Snell Acoustics, Inc.

143 Essex Street, Haverhill, Massachusetts 01832
(508) 373-6114 FAX (508) 373-6172

Unexcelled

Dear Fellow Music Lover:

Congratulations on your purchase of these great Snell Acoustics loudspeakers!

Snell loudspeakers enjoy a reputation for satisfying the goal of "musical realism" more completely than any other loudspeaker on the market today. Consequently, we are especially pleased to have this opportunity to share the reality of our reputation through the actual performance of our products in your own home.

Snell loudspeakers are designed to provide many hours of listening pleasure in a variety of system configurations including:

Bi-wiring,
Bi-amplification,
Bookshelf placement,
Surround Sound Systems, and
More.

The enclosed OWNER'S MANUAL deals with each of these applications as well as other extremely important aspects of system set-up such as:

Speaker Placement,
Room Treatment, and
Listener Position.

I want to encourage you to immerse yourself in the following pages so that you will be able to achieve the greatest enjoyment possible from your new audio investment - even starting with the correct way to unpack the speakers!

I also want to extend my sincere welcome to you in joining the Snell network of satisfied music connoisseurs. After all, our reputation - and our success - is continually reverified through the complete satisfaction of our customers! Thank you for your support.

Sincerely yours,

Dr. William R. Osgood
President

Snell™

ACOUSTICS

OWNER'S MANUAL

CONTENTS

U N P A C K I N G I N S T R U C T I O N S

(for one loudspeaker per box)

1) Set the carton on the floor so that the lettering is upside down. Open and fold back the four end flaps.

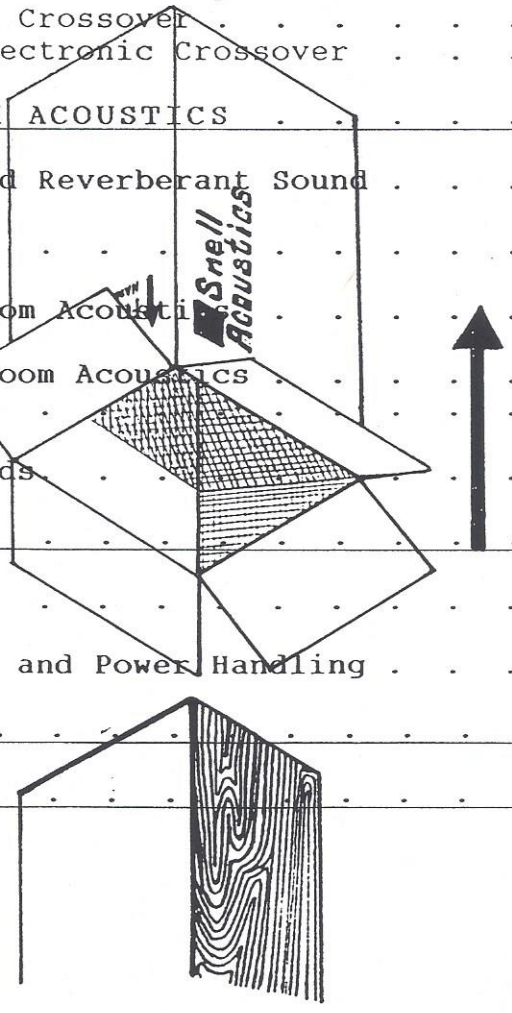
2) Carefully tip the carton over so that the bottom (end capiii exposed) is on the floor's surface with the end flaps folded back.

3) Slowly lift the carton off of the loudspeaker as shown in the diagram below.

4) Slide the plastic bag off of the cabinet.

5) SAVE ALL packing materials, including the plastic bags..

NOTE: Oak veneers will sometimes absorb small amounts of moisture in transit making the finish feel rough. When this occurs simply buff the veneer surface with 600 grit sandpaper followed by polishing with a household furniture wax such as Pledge.



U N P A C K I N G I N S T R U C T I O N S

(for two loudspeakers per box)

1) Set the carton on the floor so that the lettering is upright. Open and fold back the four end flaps.

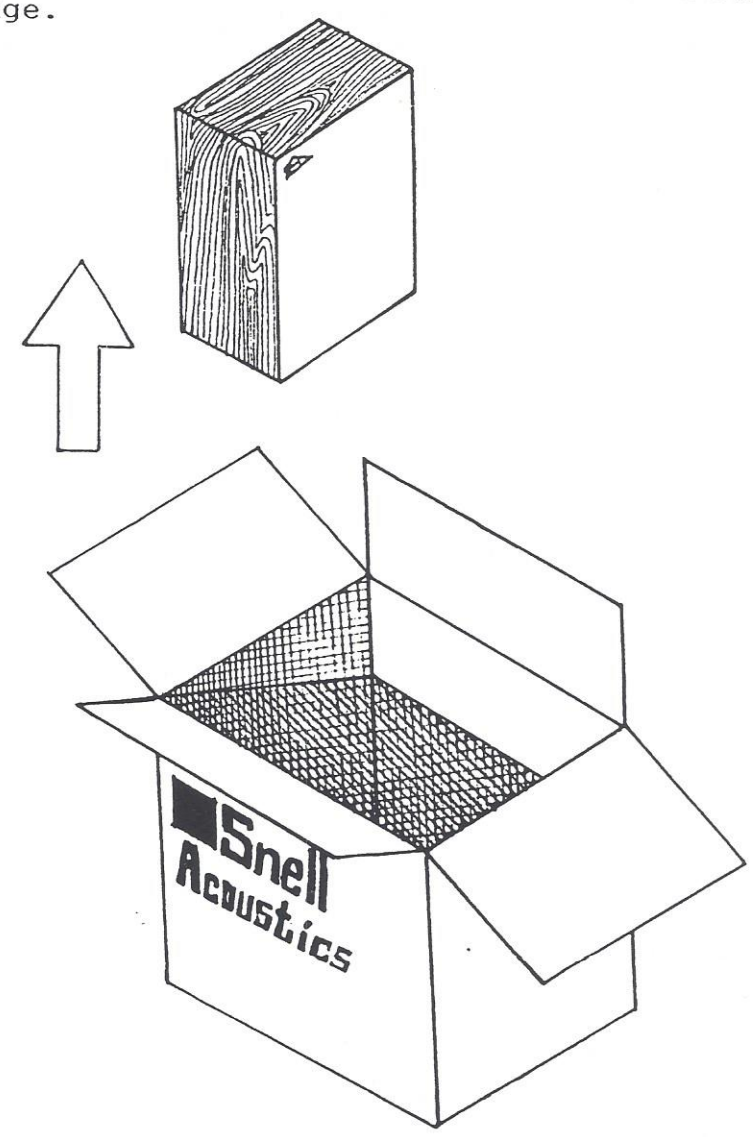
2) Remove the top carton liner.

3) Carefully lift the cabinet out of the carton. Be certain not to press against the drivers.

4) Slide the plastic bag off of the cabinet.

5) Save ALL packing materials, including the plastic bags.

NOTE: Oak veneers will sometimes absorb small amounts of moisture in transit making the finish feel rough. When this occurs simply buff the veneer surface with 600 grit sandpaper followed by polishing with a household furniture wax such as Pledge.



Introduction:

You have just purchased one of the truly great loudspeakers available in the world today. As with all great instruments, time spent now in understanding how they work, and then in fine tuning your set-up, will allow you to achieve the highest level of performance these great speakers have been designed to deliver.

It is a fact that the loudspeaker is the most important component in your audio system. Further, proper placement of the loudspeakers in your listening environment can represent dramatic improvements in overall sound quality. This instruction manual has been developed as a tool for you to use both in organizing your total sound system, and in placing your speakers within your listening environment to achieve the best performance possible.

Before you proceed further, please take a few minutes to complete and mail the enclosed warranty card in case your speakers are ever damaged. This will result in faster service and so insure minimal downtime. You will be interested to know that (thanks to the unique crossover tuning process used at Snell Acoustics) in the unlikely event that your speakers do need servicing, we are able to return performance precisely to their original specifications. We are the only manufacturer in the world that provides this level of service on all our models. Our goal is to insure that you enjoy your Snell speakers for a long, long time.

CONTENTS

U N P A C K I N G I N S T R U C T I O N S

(for one loudspeaker per box)

1) Set the carton on the floor so that the lettering is upside down. Open and fold back the four end flaps.

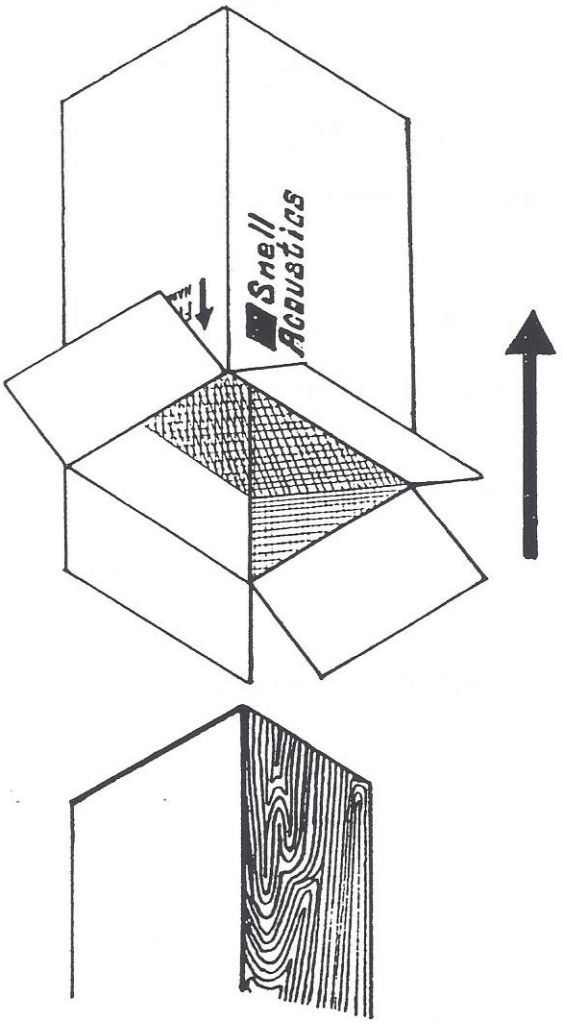
2) Carefully tip the carton over so that the bottom (end cap exposed) is on the floor's surface with the end flaps folded back.

3) Slowly lift the carton off of the loudspeaker as shown in the diagram below.

4) Slide the plastic bag off of the cabinet.

5) SAVE ALL packing materials, including the plastic bags.

NOTE: Oak veneers will sometimes absorb small amounts of moisture in transit making the finish feel rough. When this occurs simply buff the veneer surface with 600 grit sandpaper followed by polishing with a household furniture wax such as Pledge.



ASSEMBLING YOUR AUDIO SYSTEM

1. Selecting Associated Components

Your Snell loudspeakers have been carefully designed to present an easy "load" to the amplifier. They are also quite high in sensitivity (efficiency). Together this means that the loudspeakers are not at all amplifier critical. Our smaller models may even be used with the very low power amps found in many home video systems. Their wide dynamic range and high power handling capacity allow them to reproduce realistic acoustic music levels. (See Loudspeaker Care and Power Handling, section 10). Higher power amplifiers are more desirable for use with Snell speakers, to enable the reproduction of musical peaks without clipping (straining) the amplifier.

2. Loudspeaker Cables:

The length and gauge of speaker wire you use will have an effect on the performance results. Generally speaking, the heavier gauge wire you use (with lower numbers), the better the results, especially at low frequencies. Your Snell speakers have been optimized for use with speaker cables which have a resistance of .15 ohms. This means that for runs of 10 feet or less, 18 gauge wire is adequate. Longer runs will benefit from heavier wire. The integrity of the connections is also important. Spade lugs, soldered on to the wires, or high quality banana plugs provide the best connections. Be certain to tighten all of the speaker and amplifier terminals. If the terminals are loose, you may have intermittent sound or no sound at all.

3. Connecting Your Snell Loudspeakers:

- Basic System Configuration

The simplest way to connect your new Snell speakers is also the most popular and will provide superb sound reproduction. In the rear of your speakers you will see jumpers which connect the two pairs of jacks. Be sure to leave the jumpers in for this type of system configuration. You should connect your amplifier to the high frequency terminals and make sure to tighten the jacks. A 1/2" nutdriver is best. Be sure that both speakers are connected to the amplifier with the same "polarity". All speaker wire is marked in some way to separately identify one of the wires from the other. This identification is generally by a different color wire, a rib in the wire, printing on the insulation, or a thread inside along with the wire. Normally, the red terminal on your speaker would be going to the "+" or red terminal on your amplifier, and the black speaker terminal would be going to the "-" or black terminal on your amplifier. Be sure to tighten all connections firmly.

- Optional Bi-Wiring and Bi-amping Configurations

Bi-wiring, and bi-amping represent ways to improve the sonic performance of your sound system. Bi-wiring involves running two sets of speaker leads from a single amplifier to each speaker, and bi-amping utilizes two stereo amplifiers. Bi-wiring and bi-amping can also represent the means for a staged development of a home system

Design Philosophy and Goals:

The design philosophy of Snell Acoustics is that a loudspeaker should not "color" the performance of recorded sound. The goal is to design and produce loudspeakers that will in fact, deliver the same sonic qualities of a live performance. These goals were recognized with the introduction of the companies first loudspeaker model, the Type A. Soon after its introduction, the Type A earned recognition as one of the very finest loudspeakers in the world establishing its position as the benchmark for sonic accuracy. Over the years, our products have continued to receive industry recognition for their unsurpassed sound quality, integrity, and consistency of construction. Satisfied customers include major magazines, electronics manufacturers, recording studios, universities, and film producers.

Today, Snell Acoustics continues to follow Peter Snell's philosophy of producing loudspeakers that are more faithful to the music than any others. Our current design techniques eliminate the possibility of falling victim to passing audiophile gimmicks and fads. The combination of utilizing the world's most advanced testing facilities and extensive "double-blind" listening tests provide us with objective, concrete answers rather than subjective opinions in designing our loudspeakers. A Snell speaker is not put on the market until it clearly outperforms its potential competitors in blind listening tests critiqued by many music lovers.

Our success in achieving our goals stems mainly from our focus on people; our customers, our dealers, and our employees. People produce our loudspeakers literally by hand versus machinery assisted assembly lines. The individual drivers and crossover combination have been hand tuned to match the original reference design thus insuring unsurpassed accuracy in performance. The pristine finish of your veneer cabinets is the result of hand sanding and hand rubbed-in oils. We support our dealers with extensive training aids, informative brochures, and products backed with a five year limited warranty. We care about our customer's satisfaction.

In a day where automation dominates, we are proud to stand separate, offering our customers a level of quality, integrity, and value that can only come from hand craftsmanship and the human spirit.

from a "basic" system to a more elaborate system by starting out with a basic speaker/amplifier combination, later bi-wiring, and later still, adding a second amplifier. This modular approach may be an affordable way to develop a superior sound system over time without necessarily having to initially settle for lesser quality components which would later have to be upgraded. All Snell Acoustics loudspeakers have built-in provisions to accommodate bi-wiring or bi-amping.

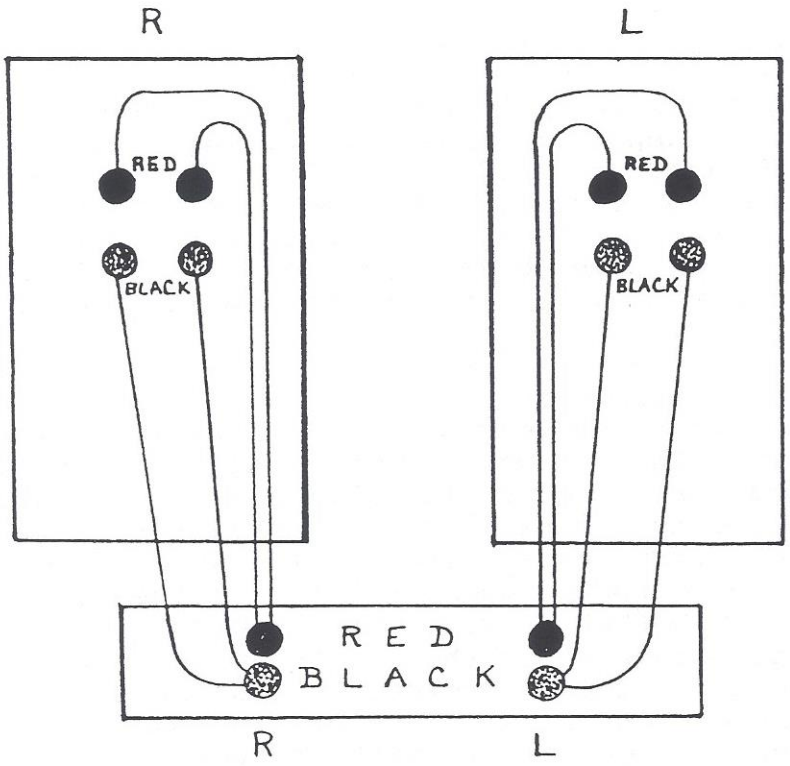
- Loudspeaker Crossovers

Loudspeaker crossovers are really passive filter networks (called passive because they do not require additional current from wall outlets or batteries to work). They consist of inductors (also known as chokes or coils), capacitors, and resistors. To over simplify, their function is to pass along the frequency range which the driver is designed to reproduce and block the frequency range which is not supposed to reach that driver. Snell loudspeakers however, do not internally permanently tie the inputs to the low and high frequency filters. Separate input terminals on the rear of the loudspeaker allow for the option of using jumpers to connect the low and high frequency inputs together or, without jumper wires, for independent access to the low and high frequency inputs. This independent access does not by-pass the filter networks, but instead allows for independent external access to the high or low range drivers within the cabinet, thus providing the built-in ability to bi-wire and/or bi-amp.

- Bi-Wiring

Bi-wiring is a way to upgrade the sound of a Snell loudspeaker at minimal additional investment. All that is required is an additional pair of speaker cables. The sonic effect of bi-wiring is generally described as an increase in "openness," and a reduction of "grit" and distortion. Even though the application itself is simple, note that the benefits are a function both of the type and quality of the amplifier used and the characteristics of the speaker wire. Further, with bi-wiring especially, greater improvement is generally achieved in installations with speaker cables more than a few feet in length.

Bi-wiring when used with a single stereo amplifier, means utilizing two pairs of speaker cables rather than one pair. For clarity, we will look at one channel only. We will refer to the red or hot amplifier output terminal, as well as the lighter colored or marked speaker wire as the "plus" side; and the black, common, or ground amplifier output terminal and the darker or unmarked speaker wire as the "minus" side. Looking at the left amplifier output, the "plus" terminal is connected to TWO plus wires, and likewise, the "minus" output terminal is connected to TWO minus wires. Both of these speaker cables are connected to the left speaker, but not to the same speaker terminals. The diagram below shows these connections. Needless to say, a loudspeaker must be designed for the mechanics of bi-wiring application to make this work.



To bi-wire your speakers, first disconnect the external jumper wires which connect the two pairs of speaker terminals together. (These perform the same function as the internal connections in other speakers that do not permit bi-wiring or bi-amping.) Once the external jumpers are removed, connect each of the "plus" speaker leads to a "plus" speaker terminal, being careful to make a tight connection, and then connect the corresponding "minus" leads to the "minus" speaker terminals. That's all there is to it!

- Why Does Bi-Wiring Work?

Like so many audio topics, there are differing explanations as to the mechanics responsible for the audible improvement when bi-wiring. It doesn't seem to be as simple as increasing the wire gauge, since doubling-up the wire without electrically separating the low and high frequency speaker inputs does not achieve the same level of result as actual bi-wiring. The most likely reason has to do with the fact that all woofers act as electrical generators, and actually send an electrical signal back to the amplifier. Because solid state amplifiers have a very low output impedance, and are therefore "seen" by the speaker as a virtual short circuit, they are most affected by bi-wiring applications. When a speaker is bi-wired, the amplifier's low output impedance (like a short circuit) is a buffer between the woofer and the tweeter, preventing most of the woofer's self-generated signal from reaching the tweeter filter, and thus reducing or even eliminating the negative impact which otherwise results. While no one has proven why bi-wiring works, and while there are a variety of technical reasons which seek to provide an explanation, the isolation theory stated here seems to have the greatest support and makes the most logical sense.

- Bi-amping

In most cases, bi-amping will result in an even greater sonic improvement over bi-wiring, with audibly reduced distortion and increased dynamic range. Bi-amping also results in improved coherency and increased openness. Bi-amping is easily achieved with Snell Acoustics loudspeakers because the internal crossover design provides independent external access to the low and high frequency range drivers. Since the internal filter networks are not by-passed, several bi-amping options are available. For example, it is possible to bi-amp using two identical amplifiers without an electronic crossover, or to bi-amp using two dissimilar amplifiers without a crossover as long as the amplifier with greater input sensitivity has input level controls, or by adding level controls ahead of the input to the more sensitive amplifier.

- How to bi-amp

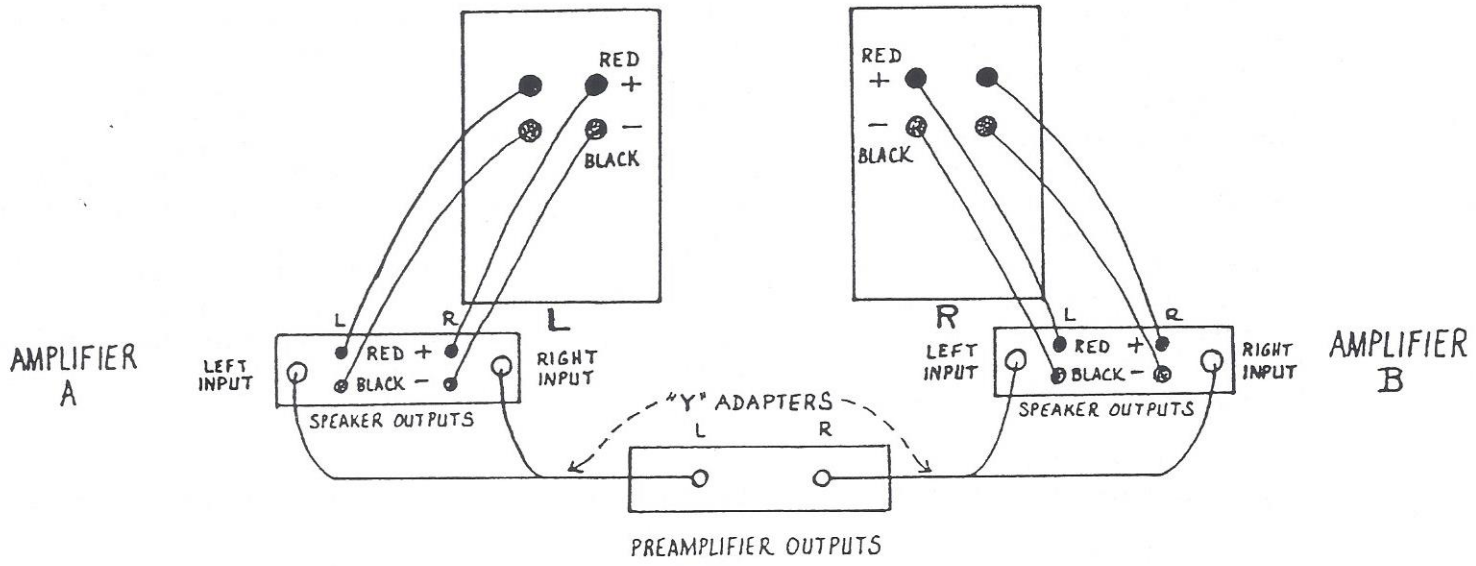
a. Bi-amping with two identical amplifiers without an electronic crossover

Utilizing two identical amplifiers is the simplest form of bi-amping, and is desired because it increases dynamic range, improves "openness", and lowers distortion. The use of two identical amplifiers provides the opportunity to "vertically bi-amp" (an innovation from Snell Acoustics). In conventional bi-amping configurations, one stereo amplifier drives the low-frequency sections of the speakers, and the other stereo amplifier drives the high-frequency sections. We refer to this arrangement as "horizontal bi-amping". With Snell Acoustics' "vertical bi-amping", one stereo amplifier is used for each speaker, with one channel for the top of one speaker and the other channel for the bottom of the same speaker. The two advantages of vertical bi-amping are the elimination of cross-talk and improved low-frequency dynamic range. We have found that even the best stereo amplifiers exhibit channel interaction (cross-talk). With vertical bi-amping, this is avoided as there is, of course, total separation between the channels. In addition, neither amplifiers' power supply is required to deliver the low-frequency current demands of both loudspeakers as the demand is shared by both amplifiers.

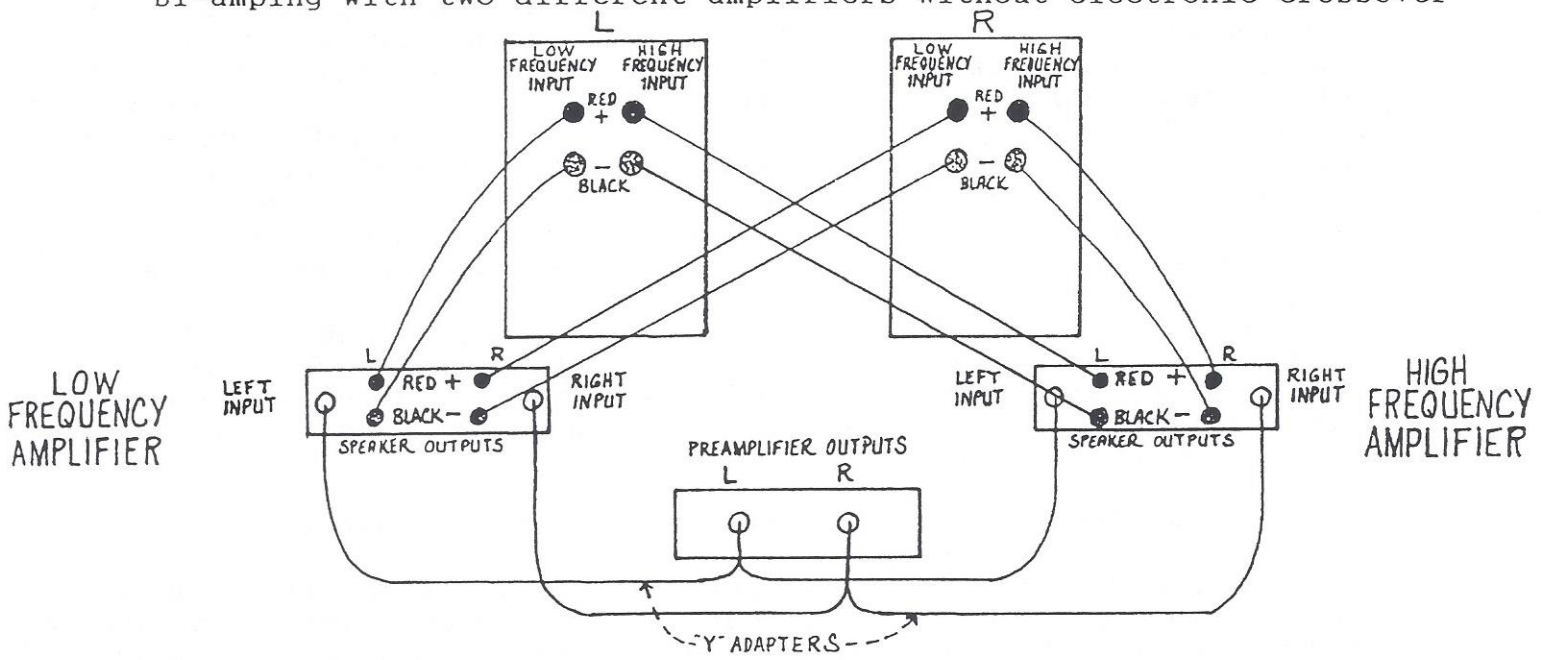
b. Bi-amping with two different amplifiers without an electronic crossover

This configuration allows for the use of one amplifier which is particularly suited for low-frequency reproduction, and one which is better suited for high-frequency reproduction. Many listeners prefer to use a solid-state amplifier for low frequencies, and a tube amplifier for high frequencies. Naturally, with such an arrangement, vertical bi-amping is not possible. In order to balance the two amplifiers, the one with the greater input sensitivity (not rated power) must have level controls. Input sensitivity is rated in volts, and a lower figure indicates greater sensitivity. If the appropriate amplifier does not have level controls, they can be added either in-line or in the amplifier. Again, the reason for this configuration is to benefit from the perceived advantages each type of amplifier provides for its portion of the total sonic spectrum.

Bi-amping with two identical amplifiers ("vertical configuration")



Bi-amping with two identical amplifiers ("horizontal" configuration")
or
Bi-amping with two different amplifiers without electronic crossover



NOTE No. 1: The location of the terminals on amplifiers and speakers varies from model to model.

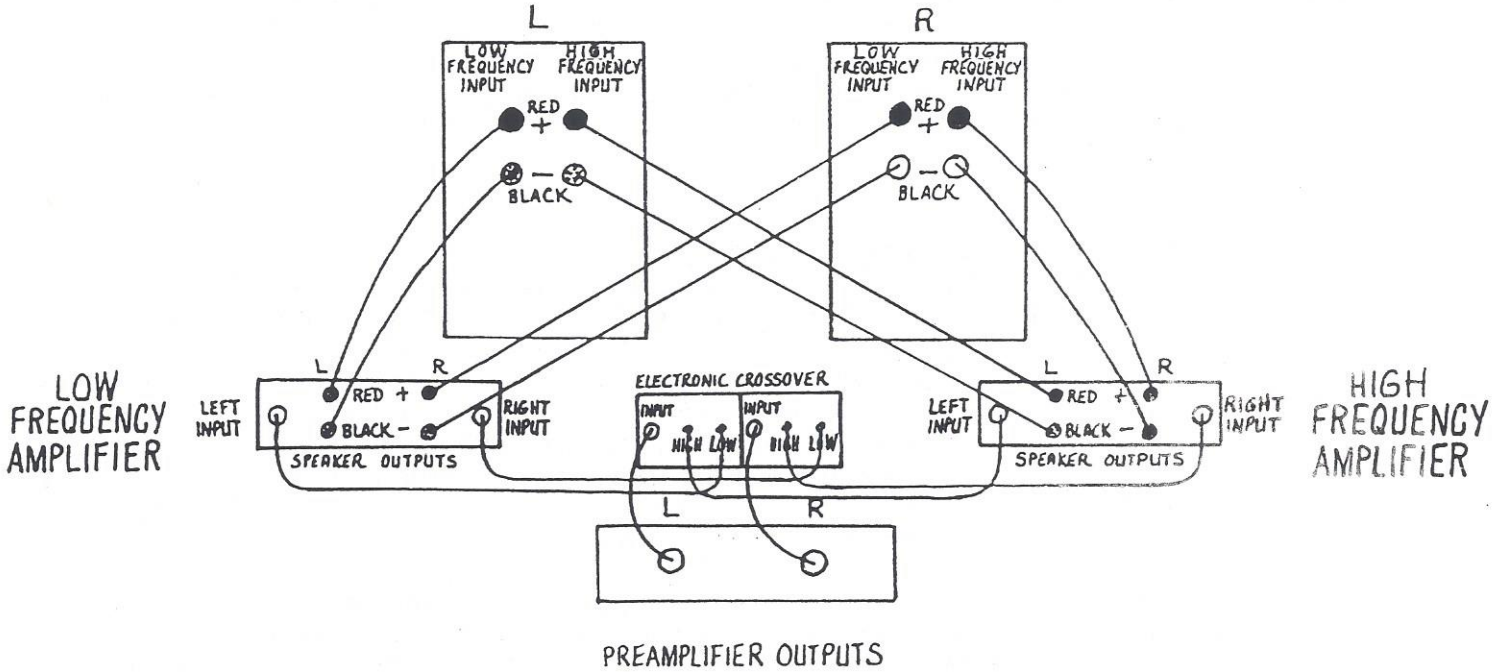
NOTE No. 2: When using this bi-amp configuration (no electronic crossover) with loudspeaker models which have "bi-amp" jacks, do not short the bi-amp jacks.

NOTE No. 3: Before bi-amping, disconnect the jumpers which connect the loudspeaker's input terminals.

c. Bi-amping with an Electronic Crossover

You may bi-amp your Snell loudspeakers using an electronic crossover. The use of an electronic crossover results in the high frequency amplifier only amplifying high frequency signals, and the low frequency amplifier only amplifying low frequency signals. Since the loudspeaker's internal filter networks (crossovers) are precision tuned for each individual loudspeaker, they are not disabled when an electronic crossover is being used. Instead, what happens is that the internal filter compensates for unit-to-unit driver differences and provides equalization when necessary. The internal filters do not degrade the sound.

When specifying your electronic crossover's crossover points, or when setting them with an adjustable crossover, follow these directions: The "high-pass" section, which connects to the high frequency amplifier, should be set to 1/4 the speaker's crossover frequency. The "low-pass" filter, which connects to the amplifier used for low frequencies should be set to four times the loudspeaker's crossover frequency. For example, if the loudspeaker's crossover frequency is 275 Hz, the high-pass frequency should be set to approximately 69 Hz, and the low-pass filter should be set to approximately 1100 Hz. These approximate frequency settings will assure that the speaker's internal crossover network will continue to have it's optimal amplitude and phase response characteristics. The specific crossover frequencies for your Snell model may be found in the enclosed product literature. As in any bi-amping configuration, the jumpers connecting the low and high frequency input terminals must be removed before connecting the speakers.



PLACEMENT AND ROOM ACOUSTICS

The three most important contributors to sound quality are your loudspeakers, their placement, and your listening room's acoustics. You have already selected the most accurate loudspeakers. Now you can optimize your sonic results by careful speaker placement and listening position, and, if needed, by room treatment.

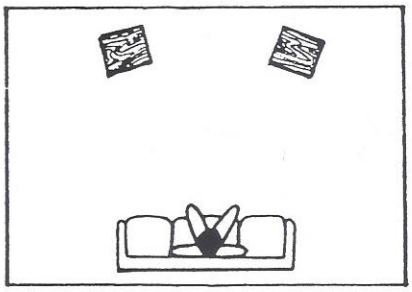
4. Early-Arrival and Reverberant Sound:

Our hearing mechanism responds to two kinds of sounds. The first, the "early-arrival" sound is what we hear for about the first 20 milliseconds after the sound is produced by the loudspeaker. It consists of a combination of the sound heard directly from the speaker, and the sound that is heard after a slight delay, having bounced off of a nearby boundary (such as a floor or wall). The second kind of sound that we hear is reverberant sound. This consists of the reflections that are heard about 20 milliseconds or more after the speaker has first produced the sound. The sound may have bounced off several boundaries (surfaces) before being heard. Snell Acoustics is one of the very few companies which optimizes speakers to be accurate in both their early-arrival and reverberant sound fields.

Placing your listening position close to the speakers will emphasize the early-arrival sound and will reduce the sonic influence of the room and the reverberant field. This results in more "pin-point" imaging, and perhaps more accurate frequency response. Conversely, sitting relatively far away from the speakers will increase the proportion of reverberant to early-arrival sound. Generally, a balance of early-arrival versus reverberant sound is most pleasing. Experimenting with changes in the speaker-to-listener distance is the best way to determine your preference in this balance. The following comprehensive instructions on room placement will maximize the potential of your listening enjoyment.

5. Placement:

The correct geometric relationship between your speakers and your listening seat is important in achieving the best stereo image. First, each loudspeaker should be exactly the same distance from the prime listening position. Second, the speakers should be somewhat closer to each other than the distance from the listener to either speaker. For example if you are seated 10 feet from each speaker, the speakers should then be about 7 feet apart.



Be certain that you have a clear line of sight between the listening area and the speakers. Also, avoid placing objects on and/or between the speakers, unless the speakers are well forward of the objects. If possible, position the speakers away from large objects which can cause unwanted reflections.

Your loudspeakers may be "toed-in" or "angled" depending on your personal choice. Since Snell speakers have excellent off-axis response, they may be used parallel to the front wall to create an expansive soundstage, while still producing accurate frequency response. For those desiring the most accurate frequency response at very high frequencies, and for pin-point imaging albeit in a narrower soundstage, the speakers should be aimed directly at the listening position.

In most rooms, the back of the speakers should be placed within one to two feet of the back wall. The distance from the back wall will affect the bass and low midrange response. Since rooms vary considerably in their low frequency characteristics, we suggest that you experiment with placement relative to the back wall. A good starting position would be twelve inches from the back of the speakers to the wall. Then try a range of distances from six inches to about three feet. The side to side position of the speakers along this wall can also affect the bass, especially if they are near corners. Moving the speakers by just one foot can often be significant. The mid-bass is flattest when the speaker is within a few inches of the front wall. However, a sense of 3-dimensional imaging is best when the speakers are well out from the wall. The location of the prime listening chair will also affect the low frequency range. The bass will be heaviest near the rear wall and lightest in the middle of the room. Bookshelf models can be positioned vertically or horizontally. In either case, both units should be positioned the same way and at the same height. When positioning the speakers horizontally, the tweeter sections of the cabinets should be to the outside. You should experiment to determine the best balance of sonic characteristics. We suggest that you try a variety of high quality recordings to evaluate your speaker's placement. Your Snell dealer can make recommendations.

6. Low Frequency Room Acoustics:

Your room's dimensions will determine what resonant frequencies will be produced, and the proportions will determine their frequency distribution. Since most listeners have to use an existing room, it is fortunate that changing speaker and listener placement can dramatically affect the results. The placement of the speaker determines the energy supplied to each of the room resonances, while the position of the listener determines their audibility. At low frequencies, a major sonic factor is the presence of "boundaries" near the speaker. The presence of a floor, wall, or ceiling near a speaker creates a "virtual image," that is, the effect of another speaker on the other side of the boundary, at twice the distance from the real speaker as the boundary is to the real speaker. This effect is most pronounced at low frequencies, where the speakers' dispersion is nearly omnidirectional. Placement of the speaker near a wall behind it will result in up to a 6 dB increase in bass output. Similarly, if the listener is near a wall, the bass will be increased. A further increase occurs if the speaker is located in a corner, but that not only results in an unnatural quantity of bass,

but also causes colorations at higher frequencies. When more bass is desired, it is usually best to place the loudspeakers along the longer wall of the room, keeping them 18 inches or less from the wall behind them, and selecting a listening position near the opposite wall. The best position for speaker and listener position is dependent on your room.

For most people, a good starting position is to place the speaker at least 3 feet from the side walls. The listening position should be at least 18 inches from the back wall.

7. High Frequency Room Acoustics

As discussed above, to achieve good sound quality, we must consider both the early-arrival response and the reverberant field. Factors affecting early-arrival response are the proximity of boundaries (such as a floor or nearby walls). The reverberant field is dependent (at high frequencies) on the reflectivity of all the room's boundaries, not just those near the loudspeakers.

We consider a neutral room to be just slightly "live". A good test is to walk from each of your speakers to your listening position while clapping your hands. The sound should be "sharp" without producing any distinct echoes. If distinct echoes are heard, they can be eliminated by absorption or diffraction. Experimentation with absorbent materials placed along the walls, will reveal the area which is causing the echo. It can be treated through the use of heavy wall hangings, heavy drapes, or by using materials especially designed for this purpose. Two of the most popular are Sonex and Owens-Corning sound absorbers. Acoustically transparent cloth may be put over these for aesthetic considerations. Just enough absorbent material should be used to eliminate the echo. The use of excessive sound absorption materials will result in an unnaturally "dead" room.

- Level Controls

Some Snell loudspeakers have high-frequency or midrange level controls located adjacent to the input terminals. When it is set to the indicated calibrated position, your speakers will perform virtually identically to the original laboratory reference. The control may be adjusted to compensate for poor recordings, or for less than optimum room acoustics. Many CD's are excessively bright, often because of recording engineering practices that were developed for analog media which have inherent high-frequency losses. When these analog recordings are transferred to CD without re-equalizing, the result can be excessive brightness. Your Snell loudspeakers are extremely accurate, and can be used to evaluate the brightness of a recording.

8. Loudspeaker Stands:

Smaller Snell loudspeaker models can be used with either Snell speaker stands, or other stands similar in height. The purpose of the stands is to reduce midrange reflections from the floor, and to get the drivers closer to ear level. All Snell speaker stands

are supplied with spikes, which should be used on carpeted floors to increase stability. The main trunk of the Snell speaker stands are also hollow to allow mass loading with lead shot or sand. The resulting increase in weight will then enhance stability and contribute to improved bass response. The smaller speakers can also be used on shelves, but with some loss of imaging and depth. If the speakers are used on shelves, locate the front edge of the speakers even with the shelf edge.

M A I N T E N A N C E

9. Cabinet Care:

In addition to the superior sonic qualities of your new audio investment, Snell loudspeakers offer an attractive addition to your decor as well. Produced entirely in our own woodworking facilities, Snell's cabinetry is justifiably considered the industry's finest. Each pair is constructed from carefully selected, first grade quality sequence matched veneers. With hours of hand sanding and hand rubbed natural oils, the finish actually improves over time. This beauty can be maintained simply by the occasional application of a household furniture polish with a soft cloth.

10. Loudspeaker Care:

Less than 1% of Snell Acoustics speakers in the field ever fail or cause trouble for their owners. There are several reasons for this excellent record. Snell loudspeakers have always used relatively "high-order" crossovers. This means that they are cut off from the input signal very quickly outside their usable frequency range. For example, this technology will keep a tweeter from attempting to reproduce midrange frequencies. Gentle crossovers ("low order"), an audio fad, place extreme demands on the power handling capabilities of drivers, and sharply increase distortion; a sign of protest from the drivers. In addition, Snell Acoustics has always chosen crossover frequencies very carefully, and has used only the highest quality drivers.

Of the less than 1% of Snell speakers that fail, 99% of these failures are caused by customer misuse. There are a variety of ways speakers can be misused, and so caused to fail.

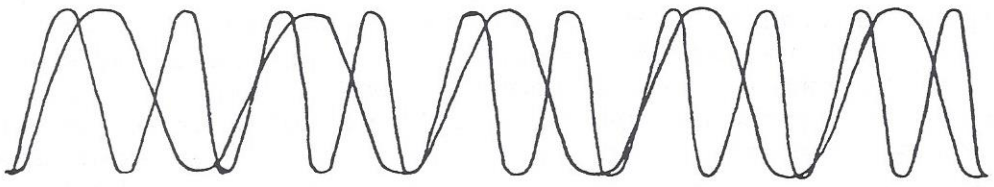
The first reason is the most obvious; playing any speaker at too high of a volume can damage it. If any distortion is audible, it is too loud and likely to cause damage. But distortion may not be noticeable before damage occurs. Snell speakers can reproduce the real dynamic range of live acoustic music; but no high quality speakers can reproduce the brutal levels of a rock concert. Low fidelity p.a. speakers should be used if that is your goal. A common misconception is to believe that the position of the volume control provides some indication of the percentage of output power the

amplifier is delivering at the time. This is not true; in fact, most systems are clipping with the volume control set at around "1 o'clock". It is expected that preamp/receiver designers do this so that the least sophisticated buyers will be impressed by their product's power. (I've only got the control set half-way and it plays this loud.) Not surprisingly, many audiophiles believe that the "power meters" on their amplifiers or receivers can be used to avoid clipping. Unfortunately, this is also not so. The meters used on amplifiers are only decorative, and cannot show actual power, since they can only be calibrated to one impedance. Speakers have an impedance that varies with frequencies; it might be 20 ohms at 40Hz and 4 ohms at 150 Hz, and yet be rated at 8 ohms! A very small number of power amplifiers have clipping indicators that actually do what they say. If your amplifier has them you can be assured the manufacturer will make that clear in the instruction manual.

The effects of too much power are either burned voice coils, deformed voice coil formers, loose voice coil windings, or lead-in wire fatigue. The first three effects are the result of excessive heat. More than 95% of the amplifier's power is converted to heat in the voice coils. A burned voice coil results when the wire has actually melted. Most voice coils are wound on aluminum bobbins to improve heat transfer and cooling. Unfortunately, when aluminum is heated to the point of deforming, it does not return exactly to it's original shape. The result can be a "rubbing driver" where the former touches the "pole piece" during it's operation. While all Snell drivers use the latest high temperature adhesives, excessive heat can melt the adhesive enough to free turns of the voice coil. This results in a rattling sound as these loose turns hit the pole piece. Tweeters can also be overpowered due to over-excursion. Since woofers and midranges use "tinsel leads", or special heavy-duty wires attached to the voice coil, they do not fail this way. But tweeters use their very thin voice coil wire to attach the voice coil to the terminals. Excessive power can break these leads. This is one of the causes for "after-the-party syndrome"; where the speaker was working at high volume levels, and then quit the next day at low levels, the actual failure occurring at levels that would not normally cause any damage.

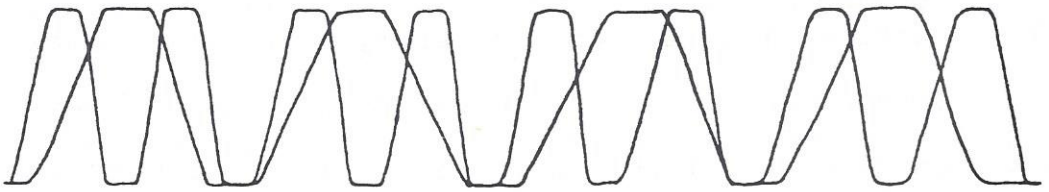
The second cause of speaker failure may be surprising: Too little power can destroy drivers, especially tweeters. To see why, we can look at a musical waveform (a).

(a)



Notice that it looks like a combination of various sine waves. If we take the same music and reproduce it at a level greater than the amplifier is capable of (clipping), we get something like (b).

(b)



Now the signal is looking more like a group of square waves rather than sine waves. Since square waves contain large amounts of high frequency information, they can destroy tweeters. Clipping can cause midrange signals, which would not normally stress the tweeter, to contain large amounts of high frequency energy, damaging the tweeter. The main reason we have high maximum amplifier power ratings is to help insure that musical peaks are not clipped and turned into potentially damaging square waves.

Some tweeter failures are also caused by defective associated components. CD players, tuners, tape decks, preamps, receivers, or power amplifiers can "oscillate" or produce inaudible high frequency signals that can destroy tweeters. These same components can produce d.c. (direct current) as well, which is especially damaging to woofers. Not even the most expensive and exotic components are immune to these potential defects. Most audio dealers can easily test your components for these two problems.

In conclusion, to avoid any problems with your Snell loudspeakers, be sure to use an amplifier which is sufficiently powerful to reach the volume levels you desire. Feel confident to reproduce live acoustic levels (given a powerful enough amplifier), but not live rock concert levels, and enjoy your loudspeakers!

L I M I T E D W A R R A N T Y

1. This warranty is extended by Snell Acoustics, Inc. to the original purchaser of the loudspeaker, purchased from an authorized Snell Acoustics, Inc. dealer and employed in normal home use.

2. The loudspeaker is warranted by Snell Acoustics, Inc. to be free of defects in workmanship and materials for a period of five (5) years from date of original purchase. If a malfunction or any such defect occurs during the period of this warranty, Snell Acoustics, Inc. will repair the loudspeaker without charge for labor and material, or, at its option, replace the loudspeaker.

3. Snell Acoustics, Inc. performs its warranty service only at its own factory or through an authorized Snell dealer. If your loudspeaker needs service, return the unit to the store where you purchased it, shipping charges prepaid, with the exception of the model A series loudspeaker. Warranty service for the Type A series loudspeaker will be provided by Snell Acoustics, Inc. at its factory service department.

If it is not possible to return the loudspeaker to the store where you purchased it, or for a Type A series loudspeaker, please call or write to the Customer Service Department at Snell Acoustics, Inc., 143 Essex Street, Haverhill, MA 01832 (tel. (508)373-6114). We will need the following information:

a. Name, address, telephone number, and the serial numbers for your loudspeakers;

b. A copy of your sales receipt;

c. A detailed description of the service nature;

d. The brands and models of the associated equipment in your system;

e. Whether you have retained the original carton and packing materials, i.e., plastic bag, corners, and end caps, or need replacement (which will be provided at a nominal fee).

We will then advise you of what action to take, and if necessary, provide you with a Service Authorization Number which is to be written on all correspondence and shipping cartons.

4. Any loudspeaker returned to Snell Acoustics, Inc. for warranty service must be shipped fully insured, with all transportation costs prepaid and packaged in the original factory shipping cartons with all fillers, and plastic properly positioned. Failure to do so will void the warranty. Replacement shipping cartons, packing material, and bags may be purchased from Snell Acoustics, Inc. if they have been lost or destroyed. Snell Acoustics, Inc. will pay for return shipping charges to any designated point within the continental United States.

5. This warranty does not cover damage caused by misuse, mishandling or accident, shipping, unauthorized tampering or modification, or operation of the loudspeaker contrary to the written instruction manual.

6. This warranty will be voided if the serial number has been removed, altered, or defaced.

7. Snell Acoustics, Inc. reserves the right to make modifications in design and/or improvements upon the loudspeaker without incurring any liability or obligation to incorporate these changes in any loudspeaker previously manufactured.

8. No other warranty, written or verbal, is authorized by Snell Acoustics, Inc. and in no event shall Snell Acoustics, Inc. be liable for any special, incidental or consequential damages or losses.

Some states do not allow the exclusion or limitation in incidental or consequential damages, so the above limitation or exclusion 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.

SUMMARY

We hope that this instruction manual has answered your questions, and assisted you in optimizing your audio system performance. Please feel free to write, call, or fax us with any questions. Absolute customer satisfaction is truly our goal. Thank you.

SNELL ACOUSTICS, INC.
143 ESSEX STREET, HAVERHILL, MA 01832
PHONE: (508) 373-6114 FAX: (508) 373-6172