening to a woofer system that has a pronounced, mid-bass resonance in it. The transmission line woofer system used in InnerSound speakers is linear — it doesn't resonate. So initially it may sound a little thin . . . until some really deep, powerful bass comes along. So if at first the bass seems a bit light, the best thing to do is just leave it that way and listen for a few hours. You will soon realize that *EROS'* transmission line is accurate and that the other woofers were flawed.

Remember that the speakers are designed to be placed near a wall. If you move them out away from the wall, the bass will be a bit less full. Why? Because all woofer systems are omni-directional (they radiate 360°). When against a wall, the bass radiation is confined to 180 ° — which doubles bass output (an increase of 3 dB).

You can use this fact to "tweak" the bass to your satisfaction (remember that you cannot use the bass level to adjust the bass because it affects midrange balance). For example, if the bass seems a little excessive in your room, you can move the speaker away from the wall to reduce it. Conversely, moving the speaker against the wall will increase the bass.

The speakers have been "voiced" to have the proper amount of bass when against the wall in most rooms. They were designed this way because most spouses do not like to have speakers out in the middle of the room.

## ESL/WOOFER PHASING

The ESL and woofer leave the factory in-phase with each other *when the ESL is driven by a non-inverting amplifier.* Most amplifiers are non-inverting (a positive input signal produces a positive output signal, not a negative one). As long as you connect the positive (red) terminal of the ESL to the positive (also probably red) terminal on your amplifier, and the red terminals on the bass amplifier to the red terminals on the woofer, the ESL and woofer will be in-phase.

If you have an inverting amplifier, the drivers will be out-of-phase when connected as described above. Out-of-phase drivers have a very subtle, adverse effect on the sound. The defect is hard to describe . . . the image is not quite razor-sharp and focused . . . it has a slightly diffuse and directionless quality.

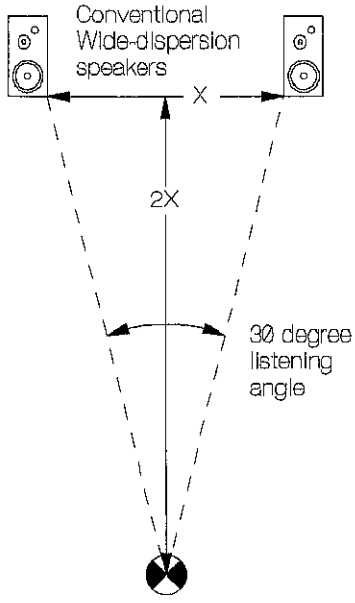
The defect is quite subtle and hard-to-detect, so you needn't be concerned about it. But you can test the phasing if you wish. To do so, first be certain that the channels are in-phase, and the speakers are exactly equidistant from your listening location — you can't expect to hear subtle phase differences if there are gross ones that overwhelm it. Then reverse the leads to either the ESLs or woofers, and listen carefully. Probably you will have to reverse the leads several times to hear any difference. If you do hear a difference, choose the phase that sounds the best to you.

## ADVANCED POSITIONING TECHNIQUES

This section is to help you position InnerSound speakers so they produce incredibly precise images — far more precise than any other type of speaker. To do this, the speakers must be placed exactly equidistant from you so that the sound from each speaker arrives at your ears at ***exactly*** the same time. Also, each speaker needs to be aimed at your preferred listening location. This "sweet spot" or "focus" is where the sound will be best, although it will be satisfactory anywhere in the room.

The following suggestions can help you achieve precise positioning. Although not essential, an assistant will be very helpful during this process.

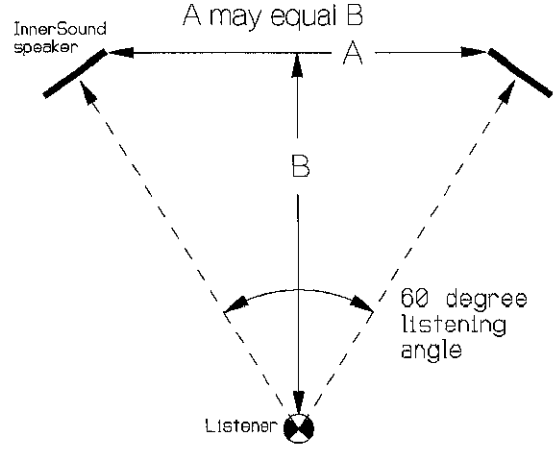
Place the speakers about where you want them and connect the speaker cables. The exact speaker position and geometry are critical and can be disturbed by connecting the cables. So connect the cables now — before you finalize speaker position.




Begin by adjusting the listening angle. How wide should the listening angle ("sound stage") be? Most speakers can only fill a listening-angle about 30° wide — their distance from each other can only be about half their distance from you. If wider, they will produce the well-known fault where there is a "hole-in-the-middle" of the sound image.

Because InnerSound speakers are phase-coherent and have a dipole dispersion pattern, they can be placed much further apart than most speakers and still completely fill the sound-stage.

The picture shows the speakers and the listener forming an equilateral triangle. This is produces a nice wide sound stage — *but this is* ***not*** *a requirement.* Place the speakers at any width you like.



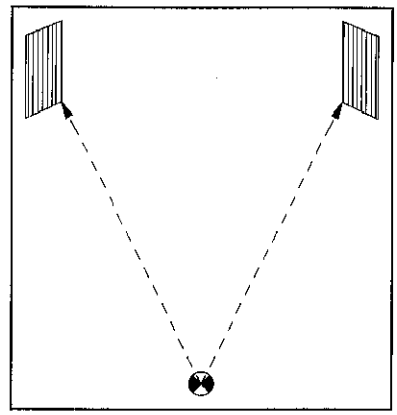
InnerSound speakers are deliberately made to be directional so that the sound quality is the most realistic possible. It is three-dimensional and has a "holographic" quality.

Wide-dispersion speakers send most of their sound away from you into the room where it reflects off room surfaces before reaching you. You are actually listening to the room more than the speakers. Because these reflections travel varying distances before they reach you, they are delayed by varying amounts. When the speaker produces a transient sound (and music is mostly transient in nature), you hear the sound from many directions and at slightly different times. This "smears" the transient and produces "muddy" sound and a poor image.

InnerSound speakers direct the sound directly to you instead of throughout the room. You hear the *speaker* instead of the *room*. This is why InnerSound speakers sound more clear than even very good conventional speakers.

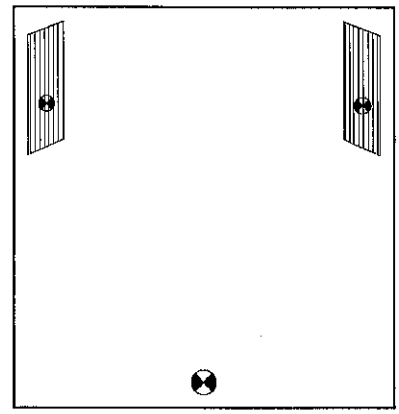
Sound clarity and image quality is a function of timing and distance. So to get the best performance, you will need to get your speakers precisely positioned. This requires that you have both speakers an equal distance from you and that they are pointed directly at you. To avoid reflections from the wall behind you, it is best that your listening chair be well-away from the wall or that the wall has an absorbent surface in the area directly behind your head.

This may seem like extra effort that is unique to InnerSound speakers, but this is not true. *All* speakers perform best when they are accurately positioned. Because wide-dispersion speakers confuse the sound from the speakers with the sound from the room, they are incapable of producing high-quality images. Therefore errors in positioning are not as obvious as with InnerSound speakers.



Equidistant inner corners

Position the base of each speaker equidistant from your ideal listening location. You can use a tape-measure, string, or thread to gauge the distance from your chair to each speaker. Use the center of the back or seat of your chair as one reference point and the inner edge of each speaker as the other. You can have an assistant at your chair hold one end of the tape or string while you check the distance to each speaker. If you don't have an assistant, you can use a pin to hold the end of the string by sticking the pin in the center or back of your chair and tying the string or thread to it. ***The anchor point must be solid and stable*** to get accurate measurements!

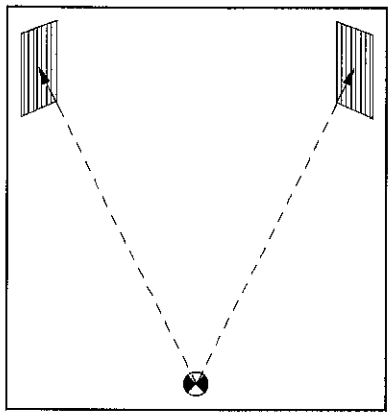


Center your reflection

Next, adjust each speaker so it is pointed directly at your chair. Although you can do this by obtaining identical measurements to both lower corners of each speaker, an easier and more precise way to do this is to observe the reflection of a flashlight in the ESL diaphragms. Hold the flashlight just above your head while you search for its reflection. The reflection is much easier to see if the ambient light in the room is low. It can be hard to see if there is bright light behind the panel.

Get your reflection in both speakers centered from side-to-side while sitting in your listening chair. To avoid altering the previous measurement, pivot the speakers on their inner corners — the one you used as the reference point.

When your reflection is centered side-to-side in both speakers, check to see that it is at the same height in both speakers. It doesn't have to be centered from top to bottom, but the reflection of your ears should be at least a foot from the bottom edge of the ESL. If not, the feet of the speaker can be screwed in or out to adjust the vertical angle of the speaker.



Equidistant to reflections

The speakers should now be correctly positioned, but it is a good idea to double-check by measuring from your chair to your reflection in each speaker's electrostatic cell. How precise should you be? The wavelength of a 10 KHz tone is about one inch. An error of $\frac{1}{2}$" will place this frequency a full 180° out-of-phase — just like you had reversed the wires to one speaker! So ideally, the speakers should be within a quarter wave — for 10 KHz, this would be a quarter inch of being equidistant from you.

**NOTE: If your speakers do not sound balanced (left to right), the most likely reason is that they are not equidistant from you.** An error of one just inch will ruin left/right balance.

## *CLEANING / MAINTENANCE*

The speakers do not require any maintenance. You may dust them as you would any fine furniture. The finish does not require furniture polish/wax. *Never spray any substance into the electrostatic cells,* as the electrostatic diaphragms could be damaged. If the electrostatic cells are extremely dusty, you may gently wipe them with a damp sponge or vacuum them as described below.

Before cleaning, unplug the speakers and let the speakers sit for an hour so most of the high voltage charge will dissipate.

You may clean the cells with a vacuum cleaner fitted with a soft brush. When cleaning, be gentle, and avoid sticking the brush's bristles through the holes in the speaker and into the diaphragm. Start vacuuming from the edge of the cell and continue in a smooth motion all the way across the speaker and beyond the other edge before stopping. Do not stop or start in the middle of the cell because this may push bristles into the diaphragm.

The rear of the speaker is a bit more difficult to vacuum because the enclosure blocks you from passing the brush freely beyond the cell. Instead, start from the top and pull the brush away as you near the bottom of the cell. Go back to the top to make another pass.

## TROUBLESHOOTING

The speakers are rugged and reliable, and problems are rare. This section is included to just make it easy to correct problems if they arise.

**HISSING, FRYING, or POPPING SOUNDS** — are caused by foreign material such as an insect or dirt getting trapped inside the ESL. It is ***normal*** for an ESL to occasionally do this. Sometimes you can see a glow where the object is, you may smell ozone, and often the output level of the speaker will be lower than normal until the object is removed.

Usually the noise will just disappear after several minutes or hours, but you usually can cure it immediately by blowing the object out of the speaker, or by vacuuming it. By listening carefully you usually can locate the offending particle. Or, you can examine the speaker in a darkened room where you will see a blue haze or even a tiny white arc that will reveal the location of the problem. The object will almost always be on the rear of the cell, not the front. Just blow it away.

**AMPLIFIER FUSE-BLOWING** — may be of two types. The first is where the amplifier blows fuses on loud music. The other is when it blows fuses the moment you turn it on. This will not occur in amplifiers that have a turn-on delay circuit, and is rare in modern amplifiers.

Blowing fuses at turn-on is due to the fact that most amplifiers require a couple of seconds to stabilize at turn-on. When connected to an ESL, they may blow fuses only during their unstable period. To be sure, you first must check to be sure that it is just a simple turn-on instability problem and not a short-circuit or other amplifier problem.

To test, disconnect one of the speaker wires from each channel. Then turn on the amplifier — it should not blow fuses with the speakers disconnected. If it does, the amplifier is defective.

If it works properly, *leave the amplifier on* while you reconnect the speaker wires (being careful not to short the amplifier terminals with the loose wires). It should NOT blow fuses, and it should play music properly. If so, probably you can solve the problem by increasing the size of the fuses up to the manufacturers recommended value. If despite larger fuses the problem persists, then you will have to connect the amplifier to the speakers through a delay relay (a delay of between 2 and 5 seconds is adequate). External, electronic delay relays are available from electronic parts houses, and your dealer probably can help install it. The amplifier manufacturer may be helpful as well.

Amplifier manufacturers often put fuses in the output circuit of their amplifiers. These fuses usually are conservatively rated compared to the output capability of the amplifier. When playing music loudly through an ESL, even high quality amplifiers may blow such a fuse. If this occurs, consult the owner's manual, your dealer, or the manufacturer to find the largest fuse that is safe to use with your amplifier. Replacing the stock one with a larger one (within the safe range specified by the manufacturer) will solve this problem.

**AMPLIFIER OVER-HEATING** — should never occur. ESLs are "wattless" speakers. This means they don't dissipate your amplifier's power as heat like magnetic speakers do. Therefore, the amplifier should run very cool — about the same temperature as if it were just idling. If either channel of the amplifier runs hot, something is wrong. That "something" usually is supersonic oscillation caused by high-capacitance speaker cables or a defective component elsewhere in your

system. DC offset in the output stages of the amplifier can also be a problem. This is *not* a speaker problem — it means there is a problem with the cables or in the electronics. Try changing cables. If that doesn't work, you will need to service the amplifier or other offending component.

**TUBE AMPLIFIER OUTPUT IMPEDANCE** — should be set as low as possible. As a minimum requirement, you must use the amplifier's 4Ω connection. If a lower one is available, us it. If your amplifier doesn't have a 4Ω (or lower) connection, it probably will not be suitable for driving electrostatic loads as it will tend to roll-off the high frequencies.

**AMPLIFIER INSTABILITY** — can be a problem if the amplifier was designed to only drive resistive loads, not capacitive loads like electrostatic speakers. Oscillation is usually noticed as a harsh quality in the high frequencies, and amplifier overheating, but anytime the sound isn't completely clear, oscillation should be suspected. If this happens, try a different amplifier. Be sure you are not using high capacitance speaker cables (see page 5). If a different amplifier solves the problem, then your amplifier needs service. If different speaker cables solve the problem, then retire the problem-causing ones.

**MOMENTARY AMPLIFIER SHUT-DOWN** — is caused by inappropriate activation of an amplifier's protection circuitry. You may experience this problem when playing music loudly and the amplifier completely shuts down for several seconds, then returns to normal operation — only to trip off again a few moments later. It will repeat the cycle as long as you try to play music loudly.

The problem here is that the amplifier is not designed to drive low impedance loads. Although the amplifier may not seem to be harmed when it shuts down in this way, repeated activation may eventually lead to failure of the output transistors. You must use a different amplifier.

**BUZZING NOISES** — are caused either by "ground loops" or unshielded interconnects. Ground loops grounding problems with your equipment — most commonly your preamp. It is not a failing of any part of your system, it is simply an interaction. The problem usually is caused by having one or more components grounded to the mains circuit. Lifting the ground (by using a 3 pin to 2 pin adaptor on the power cable) often will stop the buzz. Also, it is good practice to have all components plugged into the same outlet strip.

Surprisingly, some expensive interconnecting cables have no shielding. If lifting the mains ground doesn't stop the buzz, change interconnects. Be sure the test interconnect has a metal shield around a central conductor ("coaxial cable"). For testing at least, use an inexpensive cable because you can be sure they are properly designed and shielded.

## SPECIFICATIONS

| | |
|---|---|
| Speaker dimensions | 15" x 18" x 68" (31 x 450 x 1700 mm) |
| Speaker net weight | 74 pounds (33.5 KG) |
| Speaker shipping weight | 92 pounds (41.7 KG) |
| ESL size | 13⅞" x 42" |
| ESL power handling | No practical limit |
| ESL impedance | 112Ω @ 500 Hz falling to 2Ω @ 20 KHz |
| Bass power handling | 250 watts |
| Bass driver | 10" |
| Woofer impedance | 4Ω |
| Bass design | Transmission line |
| Sensitivity | 96 dB/2.83 volts/meter |
| Frequency response | 24 Hz to 27 KHz ±2 dB |

| | |
|---|---|
| Amplifier dimensions | 17⅜" x 15⅜" x 5" (440 x 390 x 127 mm) |
| Amplifier net weight | 34 pounds (15.45 KG) |
| Amplifier shipping weight | 42 pounds (19 KG) |
| Amplifier power | 200 watts RMS/Channel 4Ω |
| Input impedance | 47KΩ |
| Output impedance | 150Ω |

## WARRANTY

Eros loudspeakers are warranted by Innersound Inc. to be free from defects in material and workmanship for a period of three (3) years from the date of purchase. During this period, InnerSound Inc. will, at its option and without charges, either repair any part or assembly of parts that is found to be defective in material or workmanship, or replace the product with a product of comparable quality, subject to the following limitations and exclusions:

This warranty extends to the original consumer purchaser only and is not assignable or transferable. This warranty shall not apply to any product which has been subject to misuse, abuse, negligence, or accident.

All warranties implied by law including any warranty of merchantability shall be of a duration of (3) years from the date of purchase. The warranties herein are expressly in lieu of all other expressed warranties including the payment of consequential or incidental damages for the breach of any warranty.

Some states do not allow (a) limitations on how long an implied warranty lasts or (b) the exclusion or limitation of incidental or consequential damages so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

To obtain performance of the warranty obligations, the original purchaser is urged to contact an InnerSound dealer through whom warranty repair will be performed. Alternatively, the original purchaser may have InnerSound Corporation perform the warranty obligations by calling (770) 838-1400 to obtain a return authorization number. A dated proof-of-purchase will be required. The purchaser must prepay all shipping/delivery costs to the repair facility.

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