Epsilon

NO WARRANTY INCLUDED

OWNER'S MANUAL

Infinity

NO WARRANTY INCLUDED

Epsilon

OWNER'S MANUAL ADDENDUM

When using balanced output jacks, the rear panel gain control must be turned down by 6 db from the setting that would be used on the unbalanced output. i.e., assuming that you were using a 27 db amplifier, the rear gain control would be set to 0 db for the unbalanced mode. In the balanced mode the setting would be – 6 db.

Epsilon

NO WARRANTY INCLUDED

INFINITY EPSILON LOUDSPEAKER OWNER'S MANUAL

Servo feedback cable

The servo feedback cable supplied with each speaker is 50 feet (15m) long. It employs a special female 4-pin "XLR" type audio connector at each end. The 50' length should be ample for most installations. If you need longer servo feedback cables, please contact your dealer for assistance.

Cable lengths

Please do not cut or order any cables to a finished length until you have determined the exact locations for all of your components. Cables that are too long rarely create problems (except for vastly too-long speaker cables), but cables that are too short are one of life's sharper irritations.

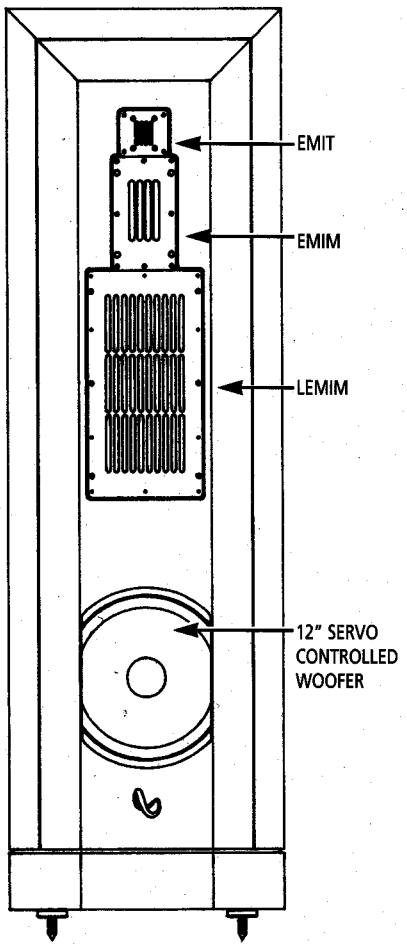
LOUDSPEAKER PLACEMENT

Few of us have the luxury of creating a listening room from the ground up. Even for rooms whose primary use is listening, other uses also must be accommodated. As a result, the types and locations of furniture, passageways, windows, and room dimensions, as well as floor, ceiling and wall materials and treatments, may not be the optimum choices from a purely acoustical point of view.

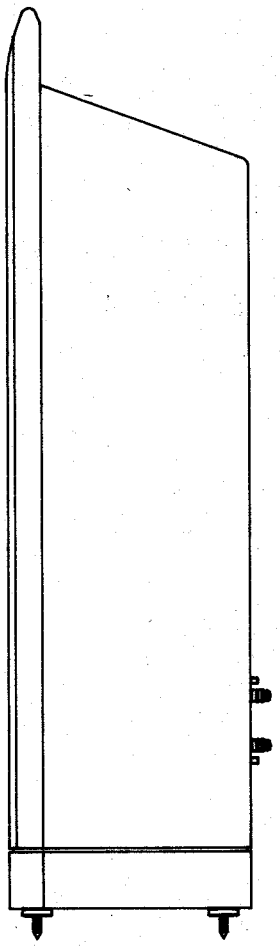
That is why your Epsilon loudspeakers are designed to deliver inherently wide coverage, producing superior "staging" and imaging over a large listening area. Although the Epsilon's planar drivers are dipole radiators (meaning that they radiate equally, but in opposite polarity, toward the front and rear), the rear housing of the Epsilon has been designed to absorb much of the rear radiation, smoothing and widening the coverage, while still providing the "spaciousness" for which dipole radiators are noted. Its acoustic design makes Epsilon unusually versatile at fitting into your particular listening room *and* delivering great sound.

The huge variety of listening room geometries, room acoustics, and user preferences make it impossible for us to recommend a particular set-up for your equipment. Serious listening and uninhibited experimentation with placements and aiming angles are your best path to sonic excellence.

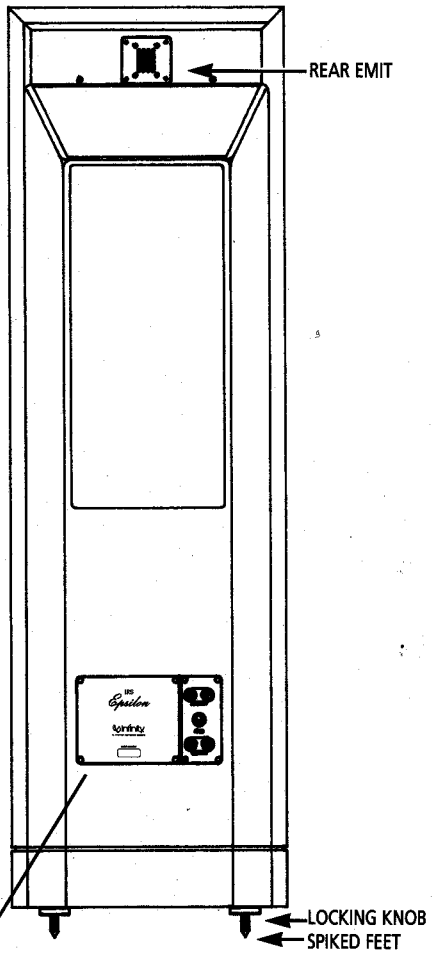
The goal is a wide, realistic stage from left to right, with instruments and vocalists properly balanced in loudness, and correctly located in the sonic stage's width and depth. Recordings which have detailed program notes on the location of various instruments and/or vocalists at the time of the recording can be a great help in determining the optimum separation and aiming angles.



FRONT VIEW

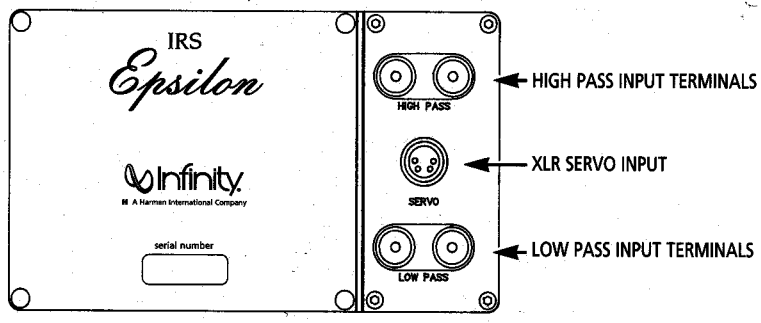


SIDE VIEW

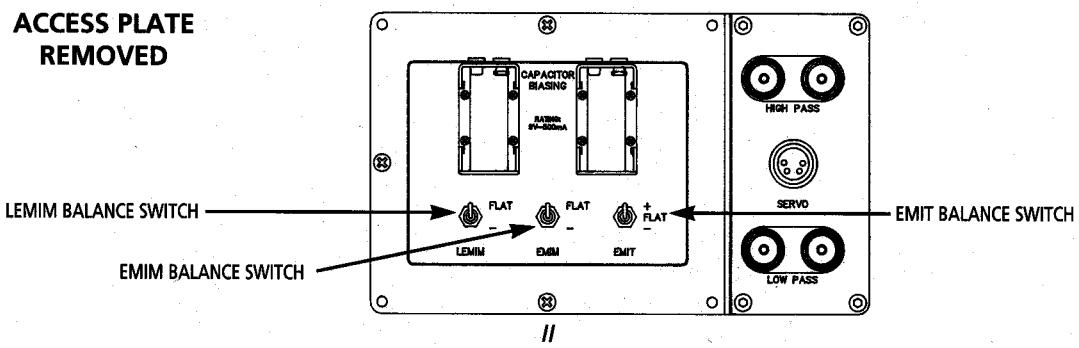


REAR VIEW

ACCESS PLATE INSTALLED



ACCESS PLATE REMOVED



MANUAL OVERVIEW

This manual provides information about unpacking, locating, connecting, and using your Epsilon System. The sections about System Configuration, Amplifiers and Other System Components, and Loudspeaker Placement come before the Unpacking instructions. This is because we want you to have a clear view of the system as a whole before you begin to think about the details of connecting and using your Epsilon System.

Most people prefer to minimize the handling and moving of large, heavy loudspeakers and amplifiers. When you have a clear picture of the factors affecting the placement of these components, you may be able to make some essential decisions about equipment placement and the effects on other furnishings before you unpack. This in turn may result in less overall disruption and heavy lifting.

Please read this manual all the way through. Even if your dealer has done the heavy work and looked after the set-up details, we believe the manual will provide you a better understanding of your Epsilon System and the opportunities it gives you for truly superior sound reproduction.

INTRODUCTION

Your Epsilon loudspeakers are the result of Infinity's more than 25 years of research into the acoustics, operation and design of high performance loudspeakers. The design goal for Epsilon was nothing less than to achieve the highest overall level of performance, ever, from a single pair of loudspeaker enclosures. A corollary of that goal was to give them a reasonable size and an attractive appearance, important factors in making them welcome in any listening room.

Each Epsilon loudspeaker employs unique Infinity technologies, including an active servo woofer system and high-accuracy planar drivers, to deliver all of the hallmarks of high fidelity sound: Wide bandwidth, high acoustic power output, uniform coverage, smooth frequency response and extremely low distortion.

These characteristics enable an Epsilon system to accurately reproduce the entire frequency spectrum, dynamic range and sonic levels of the original performance. In short, Epsilon faithfully recreates the recorded performance in your listening room.

SYSTEM CONFIGURATION

Each Epsilon loudspeaker is a biamplified, four-way system containing a 12" Injection Molded Graphite (IMG) woofer, and four of Infinity's state-of-the-art planar drivers: a Lower Electro Magnetic Induction Midrange (LEMIM), an Electro Magnetic Induction Midrange (EMIM), and two Electro Magnetic Induction Tweeters (EMITs); the two tweeters face front and rear, but operate as a single unit.

AMPLIFIERS AND OTHER SYSTEM COMPONENTS

Overall Component Quality

Your Epsilon System is one of the finest loudspeaker systems ever made. You and your Epsilons deserve supporting audio components of the highest quality. Audio systems are highly synergistic — excellent sound quality in any one component can raise the overall performance of the other components connected to it, while poorer quality can seem to diminish the overall result more than you would expect. Choose your other system components with the same care you have devoted to selecting the Epsilon System.

Wiring

System cables, wiring, and connectors have come to occupy a central position in audiophile discussions about sound quality. We make no recommendations about specifics of cables and interconnects, except to note that the power transfer between the amplifiers and speakers should be as efficient as possible. This means using heavy gauge, low impedance speaker cables. There is no substitute for personal experience in the selection of audio components, and nowhere is this more true than in choosing cables and interconnects.

Important amplifier specifications

You will need to know the overall maximum voltage gain, in decibels (dB), for each of your power amplifiers, and you also will need to know if each is phase inverting or non-inverting from input to output.

Correct set-up and operation of the Epsilon Servo Control Unit depends upon this information. Your dealer will have, or can find out, this information. Check the specification sheets and/or manuals for amps you already own; if this information is not provided, contact the dealer or the manufacturer. We will refer to these specifications again in the **Servo Control Unit Set-up** section of this manual, and also in the **Appendix: Amplifier Gain Measurement/Setting.**

If any of your amplifiers have balanced input connections, you also must know if the balanced connector conforms to AES standards for signal polarity. See the **Servo Control Unit Set-Up** section of this manual, and also the **Appendix: Balanced Connection Notes.**

Amplifier gain requirements

If your amplifiers are not all identical, please verify that the amplifiers meet the following gain requirements:

- The gains of the two woofer amplifiers must be nearly identical, within a fraction of one dB.
- The gains of the two mid/high amplifiers must be nearly identical, also within a fraction of one dB.
- The gains of the two amplifiers (woofer and mid/high) that drive an Epsilon loudspeaker's two sections must be the same, or *be adjustable to be the same, within 6dB.*

The Epsilon System has three pieces: Two loudspeaker enclosures and one electronic Servo Control Unit (SCU). For operation, the Epsilon system requires a separate component stereo preamplifier (or audio control unit) and:

Two stereo power amplifiers — or
Four mono power amplifiers — or
One stereo amp and two mono amps

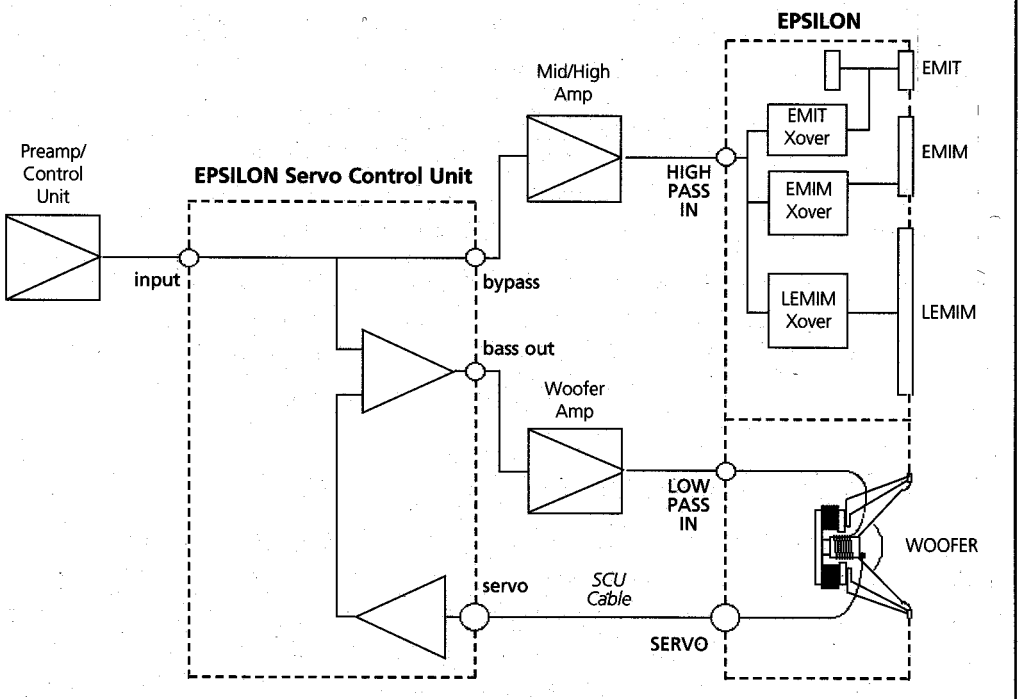
The Epsilon System requires two power amplifier channels for each loudspeaker enclosure: One for the servo woofer section and one for the mid/high frequency section containing the planar-midrange and tweeter drivers.

Each Epsilon loudspeaker's two sections are completely separate electrically, so that there is no danger in using any amplifier combination, whether on separate or common chassis, to drive each Epsilon's two sections or to drive both Epsilons.

Each section of an Epsilon loudspeaker has a rated impedance of 4 Ohms. If you are using amplifiers that have output transformers, such as tube-type amps, or solid-state amps that have output transformers, such as those built by McIntosh Laboratories, connect the speaker cables to the "4 Ohm" outputs of the amplifiers.

The Epsilon Servo Control Unit goes between the preamplifier/control unit and the power amplifiers. Because the woofer is an active servo type, an electronic feedback signal returns to the SCU from the loudspeaker via a special cable supplied with each speaker. **Figure 1** shows the block diagram of an Epsilon System.

FIGURE 1



EPSILON System Block Diagram (one channel shown)

If you are not sure if your amplifiers meet these basic gain requirements, please consult your dealer and read the **Appendix: Amplifier Gain Measurement/ Setting,** for background about this issue.

How much amplifier power do you need?

The amount of power needed to drive the Epsilon loudspeakers depends upon how loudly you listen. The electronic servo woofer system inherently compensates for the natural low-frequency roll-off of the woofer section. Because of this, the woofer section can require substantially more amplifier power than the mid/high frequency section for a given loudness. This is especially true when the program material has large amounts of low-frequency energy, such as organ pedal tones, large drums or synthesized bass sounds.

Minimum power requirements

We recommend that the power amplifiers you use have *minimum* power ratings of 75 Watts per channel, continuous, for driving the mid/high frequency section and 150 Watts per channel, continuous, for driving the woofer section. Some users will find these minimums insufficient, while others will wonder why anyone would need larger amplifiers. Your listening habits, the size and acoustics of your listening room, and your personal views will determine how much power you need.

Maximum power

As a practical matter, there is no upper limit on the power of the amplifiers you can use with the Epsilon System. If you always listen at moderate levels, you can easily end up with amplifier power you never use. If you often listen at concert levels or beyond, then high power amplifiers (250W/ch and more) yield immediate dividends in dynamic range and clarity.

Your Epsilon loudspeakers are capable of stunning sound pressure levels. If your music begins to sound bad at elevated listening levels, and these are the levels you require your system to reproduce, more than likely you have exceeded the capabilities of your amplifiers and *not* those of your Epsilon speakers.

Placing the amplifiers

Audiophiles often prefer to place the power amplifiers close to each loudspeaker, to eliminate power losses and distortions that can result from long speaker cable runs. Many prefer to locate the amplifiers midway between the speaker pair as a means of optimizing both proximity and aesthetics.

Placing the Servo Control Unit

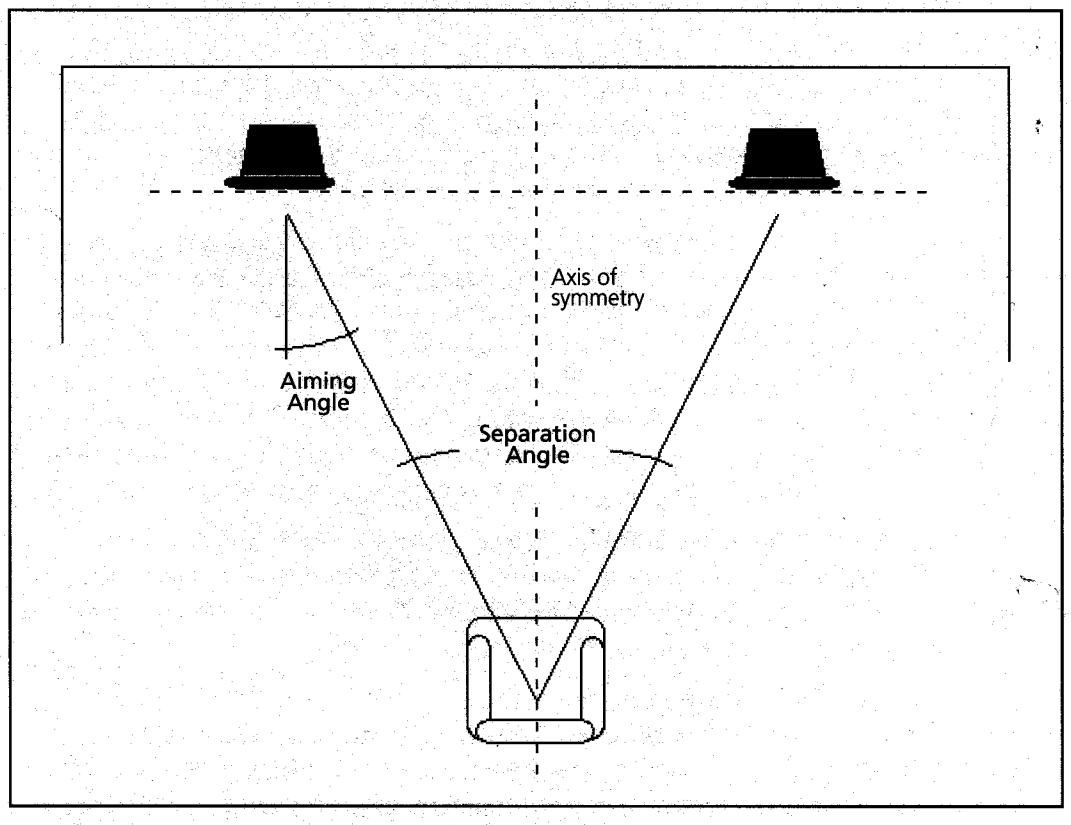
The Epsilon SCU is best placed near your preamplifier/control unit, since the SCU contains controls which affect overall sonic balance.

Separation angle

A starting point for placement is to put the primary listening position(s) on the axis of symmetry between the two Epsilons, with the sight lines toward the speakers (the separation angle) forming an included angle of 60°. See **Figure 2** for the basic geometry.

Because the Epsilons have wide dispersion and very smooth off-axis response, they can be placed so that they create the widest possible sonic stage. Widening the separation angle will widen the stage and the best placement will be one in which the Epsilons are as far apart as possible, yet create a complete sonic stage with no sense of a "hole in the middle." Smaller angles will be called for in some rooms, particularly when the speakers are necessarily close to the side walls; see **Aiming angle**, following.

FIGURE 2. BASIC LOUDSPEAKER GEOMETRY



Aiming angle

Unlike many conventional speakers, the Epsilons usually perform best when their front panels are in line, as shown in **Figure 2,** rather than "toed-in" to face the listening position.

When the room's geometry or its furnishings (such as the presence of a large home theater viewing screen) require a wide separation for the Epsilons that results in a "hole in the middle effect," adjusting the aiming angle, or "toe-in," can help to create the proper sense of the sonic stage. Toe-in the Epsilons only to the point that the hole in the middle is filled.

Placing the Epsilons very close to the room's side walls can create a variety of unwanted sonic effects These effects include an outward movement of the apparent locations of sounds which originate at the left and right of the sonic stage. The effects also include making sound sources more diffuse, rather than pinpoint; this tends to make soloists, for example, seem physically larger than they should be. All such effects are caused by too much sound reflecting off the side walls. If necessary, toe-in the Epsilons *only* to the point where the proportions of the sonic image are correct.

Distances to room boundaries

Like most large loudspeakers, Epsilons tend to produce their smoothest overall frequency response when relatively far from the walls of the listening room. In larger listening rooms, we recommend that you take advantage of this characteristic and locate your Epsilon speakers away from the side and rear walls. There is no "magic" distance — as noted, the room's size, plus the composition, draping, and decoration of walls and windows, all have major affects on the overall sonic balance.

The distances of the two Epsilons to the rear wall should ideally be the same. If possible, the two Epsilons should also be the same distance from their adjacent side walls. Where the room's geometry or furnishings make this symmetrical placement of the speakers in relation to the walls impossible, you will have to experiment with the separation and aiming angles to achieve the best overall sound quality. The distance from the central listening position to each speaker must be exactly the same – within one inch (25mm).

Regardless of which wall, placement closer to a wall will increase the deep bass output, and corner placement will make an even larger apparent increase. Although the SCU has controls to help adjust for these changes in balance, there is no substitute for trying many positions. Even crazy-looking arrangements can be instructive, especially when the room's geometry is unusual.

UNPACKING

Your Epsilon System has most likely been delivered, unpacked, and connected by the dealer from whom it was purchased. However, if you are unpacking your Epsilons, note that the unpacking instructions for the two loudspeakers are found on their cartons.

The size, weight and special connections of the Epsilon System mean that extra care is required in unpacking and connecting the system, and at any later time that you move it.

Spiked feet

Please note that the speakers stand on spiked feet, which come with plastic caps installed to prevent injury to you and your belongings. The loudspeakers will perform best when the spikes make direct contact with the floor. If you wish to protect hardwood or other solid floors, leave the plastic caps in place.

To level the speaker and to provide firm support at each corner on uneven floors, you can adjust the height of each foot by screwing it in or out of the bottom of the speaker. The feet have knurled locking rings that you can run up against the base of the speaker to secure the height setting.

We recommend that you leave the plastic caps in place until all of the connections and adjustments are complete, and you are satisfied with the location and sound of the loudspeakers. Then, you can remove the plastic caps and adjust the height of the spiked feet to level the speakers. It is easiest to remove the caps and adjust the feet if you have a helper. Have your helper tilt the speaker to one side while you work on the feet which are free of the floor; then repeat by tilting the speaker to the other side. The Epsilon is very heavy and care must be exercised during this procedure.

Servo Control Unit

The SCU is wrapped in plastic and supported by foam end caps inside the carton. Open one end of the carton and remove the end cap. Then slide out the SCU in its bag. Use care if you lift the SCU up and out of the carton – the plastic bag can be slippery.

Please keep the packing and cartons

We strongly recommend that you keep all the shipping cartons and packing materials. If you move or ship the system for any reason, carefully repack it with the original packing materials. Follow the packing order shown on the loudspeaker cartons, and use the plastic bag and foam end caps for the SCU.

LOUDSPEAKER SET-UP

Once you've unpacked the speakers and they are upright, you must perform several steps prior to connecting them for use. These steps require access to the rear of each loudspeaker. If the initial positions you have selected for the speakers do not permit easy access to their rear panels, set them in a position which gives you access for the following set-up and for cable connections.

Battery Installation

Each Epsilon loudspeaker's high frequency driver crossover network capacitors are electrically biased with a DC voltage supplied by two common alkaline 9V snap-top batteries, NEDA type 1604A. The DC bias supplied by these batteries offers a subtle but important improvement in sound quality. While the speakers will seem to work normally without the batteries installed, the best sound quality is achieved with the batteries in place.

The current drain from the batteries is extremely low, enabling them to last nearly as long as if they were sitting unused on the shelf. For this reason, we recommend the use of "alkaline" batteries rather than ordinary carbon-zinc or "heavy duty" zinc-chloride batteries, which have shorter shelf lives. ***Do not use rechargeable batteries of any kind.***

At the bottom rear of each Epsilon, to the left of the input terminals, is a brass access panel held in place by four knurled screws. This panel provides access to the battery compartments and to three switches that provide tonal balance adjustments for the loudspeaker's EMIT, EMIM and LEMIM drivers.

Remove the four screws and the access panel from each Epsilon and place them out of the way. Observe that the battery snaps are female and male, and mate with the battery compartment snaps of the opposite sex. Place one 9V battery into each battery compartment by inserting the snap-top of the battery into the upper end of the compartment. Once the snaps are aligned, push up and in on the bottom of the battery, so that all of the snaps mate properly and the battery seats inside the compartment.

Battery maintenance

For best operation, the batteries should be changed approximately every two years, well before they are fully discharged. They can be removed by prying out their bottom ends and then pulling them down with your fingers to unsnap the connections.

Initial balance switch settings

Place each of the three balance switches in its **FLAT** position. You will most likely want to experiment with these switches once your system is fully connected and operating, so do not replace the access door yet.

Place the speakers near the initial positions you have chosen, leaving sufficient room behind them to make the cable connections.

AMPLIFIER-LOUDSPEAKER CONNECTIONS

Speaker wire polarity

All speaker wires are marked with symbols, color stripes, different color insulation, or different color conductors (for example, copper and silver) to identify which conductor is which, at each end. This simple convention prevents inadvertent reversals of polarity that can cause serious audible artifacts and poor sound quality.

Unless otherwise indicated, this manual assumes that the "+", copper, red, or striped conductor in a wire-pair is the "+" conductor and connects to the red, "+" or "4 Ohm" terminals of the amplifiers and speakers.

Epsilon input terminals

The Epsilon's **HIGH PASS** and **LOW PASS** input terminals accept most of the speaker wire terminations currently in use. If you have wires with unusual connectors or terminals that don't fit the Epsilon inputs, please seek assistance from your dealer. The input terminals' knurled posts provide plenty of grip for finger-tightening the connections. Do not use pliers to tighten the posts; you could damage them or strip their threads, making it impossible to undo the connections.

Amplifier output terminal identification

Amplifiers have a variety of identifications for output terminals. Most solid-state amps have just two output terminals per channel; often these are red and black terminals, or screw-type terminal strips. Amps with output transformers have several output terminals, usually identified by the speaker load impedance they are intended to drive, such as 4Ω or 8Ω, and also a common terminal.

In this manual, we call the amplifier output terminals "+" and "–", meaning that the "+" terminal is the red, "4Ω", or "+" terminal, and the "–" terminal is the black, "common", "ground", or "–" terminal. When the amplifier has output terminals for more than one speaker impedance, always use the "4Ω" terminal for the "+" connection.

Amplifier phase (polarity)

The connections from the amplifiers to the Epsilon loudspeakers' **LOW PASS** and **HIGH PASS** input terminals depend on the phase of the amplifiers' outputs referred to their inputs. Amplifiers are either *inverting* or *non-inverting;* that is, their outputs either go positive when the inputs go positive (non-inverting), or their outputs go negative when the inputs go positive (inverting). In the first case, the inputs and outputs have a phase relationship of approximately 0°; in the second the phase relationship is approximately 180°. We use the terms "polarity" and "phase" interchangeably when we discuss this 0°/180° relationship.

Regardless of the phase combination, always connect the woofer amplifiers as described below:

Woofer amplifier to Epsilon LOW PASS (woofer) terminals

Connect the "+" terminal of the left channel woofer amplifier to the **red LOW PASS** terminal of the left Epsilon (the speaker to your left as you face them from the listening position). Connect the "–" terminal of the left channel woofer amp to the **white LOW PASS** terminal of the left Epsilon. Repeat the connections for the right woofer amplifier and right Epsilon.

The mid/high section amps connect in one of the two following ways:

Mid/High frequency with non-inverting amplifier, to Epsilon HIGH PASS (mid/high) terminals

Connect the "+" terminal of the left channel mid/high amplifier to the **red HIGH PASS** terminal of the left Epsilon. Connect the "–" terminal of the left channel mid/high amp to the white HIGH PASS terminal of the left Epsilon. Repeat the connections for the right mid/high amplifier and right Epsilon.

Mid/High frequency with inverting amplifier, to Epsilon HIGH PASS (mid/high) terminals

Connect the "+" terminal of the left channel mid/high amplifier to the **white HIGH PASS** terminal of the left Epsilon. Connect the "–" terminal of the left channel mid/high amp to the **red HIGH PASS** terminal of the left Epsilon. Repeat the connections for the right mid/high amplifier and right Epsilon.

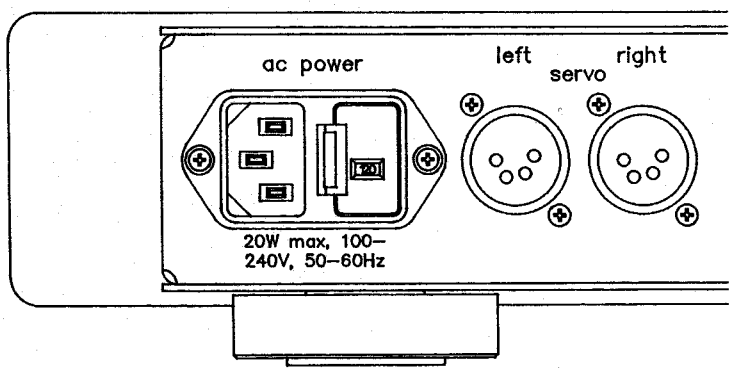
EPSILON SERVO CONTROL UNIT CONNECTIONS

CAUTION: Turn off the AC power to all components and switch the SCU to **stand-by** mode before making or breaking *any* signal or power connections.

SCU AC power connections

The Epsilon SCU employs a power connection module that receives AC power from the wall via an "IEC" connector like the ones found on virtually all computers and electronic instrumentation. The module also contains the SCU's line fuse and a plug to select its operating voltage. **Figure 3** shows the details of the fuse mounting and the voltage selector. The SCU operates equally well on 50Hz or 60Hz AC power.

FIGURE 3



Voltage and fuse ratings

Before you connect the power cord to the SCU, please verify that the correct voltage for your power service shows through the small window in the front of the fuse block. The table below shows the correct fuse rating for the various voltage ratings. The SCU's AC voltage input can be set to one of four values: 100V, 120V, 220V, and 240V. If the voltage rating is already correctly set, then the fuse rating probably is correct also. If not, then replace with correct fuse.

AC Line Voltage	Fuse rating	Fuse type
100 or 120	500mA (1/2A)	FSF, 5x20mm (Bussman type GMC)
220 or 240	250mA (1/4A)	same as above

Changing the voltage selector or fuse

To change the voltage selector, or to check or replace the fuse, *always* unplug the power cord at the SCU *before* you access the fuse and voltage selector. Insert the blade of a 1/8" (3mm) flat-blade screw driver into the small opening between the power cord receptacle and the fuse block. Press the blade toward the fuse block to release the locking tab and pry out the fuse block.

The fuse protrudes from the rear of the voltage selector plug. Remove it to check its rating. To change the voltage selector, pull the gray selector plug out of the fuse block, turn it so that the correct voltage marking is up, and plug the selector back into the fuse block. (NOTE: The SCU has been shipped in the 120V position. The fuse for the 220V and 240V position is in the compartment adjacent to the active fuse in the fuse block). Verify that the correct voltage reading shows in the window. Replace the fuse by inserting it into the rear of the selector plug, then plug the fuse block back into the power module.

We recommend that you plug the SCU into a wall outlet that is unswitched and always "hot," so that the SCU's amplifier circuitry can remain warmed-up and stabilized for best sound quality.

Signal connections

The SCU has inputs and outputs for both balanced and unbalanced configurations. The unbalanced connections are standard "phono" type connectors, while the balanced connections are "XLR" types commonly used for low-impedance microphones. The input and output connections to and from the SCU may be all balanced, all unbalanced, or any combination of balanced and unbalanced. Refer back to **Figure 1** for basic system connections.

We recommend that you use the balanced connections if available on your other equipment; *but* if you do, please see the **Appendix: Balanced Connection Notes.** This manual assumes that all of your balanced connections conform to AES standard wiring, in which pin 1 is ground (common), pin 2 is "+" and pin 3 is "–". *It is vital that you know whether the amplifiers conform to AES standards or are polarity reversed.*

Inputs to the SCU

Connect the preamp/audio control center's left and right channel outputs to the SCU's **left** and **right input** connectors. Be certain to connect left channel to left, and right to right.

Outputs to the Mid/High Frequency Amplifiers

Connect the SCU's **left** and **right bypass** outputs to the left and right channel inputs, respectively, of the amplifier(s) that drive the Epsilons' **HIGH PASS** inputs for the Mid/High frequency section.

Outputs to the Woofer Amplifiers

Connect the SCU's **left** and **right bass out** outputs to the left and right channel inputs, respectively, of the amplifiers that drive the Epsilons' **LOW PASS** inputs for the Woofer section.

Servo connections from the loudspeakers to the SCU

Plug one end of the special 4-pin XLR servo cable into the left loudspeaker's **SERVO** output jack. Plug the other end into the SCU's **left servo** input jack. Repeat these connections for the right speaker's **SERVO** output and the SCU's **right servo** input jack.

WARNING: *DO NOT* connect the right speaker's *SERVO* output to the SCU's *left servo* jack or vice versa. Incorrect hook-up can lead immediately to woofer and/or amplifier failure.

You may now move the speakers into their initial positions for listening evaluation.

EPSILON SERVO CONTROL UNIT SET-UP

Amplifier gain matching

Now that the system cable connections are complete, it is time to set-up the controls on the SCU. This is when we must consider the gain specifications of the various amplifiers.

Basic to the operation of the Epsilon System is that the gains of the two woofer amplifiers be nearly identical, within a fraction of one dB, and that the gains of the two mid/high amplifiers be nearly identical, also within a fraction of one dB.

It is also basic to system operation that the gains of the two amplifiers (woofer and mid/high) that drive an Epsilon's two sections be the same, or be adjustable to be the same, within 6dB if possible.

The SCU's front panel **bass level** control enables you to adjust the level of the low frequency section to achieve satisfactory tonal balance between the two sections.

If your amplifiers for the two sections do not have gains that match within 6dB, or are not adjustable to this degree of gain matching, consult your dealer for assistance. You may need different amplifiers or an external level control. This will allow more "bass level" adjust range.

Setting the SCU rear-panel *phase* switch

The signal phase of the SCU's electronic woofer servo control circuitry must match that of the woofer amplifier. The SCU's **phase** switch provides this matching. If the woofer amps are *non-inverting*, set the **phase** switch to the 0 position. If the woofer amps are *inverting*, set the **phase** switch to the 180 position.

WARNING: The SCU's *phase* switch must be correctly set for the amplifier in use. Incorrect setting of this switch can lead immediately to woofer and/or amplifier failure.

If you are unsure of the amplifier's phase, by all means, check it or have it checked. If you are using balanced XLR inputs on the amplifier, it is imperative that you check its conformance to AES standard wiring of the connector.

Setting the SCU rear-panel dB gain control

The gain of the SCU's woofer servo control circuitry must match that of the woofer amplifiers. The SCU's **dB gain** control provides this gain matching for amplifier gains ranging from 21dB to 39dB. If your woofer amps' gains fall outside of this range, and cannot be adjusted to be within this range, please see your dealer for assistance. You may need different amplifiers or an external level control.

The top-center **0** setting matches a woofer amplifier gain of 27dB. If your woofer amplifier gain is lower than 27dB, *increase* the **dB gain** control setting (clockwise) by the difference between your woofer amps' dB gains and 27dB. Similarly, if woofer amp gain is higher than 27dB, *decrease* the **dB gain** control setting (counter clockwise) by the difference between your woofer amps' dB gains and 27dB.

Setting the SCU front-panel controls

Initially, set the front-panel **bass contour, mid-bass contour,** and **bass level** controls to their top-center, **0dB** positions. We will discuss the use of these controls in the following sections.

You are now ready to turn the system on and listen to music.

FIRST-TIME POWER-UP AND USE

Check everything!

Before turning on the power to your system, confirm that all cable connections are fully and securely made, and that all switches and controls are in their recommended initial positions. Be sure that the preamp volume control is all the way down.

SCU power control

The Epsilon SCU power switch has two positions — **standby** and **on**. In the **standby** position, the outputs of the SCU are muted but the SCU's amplifier circuitry stays powered up. The **on** LED flashes when the SCU is in standby mode. Since the power consumption of the SCU is quite small, there is no reason for complete shutdown. Keeping the circuitry "hot" assures stable operation and best sound quality. When you turn the **power** switch to **on**, the **on** LED will light steadily. About 10 seconds after this, the **servo** LED will light, indicating that the system is unmuted and is ready for operation.

Power-up sequence

Turn on the system in sequence from signal sources to preamp to SCU to amplifiers, keeping the amplifiers for last. Turn the amplifiers on one channel or stereo amplifier at a time, and wait for each to stabilize before turning on the next. This procedure gives you time to immediately turn off the amplifier in question, if there is any unusual or loud noise resulting from incorrect connections or control settings, before damage can occur. At the end of the initial power-up, you should be greeted by silence from your system.

If any loud or unusual noise occurs, quickly turn off all components and re-check all connections and SCU control settings, paying particular attention to woofer amplifier phase and the SCU's **phase** switch setting.

Play some music

Put on a CD or LP or tape, and advance the preamp volume control. Play the system at a moderate level for a while and check that the left and right speakers are actually reproducing left and right channel sounds — a test CD with voices or sounds in each channel separately is very helpful for this. Verify that the system sounds well balanced from left to right with stereo music, and that each of the drivers is actually operating.

SCU AND EPSILON CONTROLS: Getting the Most From Your Epsilon System

The acoustic design and operation of your Epsilon system enables it to perform exceptionally well in nearly any usable space. As you might expect, however, achieving the highest levels of performance requires careful listening and experimentation with the settings of the Epsilon System's controls. These controls are the SCU's **bass contour, mid-bass contour** and **bass level** controls, and the Epsilon's **EMIT, EMIM** and **LEMIM** level switches.

The SCU's three controls all tend to interact audibly. This is partly because human hearing is not very acute in the bass range, either for level or pitch, and partly because they actually do interact. We recommend that you initially set the bass contour, mid-bass contour and bass level controls to their 0dB positions, and adjust the bass level control first.

When adjusting any of the controls, play lots of music in a variety of styles so that you can evaluate overall performance. Then, make notes of the overall most satisfying settings so that you can easily restore them. Don't hesitate to readjust the controls on a per-recording basis to achieve the sound quality you want from an individual performance.

SCU bass level control

This control provides the primary adjustment for the relative level balance between the Epsilons' woofer sections and their mid/high frequency sections. Adjusting this control requires some period of acclimation to the sound of the system, unless you are a very experienced listener. This is because the Epsilons' have deep bass capabilities far beyond those of nearly any other loudspeaker.

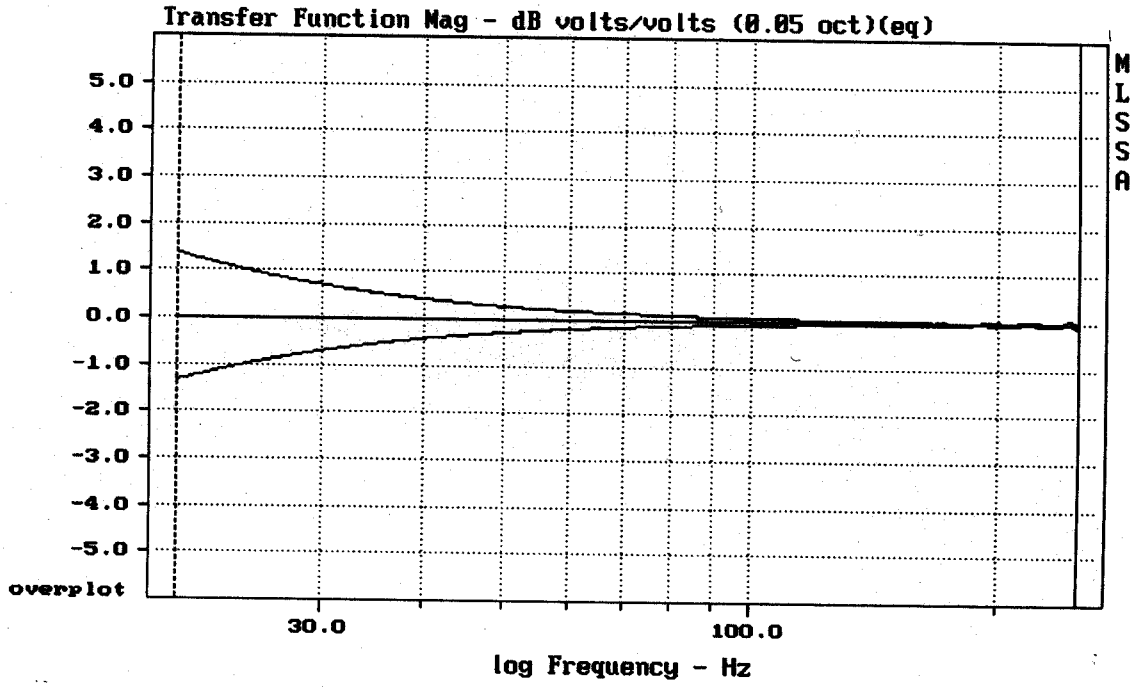
On recordings with substantial deep bass content, you may initially tend to turn the bass level down, simply because you are hearing bass that you've never heard from your system before. By the same token, on recordings with little deep bass content, you may tend to turn the bass level up in the expectation of hearing something that isn't there.

Orchestral music with strong double bass and cello sections offers a good means of evaluating the overall level balance between sections, because these string instruments are active throughout the middle of the bass frequency range. In popular music, bass guitars also cover the middle of the bass range well, but the impulsive nature of their sound makes evaluating levels difficult. Piano music of any genre that has a lot of left hand work is excellent for bass level adjustment.

SCU bass contour control

This control allows you to adjust the amount of deep bass signal produced by the system below 70Hz. Adding or removing deep bass output can help compensate for having the Epsilons closer to, or farther away from walls, and helps you to achieve musically appropriate bass output regardless of the size of the listening room.

FIGURE 4



EPSILON BASS CONTOUR CONTROL. MAX-FLAT-MIN

Figure 4 shows the action of the control at its **0dB, +5dB** and **–5dB** positions.

Play recordings with a lot of deep bass content from big drums, organ pedals, or synthesizers, and adjust the bass contour control to get the most musically satisfying sound. Though you might not think so, recordings with content below 41Hz are quite rare, since there is not much music below the 41Hz bottom E of a string bass or a bass guitar.

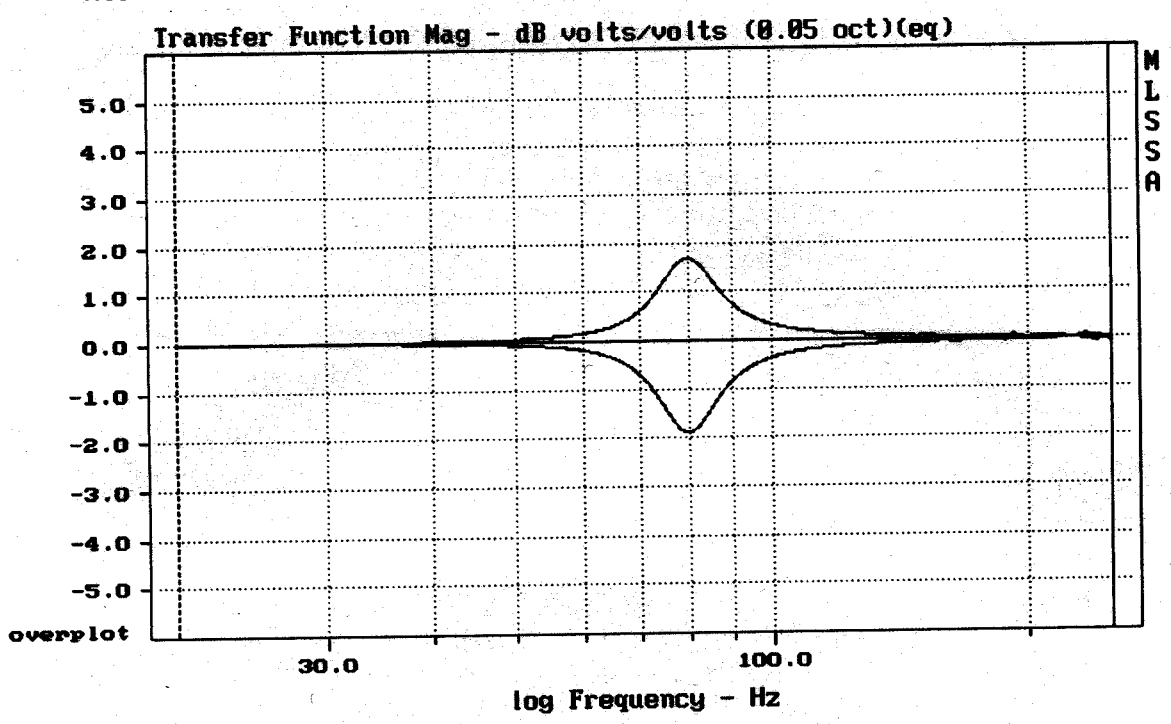
SCU mid-bass contour control

This control adjusts the frequency content of the sound in the 80Hz region from the woofer section. It has an effect on the male voice, which has "chest sound" and fundamentals in this region.

Figure 5 shows the action of the mid-bass contour control at its **0dB, +3dB,** and **–3dB** positions.

The frequency region affected by this control is extremely important to subjective sound qualities of "boominess" or "thinness", so spend a great deal of listening time evaluating its action. As with the other bass controls, don't hesitate to use this control on a per-recording basis to adjust for artifacts in the recording or to satisfy your musical tastes.

FIGURE 5



EPSILON MID-BASS CONTOUR CONTROL. MAX-FLAT-MIN

Epsilon EMIT, EMIM and LEMIM level switches

These switches do not change the levels of their respective drivers by very much, but because their effects each span several octaves, they are very audible. **Figure 6** shows their combined actions in a single plot. This is the acoustic output from an Epsilon speaker normalized to the **FLAT** settings of each switch.

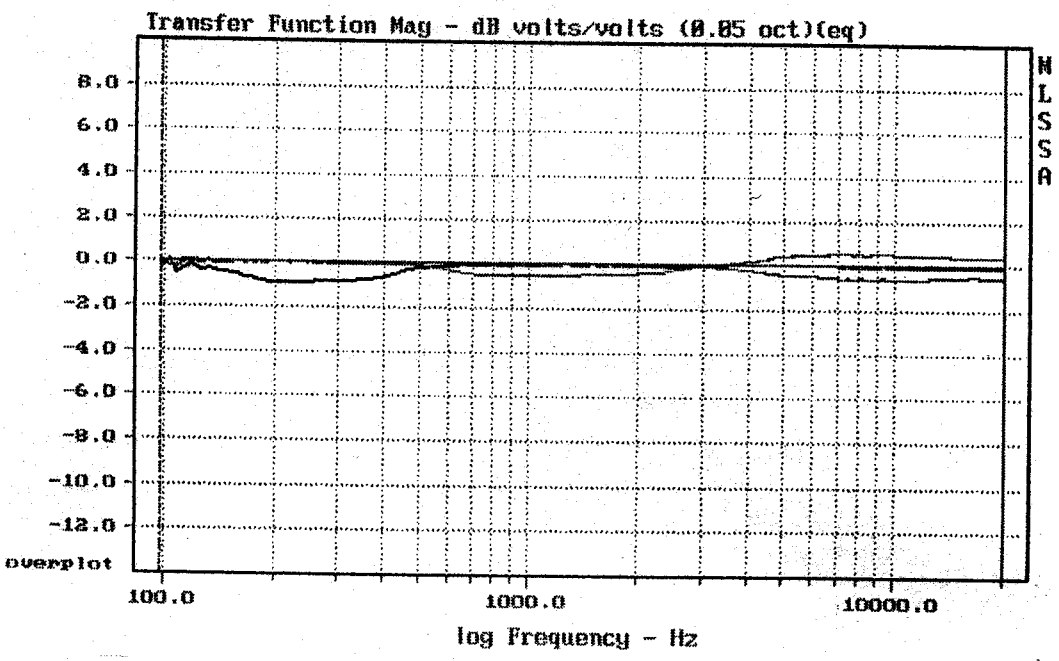
As you can see, the **EMIT** switch, which affects the range from 4kHz to beyond audibility, provides about 0.6dB of boost in the "+" position and 0.6dB of cut in the "–" position. This control provides more or less "air" in the sound to compensate for overly bright or dull room acoustics.

The **EMIM** switch affects the range from 600Hz to 3kHz, offering a cut of about 0.5dB in the "–" position. This range contains the harmonics of the female voice and of many instruments. An overly bright room can make voices, in particular, sound strident in this range. If your room is like this, set the switch to the "–" position.

The **LEMIM** switch affects the range from 150Hz to 400Hz, offering a cut of about 1dB in the "–" position. Many rooms have acoustical artifacts in this range which make them sound overly warm. If your room is like this, set the switch to the "–" position.

As you can tell from the previous discussion, the effects of these switches are designed to help you get the best sound from your Epsilons given the particulars of your room's acoustics. Freely experiment with the settings to determine which combination of settings produces overall sound that offers the most natural, realistic quality, with all types of music.

FIGURE 6



MAINTENANCE, TROUBLE SHOOTING AND THINGS TO AVOID

Remember to change the batteries!

The two 9V batteries located in each speaker's rear compartment should be changed at least every two years, well before they are fully discharged. Given their invisibility and their subtle effect on sound quality, this is an easy item to forget about, with no attention-getting reminders that the batteries need replacing. Letting the batteries fully discharge will often result in chemical damage to the batteries, their connections, and their surroundings.

Since these batteries are inexpensive, you may find it convenient to change them annually, on an anniversary, or at the same time that other maintenance items around the home are performed — for example, the changing of clock batteries or the batteries in smoke detectors. A note in this manual detailing the batteries' installation date and the next change date can help to remind you.

Cleaning

The Epsilon enclosures should be keep dust free — simply wipe the enclosures' finished surfaces with a soft, clean, lint-free cloth on a regular basis. The cloth grilles covering the rear of the speakers may be lightly vacuumed with a dust brush attachment. Do not vacuum over the location of the rear-facing EMIT tweeter at the top rear of the enclosure. The front grille cloth may be lightly brushed to remove dust. Do not vacuum over the openings of the LEMIM, EMIM and EMIT drivers.

Keep the case and panels of the SCU free from dust by wiping with a soft cloth and by vacuuming with a dust brush attachment.

No power to the SCU

If the SCU is plugged into a known live outlet (test it with a lamp or voltmeter), the power cord has no sign of damage and is plugged into the SCU, but the SCU does not power up, check its fuse by following the procedure in the **Epsilon Servo Control Unit Connections, Changing the voltage selector or fuse, page 13.**

A blown fuse is extremely rare and is the result of a surge on the power line, the incorrect fuse, the wrong voltage setting, or the failure of a component in the SCU. If the fuse is blown, replace it with a fuse having the correct rating. If the second fuse also blows, take the SCU to your dealer for service.

CAUTION: The SCU contains no user serviceable parts. Do not attempt to repair the SCU. Refer all service requirements to qualified personnel.

Damaged power cord

If the power cord or one of its molded terminals is damaged, cut, has loose pins, an exposed wire or a missing ground pin, replace it at once with an equivalent cord. The SCU's "IEC" power cord is a type commonly used with computers and electronic instruments, and is widely available.

Avoid connecting and disconnecting equipment without first turning off the power to all of the components

Long familiarity with audio equipment tends to make even experts casual about connecting and disconnecting equipment. Not turning off the power to each component can lead to low frequency pulses or bursts of high power noise that can damage amplifiers and/or loudspeakers. It is best to be cautious.

Avoid trying to find out how loudly the system will really play

This is like trying to find out how far you can stretch a rubber band — the answer is only known when the rubber band breaks. With a high performance system like the Epsilon, it is easy to play music at levels well beyond those of actual performances. Of course, it also is tempting to play some sonic spectacular as loudly as the equipment will let you. Please remember that you can damage your equipment with sustained power levels beyond those required for realistic reproduction.

This is especially true when an amplifier is driven into overload (clipping) and it generates huge amounts of high frequency energy not found in any ordinary acoustic signals. This problem is most frequently encountered when amplifiers of insufficient power are used. It is hard to tell the difference between amplifier overload and loudspeaker overload, and to compound the matter, some recordings contain real sounds that can absolutely convince experts that something is wrong with the playback system.

Any electronic or mechanical system can be driven to the point of failure and your Epsilon loudspeakers are no exception. After you have become familiar with your new system and have sustained listening experience with it, a doubt or a hunch that all is not well is often correct. If you have any doubts about the system's performance, call in an expert immediately.

Avoid accidentally switching the SCU's phase switch

This is a really serious mistake, because it makes the feedback from the woofer to the SCU positive (regenerative) instead of negative (controlling). The result is that the system oscillates, quickly reaching the power limit of the amplifier. The audible result is horrendous noise, with a high likelihood of woofer and/or amplifier damage.

APPENDIX: BALANCED CONNECTION NOTES

Many audiophile-quality components have balanced signal connections. If your equipment has such connections, we recommend that you use them. In general, they offer superior sound and lowest noise.

However, some equipment made overseas has the "+" and "–" pins reversed from those specified by the standards of the Audio Engineering Society (AES), which require that pin 2 is "+" and pin 3 is "–" . If the pins are reversed, the output polarity of the signal to the speakers will be reversed from that of AES standard connections. The effects caused by this signal polarity reversal depend on whether it occurs before the SCU or in the amplifiers following the SCU.

When using balanced output jacks, the rear panel gain control must be turned down by 6 db from the setting that would be used on the unbalanced output. i.e., assuming that you were using a 27 db amplifier, the rear gain control would be set to 0 db for the unbalanced mode. In the balanced mode the setting would be – 6 db.

Reversed polarity prior to SCU

Reversal of balanced connection polarity prior to the SCU causes no large problems as long as both channels are the same. Many audiophiles believe that absolute polarity should be maintained from the signal source to the loudspeakers. All Infinity loudspeakers are designed to deliver positive acoustic pressure when a positive signal is applied to the red or "+" terminal.

Many electronic products, however, follow no convention about signal polarity; some invert phase, and some don't. If you care about absolute polarity, many test CDs include impulse signals which are unipolar, that is, they are only positive-going when referenced to ground.

An oscilloscope connected to the outputs of each electronic unit in the signal chain, including the CD player, can verify whether absolute polarity is being maintained. On balanced connections and a positive unipolar pulse signal, pin 2 should have a positive going signal, while pin 3 should have a negative going signal. Correctly interpreting the 'scope display often requires expertise, depending on the nature of the pulse waveform.

Reversed polarity in the power amplifier(s)

If the amplifiers have reversed balanced connections, then as far as the SCU is concerned, they are changed from non-inverting to inverting, or vice-versa. For example, if a *non-inverting* woofer amp has reversed balanced connections, then from the SCU's perspective, it is an inverting amp and the SCU's **phase** switch *must* be set to the **180** position. Furthermore, if you have amps which have mixed reversals, that is, one reversed and one not, refer to page 12.

Correcting a balanced connection polarity reversal on any piece of electronic equipment is a simple matter of unsoldering and resoldering two wires on the XLR connector. This is an easy task for any technician.

APPENDIX: AMPLIFIER GAIN MEASUREMENT/SETTING

Power amplifiers do just what their names imply: They take small, low-power audio signals and amplify them, increasing their power so that they drive the loudspeakers to audibly useful output levels. The amount of amplification is measured in decibels (dB) and is called *gain.*

Many power amplifiers are fixed-gain units with no input level or sensitivity adjustments. Others have switches and/or potentiometers that adjust the input sensitivity or overall gain. As noted in the section **Epsilon Servo Control Unit Set-Up,** the Epsilon Servo Control Unit has a **dB gain** control to optimize the servo system for the gain of the woofer amplifier. When the amplifier has no input level control or gain adjustment, the SCU **dB gain** control is adjusted as previously described.

Measuring amplifier voltage gain

If you do not know the gain of each of your amplifiers with a 4 Ohm load, and cannot tell what it is from the specifications, you must measure the gain or have it measured. Then, you can use the gain or level controls, if any, along with the controls on the SCU, to match all of the amplifier gains.

To measure the effective voltage gain:

1. Connect a high-wattage 4 Ohm load resistor (25 Watts or more) between the amp's "4 Ohm" and "common" output terminals.
2. Apply a 1000Hz sine-wave input signal of known voltage, as measured with an AC voltmeter. The input level must be low enough so that the amplifier is not close to overload (clipping) at the output; an input level of 100mV is a good starting point. If possible, monitor the amplifier's output with an oscilloscope to verify linear operation.
3. Set all gain or level controls or switches to maximum, and measure the output voltage across the 4 Ohm load resistor.

Note that maximum gain means highest sensitivity; for example, if the amp has an input switch labeled "1V" and "2.5V", the 1V position results in the highest sensitivity and gain. If the AC voltmeter does not have dB scales or readings, calculate the gain as follows:

dB gain = 20 log (Vout/Vin)

4. Check the gain of each amplifier with an input signal of 100Hz, as well. It should be virtually identical to the gain at 1000Hz; if not, note the two different readings, and use the 100Hz reading for the woofer amp and the 1000Hz reading for the mid/high amp.

Setting amplifier gains:

- If *every* amplifier has a level control, adjust each so that the amplifier has a gain of 27dB.
- If *none* of the amplifiers has a level control, and the woofer amp and the mid/high amp gains differ by more than 6dB, then you will need an external level control for the amp with the highest gain. Adjust this control so the highest gain amp matches the lower gain amp. Your dealer may be able to provide such a control for you.
- If only *one* of the amps has a level control, and it also has the *highest* gain, then set it to match the lower gain amp.
- If only *one* of the amps has a level control, and it also has the lowest gain, then you will need an external level control for the highest gain amp. Set the lowest gain amp level control to maximum and set the external level control of the highest gain amp to match the lower gain amp.

ABOUT INFINITY:
A QUARTER CENTURY OF SONIC EXCELLENCE

Infinity Systems, Inc. was founded in 1968 from a passion for music, with a commitment to excellence and a drive to perfection. Its founders brought advanced aerospace technology and materials science to the task of building the finest possible loudspeakers.

The company's first product, the Servo Statik 1, was the world's first hybrid three-piece system, employing a servo-controlled subwoofer and a pair of electrostatic satellites. The Servo Statik immediately captured the attention of audiophiles and Infinity was on its way to creating an American tradition of breakthrough audio technologies.

Today, Infinity builds advanced audio products covering a wide range of audio applications, with advanced technology loudspeakers as a primary focus. Whether for audiophile-grade stereophonic reproduction, high performance home theater, or high-quality, yet high-value smaller systems, Infinity's goals remain the same as they were at the company's founding — to relentlessly extend the boundaries of the art and science of loudspeaker design and manufacturing.