

# **MONTAGE™**

u s e r ' s m a n u a l



**MARTIN LOGAN®**

the loudspeaker technology company

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# INSTALLATION IN BRIEF

We know you are eager to hear your new Montage loudspeaker, so this section is provided to allow fast and easy set up. Once you have it operational, please take the time to read, in depth, the rest of the information in this manual. It will give you perspective on how to attain the greatest possible performance from this most exacting transducer.

If you should experience any difficulties in the setup or operation of your Montage speaker, please refer to the Operation or Placement sections of this manual.

Should you encounter a persistent problem that cannot be resolved, please contact your authorized MartinLogan dealer. They will provide you with the appropriate technical analysis to alleviate the situation.



## WARNING!

- Refer servicing to a qualified technician.
- To prevent fire or shock hazard, do not expose this module to moisture.
- Turn amplifier off should any abnormal conditions occur.
- Do not drive speaker beyond its rated power.



The lightning bolt flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

This product complies with all applicable European directives. Applicable directives:

EMC directive 89/336/EEC

- 1 The product will not cause electromagnetic interference.
- 2 The product is not adversely affected by electromagnetic interference.

## Step 1: Unpacking

Remove your new Montage speaker from the packing.

## Step 2: Placement

Place the Montage near the desired location. Please see the 'Placement' section (page 6–7) for more details.

## Step 3: Signal Connection

Use the best speaker cables you can. Higher quality cables, available from your specialty dealer, are recommended and will give you superior performance. Spade connectors are suggested for optimum contact and ease of installation.

Attach your speaker cables to the signal input section on the rear panel. Be consistent when connecting speaker leads to the terminals on the back of the Montage. Take great care to assign the same color to the (+) terminal on both the speaker and the amplifier. Please see the 'Operation' section (page 5) for more details.

## Step 4: Listen and Enjoy

Now, you may turn on your system and enjoy!

## Lifting Directions

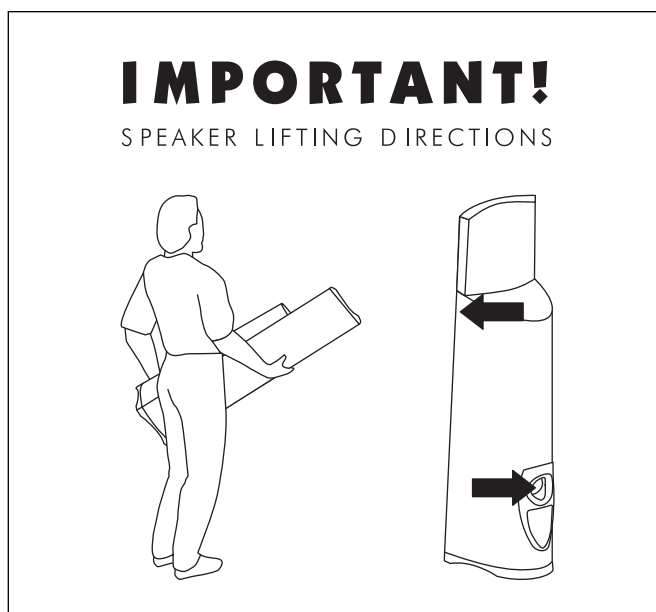


Figure 1. Montage lifting directions.

# INTRODUCTION

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## **Congratulations! You have invested in a new world of high-performance audio!**

The MartinLogan Montage represents the extension of an intensive, dedicated group research program directed toward establishing a world class reference monitor utilizing leading-edge technology, without compromising durability, reliability, craftsmanship or aesthetic design.

The result of cumulative technology gleaned from previous research and development projects, the Montage represents the latest developments in advanced thin film and hybrid loudspeaker technology.

The materials in your new Montage speaker are of the highest quality and will provide years of enduring enjoyment and deepening respect. Montage's state-of-the-art Vojtko™ crossover is designed and manufactured with the same meticulous attention, care and precision as those found in MartinLogan's ultimate loudspeaker products.

This User's Manual will explain in detail the operation of your Montage speaker and the philosophy applied to their design. A clear understanding of your speakers will insure that you obtain maximum performance and pleasure from this most exacting transducer. It has been designed and constructed to give you years of trouble-free listening enjoyment.

## Signal Connection


Use the best speaker cables you can. The length and type of speaker cable used in your system will have an audible effect. Under no circumstance should a wire of gauge higher (thinner) than #16 be used. In general, the longer the length used, the greater the necessity of a lower gauge, and the lower the gauge, the better the sound, with diminishing returns setting in around #8 to #12.

A variety of speaker cables are now available whose manufacturers claim better performance than standard heavy gauge wire. We have verified this in many cases, and the improvements available are often more noticeable than the differences between wires of different gauge. The effects of cables may be masked if the equipment is not of the highest quality.

We also recommend, if possible, that short runs of speaker cable connect the power amplifier and speaker and that high quality long interconnect cables be used to connect the preamplifier and power amplifier. This results in the power amplifiers being close to the speakers, which may be practically or cosmetically difficult, but if the length of the speaker cables can be reduced to a few meters, sonic advantages may be obtained.

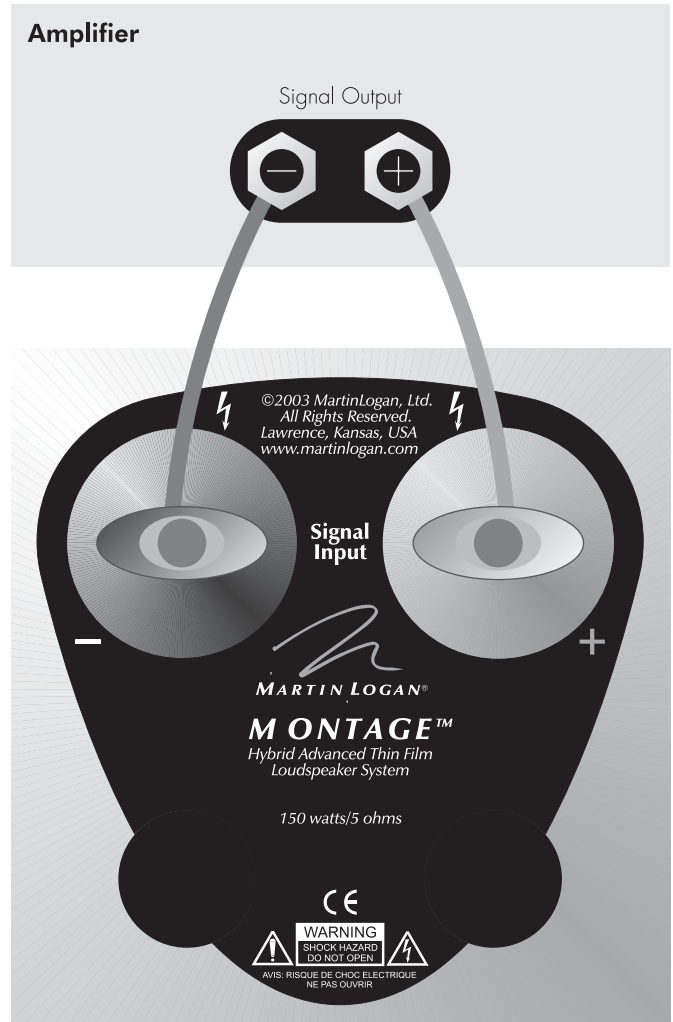
Connections are done at the signal input section on the rear electronics panel of the Montage (see figure 2). Use spade connectors for optimum contact. Make certain that all of your connections are tight.

Be consistent when connecting speaker leads to the terminals on the back of the Montage. Take great care to assign the same color to the (+) terminal on both the speaker and the amplifier.

 **WARNING!** Turn your amplifier off before making or breaking any signal connections!

## Break-In

When you first begin to play your Montage speaker, it will sound a bit bass shy. This is due to the high-quality, long-life components used in our woofer. Montage's woofer requires at least 30 hours of break-in at 90 dB (moderate listening levels) before any critical listening. The break-in requirements of the crossover components (and, to a lesser degree, the ATF transducer) are equal.



**Figure 2.** Single wire connection. One channel shown.

# PLACEMENT

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## Listening Position

By now your speakers should be placed approximately two to three feet from the front wall (the wall in front of the listening position), and at least one to two feet from the side walls. Your sitting distance should be farther than the distance between the speakers themselves. What you are trying to attain is the impression of good center imaging and stage width.

There is no exact distance between speakers and listener, but there is a relationship. In long rooms, naturally, that relationship changes. The distance between the speakers will be far less than the distance from you to the speaker system. However, in a wide room, you will still find that if the distance from the listener to the speakers becomes smaller than the distance between the speakers themselves, the image will no longer focus in the center.

Now that you have positioned your speaker system, spend some time listening. Wait to make any major changes in your initial setup for the next few days as the speaker system itself will change subtly in its sound. Over the first 40 hours of play the actual tonal quality will change slightly with deeper bass and more spacious highs resulting.

After a few days of listening you can begin to make refinements and hear the differences of those refinements.

## The Wall Behind the Listener

Near-field reflections can occur from your back wall, the wall behind the listening position. If your listening position is close to the back wall, these reflections can cause problems and confuse the quality of imaging. Actually it is better for the wall behind you to be soft than to be bright. If you have a hard back wall and your listening position is close to it, experiment with devices that will soften and absorb information (i.e., wall hangings and possibly even sound absorbing panels).

## The Wall Behind the Speakers

The front surface, the wall behind your speakers, should not be extremely hard or soft. For instance, a pane of glass will cause reflections, brightness and confused imaging. Curtains, drapery and objects such as bookshelves can be placed along the wall to soften a hard surface. A standard

sheet rock or textured wall is generally an adequate surface if the rest of the room is not too bright and hard. Sometimes walls can be too soft. If the entire front wall consists of only heavy drapery, your system can sound too soft or dull. You may hear dull, muted music with little ambience. Harder room surfaces will actually help in this case.

The front surface should, optimally, be one long wall without any doors or openings. If you have openings, the reflection and bass characteristics from one channel to the other can be different.

## The Side Walls

The same requirements exist for side walls. Additionally, a good rule of thumb is to have the side walls as far away from the speaker sides as possible, minimizing near-field side wall reflections. Sometimes, if the system is bright or the imaging is not to your liking, and the side walls are very near, try putting curtains or softening material directly to the edge of each speaker. An ideal side wall, however, is no side wall at all.

## Experimentation

### Toe-in

Now you can begin to experiment. First begin by toeing your speakers in towards the listening area and then facing them straight into the room. You will notice that the tonal balance changes slightly. You will also notice the imaging changing.

### Imaging

In their final location, the Montage's should have a stage width somewhat wider than the speakers themselves. On well-recorded music, the instruments should extend beyond the edges of each speaker to the left and to the right, yet a vocalist should appear directly in the middle. The size of the instruments should be neither too large nor too small. Additionally, you should find good clues as to stage depth. Make sure the vertical alignment, distance from the front wall, and toe-in, is exactly the same from one speaker to the other. This will greatly enhance the quality of your imaging.

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### **Bass Response**

Your bass response should neither be one note nor too heavy. It should extend to even the deepest organ passages, yet it should be tight and well defined. Kick-drums should be tight and percussive—string bass notes should be uniform and consistent throughout the entirety of the run without any booming or thudding.

### **Tonal Balance**

Voices should be natural and full, cymbals should be detailed and articulate yet not bright and piercing, pianos should have a nice transient characteristic and deep tonal registers as well. If you cannot attain these virtues, read the section on Room Acoustics (pages 8–9). This will give you clues on how to get closer to those ideal virtues.

## **Final Placement**

After obtaining good wall treatments and the proper angle, begin to experiment with the distance from the wall behind the speakers. Move your speaker slightly forward into the room. What happened to the bass response? What happened to the imaging? If the imaging is more open and spacious and the bass response is tightened, that is a superior position. Move the speakers back six inches from the initial setup position and again listen to the imaging and bass response. There will be a position where you will have pinpoint imaging and good bass response. That position is the point of the optimal placement from the front wall.

Now experiment with placing the speakers farther apart. As the speakers are positioned farther apart, listen again, not so much for bass response but for stage width and good pinpoint focusing.

### **Your ideal listening position and speaker position will be determined by:**

- Tightness and extension of bass response
- Width of the stage
- Pinpoint focusing of imaging

Once you have determined the best of all three of these considerations, you will have your best speaker location.

## **The Extra “Tweak”**

A major cable company developed the following procedure for speaker placement. As a final test of exact placement, use these measurements for your speakers placement, and see what can happen to the ultimate enhancement of your system’s performance. These two basic formulas will determine optimum placement of your speakers to minimize standing waves.

- 1 Distance from the front wall (the wall in front of the listening position) to the center of the ATF transducer. To determine distance from the front wall, measure the height of your ceiling (inches) and multiply the figure by 0.618 (i.e., ceiling height in inches  $\times$  0.618 = the distance from the front wall to the center of the ATF transducer).
- 2 Distance from the side-walls to the center of the ATF transducer. To determine distance from the side walls, measure the width of your room (inches) and divide by 18. Next, multiply the quotient by 5 (i.e., room width in inches  $/$  18  $\times$  5 = the distance from the side-walls to the center of the ATF transducer).

## **Enjoy Yourself**

The Montage is a very refined speaker and benefits from care in setup. With these tips in mind you will find, over your months of listening, that small changes can result in measurable differences. As you live with your speakers, do not be afraid to experiment with their positioning until you find the optimal relationship between your room and speaker system that gives to you the best results. Your efforts will be rewarded.

You are now armed with the fundamental knowledge of room acoustics and the specific fundamentals of the Montage loudspeaker. Happy listening!

# Room Acoustics

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## Your Room

This is one of those areas that requires both a little background to understand and some time and experimentation to obtain the best performance from your system.

Your room is actually a component and an important part of your system. This component is a very large variable and can dramatically add to, or subtract from, a great musical experience.

All sound is composed of waves. Each note has its own wave size, with the lower bass notes literally encompassing from 10 feet to as much as 40 feet. Your room participates in this wave experience like a three-dimensional pool with waves reflecting and becoming enhanced depending on the size of the room and the types of surfaces in the room.

Remember, your audio system can literally generate all of the information required to recreate a musical event in time, space and tonal balance. The purpose of your room, ideally, is to not contribute to that information. However, every room does contribute to the sound, and the better speaker manufacturers have designed their systems to accommodate this phenomenon.

Let's talk about a few important terms before we begin.

## Terminology

### Standing Waves

The parallel walls in your room will reinforce certain notes to the point that they will sound louder than the rest of the audio spectrum and cause "one-note bass", "boomy bass" or "tubby bass". For instance, 100Hz represents a 10 foot wavelength. Your room will reinforce that specific frequency if one of the dominant dimensions is 10 feet. Large objects in the room such as cabinetry or furniture can help to minimize this potential problem. Some serious "audiophiles" will literally build a special room with no parallel walls just to help eliminate this phenomenon.

### Reflective Surfaces (near-field reflections)

The hard surfaces of your room, particularly if close to your speaker system, will reflect some waves back into the room over and over again, confusing the clarity and imaging of your system. The smaller sound waves are mostly affected here, and occur in the mid and high frequencies. This is where voice and frequencies as high as the cymbals occur.

### Resonant Surfaces and Objects

All of the surfaces and objects in your room are subject to the frequencies generated by your system. Much like an instrument, they will vibrate and "carry on" in syncopation with the music, and contribute in a negative way to the music. Ringing, boominess, and even brightness can occur simply because they are "singing along" with your music.

### Resonant Cavities

Small alcoves or closet type areas in your room can be chambers that create their own "standing waves" and can drum their own "one-note" sounds.

Clap your hands. Can you hear an instant echo respond back? You have near-field reflections. Stomp your foot on the floor. Can you hear a "boom"? You have standing waves or large panel resonances such as a poorly supported wall. Put your head in a small cavity area and talk loudly. Can you hear a booming? You've just experienced a cavity resonance.

## Rules of Thumb

### Hard vs. Soft Surfaces

If the front or back wall of your listening room is soft, it might benefit you to have a hard or reflective wall in opposition. The ceiling and floor should follow the same basic guideline as well. However, the side walls should be roughly the same in order to deliver a focused image.

This rule suggests that a little reflection is good. As a matter of fact, some rooms can be so "over damped" with carpeting, drapes and sound absorbers that the music system can sound dull and lifeless. On the other hand, rooms can be so hard that the system can sound like a gymnasium with too much reflection and brightness. The point is that balance is the optimum environment.

### Breakup Objects

Objects with complex shapes, such as bookshelves, cabinetry and multiple-shaped walls can help break up those sonic gremlins and diffuse any dominant frequencies.

### Solid Coupling

Your loudspeaker system generates frequency vibrations or waves into the room. This is how it creates sound. These vibrations vary from 20 per second to 20,000 per second. If your speaker system is not securely planted on the floor



or solid surface, it can shake as it produces sound and, consequently, the sound can be compromised. If your speaker is sitting on the carpet and only foot gliders are used, the bass can be ill defined and even boomy. The use of spikes is recommended to insure secured footing for your speakers. (See Solid Footing, this page, for spike information and installation instructions).

## Dipolar Speakers and Your Room

The MartinLogan Montage loudspeakers are dipolar radiators. This means that they produce sound from both their fronts and their backs. Consequently, musical information is reflected by the wall behind them and may arrive either in or out of step with the information produced by the front of the speaker.

The low frequencies can either be enhanced or nulled by the position from the front wall. Your Montage's have been designed to be placed two to three feet from the front wall (the wall in front of the listening position) to obtain the best results; however, your room may see things differently. So listening to the difference of the bass response as a result of the changes in distance from the front wall can allow you to get the best combination of depth of bass and tonal balance.

Now that you know about reflective surfaces and resonant objects, you can see how the midrange and high frequencies can be affected. The timing of the initial wave as it radiates to your ears, and then the reflected information as it arrives at your ears later in time, can result in confusion of the precious timing information that carries the clues to imaging. Consequently the result is blurred imaging and excessive brightness. Soft walls, curtains, wall hangings, or sound dampeners can be effective if these negative conditions occur (your dealer can give you good information here).

## Solid Footing

After living and experimenting with your Montage's, you may want to use ETC (energy transfer coupler) Spikes (see figure 3), which are available from your local MartinLogan dealer or from the Xtatic shop at [www.martinlogan.com](http://www.martinlogan.com). With the use of these spikes, the Montage will become more firmly planted on the floor and, consequently, bass will tighten and imaging will become more coherent and detailed. It

is best not to implement the spikes, however, until you are secure in the positioning, as the spikes can damage the floor if the speaker is moved. MartinLogan ETC spikes will fit any common 1/4" x 20 thread insert that may be found on your other audio equipment (racks, etc.)

### Spike Installation Instructions:

- 1 Carefully lay your speaker on its side to gain access to the bottom.
- 2 Remove existing feet or spikes. Thread new spikes into holes and screw them in all of the way. If the speaker does not sit level loosen one spike until level is achieved.
- 3 Tighten the jam nut snugly by hand. Do not over tighten the nut.
- 4 Right the speaker.

**Caution:** Make sure your hands and any cabling are clear of the spikes. Do not slide speaker as spikes are sharp and can damage your floor or carpet.

- 5 Adjust to level by rotating spikes. Tighten the jam nut securely when satisfied that speaker is level.

**Caution:** Walking the speaker may result in a broken spike.

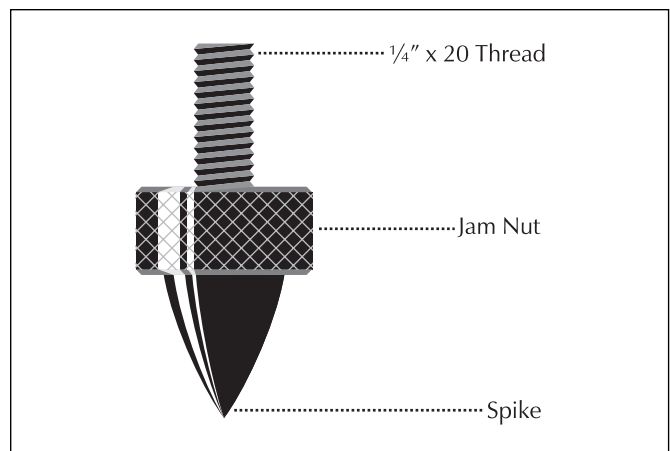


Figure 3. The ETC Spike.

# HOME THEATER

It had long been the practice of stereo buffs to connect their television to a stereo system. The advantage was the use of the larger speakers and more powerful amplifier of the stereo system. Even though the sound was greatly improved, it was still mono and limited by the broadcast signal.

In the late 1970's and early 1980's two new home movie formats became widely available to the public: VCR and laser disc.

By 1985, both formats had developed into very high quality audio/video sources. In fact, the sonic performance of some video formats exceeded audio-only formats. Now, with theater-quality sound available at home, the only element missing was the "surround sound" presentation found in movie houses.

Fortunately, Dolby and DTS-encoded movies (which include almost all movies) have the same surround sound information encoded on home releases as the theater films. All that is required to retrieve this information is a decoder and additional speakers and amps to reproduce it.

Home theater is a complex purchase and we recommend that you consult your local MartinLogan dealer, as they are well versed in this subject.

Each piece of a surround system can be purchased separately. Take your time and buy quality. No one has ever complained that the movie was too real. The following list and descriptions will give you only a brief outline of the responsibilities and demands placed on each speaker.

## Front Left and Front Right

If these speakers will be the same two used for your stereo playback, they should be of very high quality and able to play loudly (over 102 dB) and reproduce bass below 80 Hz.

## Center Channel

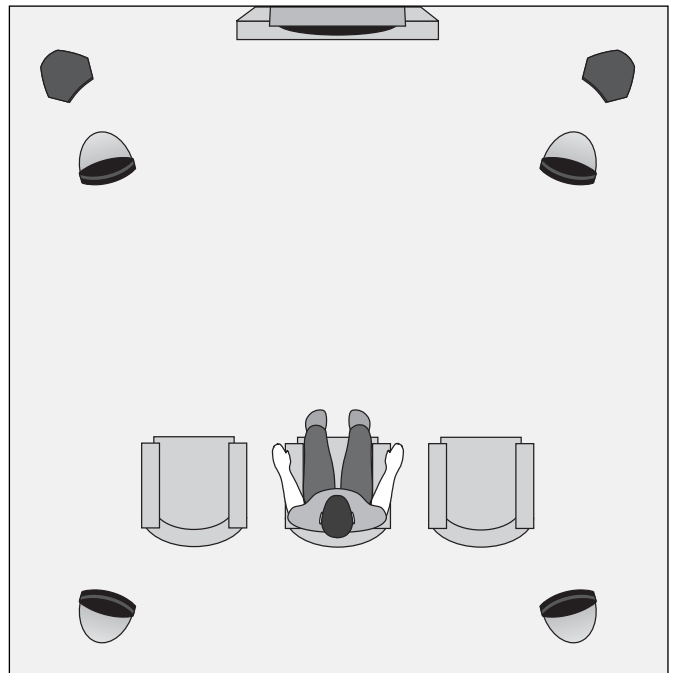
This is the most important speaker in a video system, as almost all of the dialogue and a large portion of the front speaker information is reproduced by the center channel. It is important that the center speaker be designed by the same manufacturer as the front speakers, and that it is recommended for use as a center speaker. This is not the place to cut corners.

## Surround Speakers

We recommend that the surround speakers play down to 80 Hz or below. The surround speakers contain the information that makes it appear that planes are flying over your head. Some may suggest that this is the place to save money and purchase a small, inexpensive speaker. If you choose to do so, be prepared to upgrade in the future as discrete six-channel digital encoding becomes available and the demands on the surround speakers increase.

## Subwoofer

With any good surround system you will need a high-quality subwoofer (the .1 in a 5.1 channel surround system). Most movie soundtracks contain large amounts of bass information as part of the special effects. Good subwoofers will provide a foundation for the rest of the system.



**Figure 4.** Montage loudspeakers as front and surround (effects) channels. Fresco loudspeakers as center (effects) channel. Grotto subwoofers as 0.1 (effects) channel.

# ATF (ADVANCED THIN FILM)

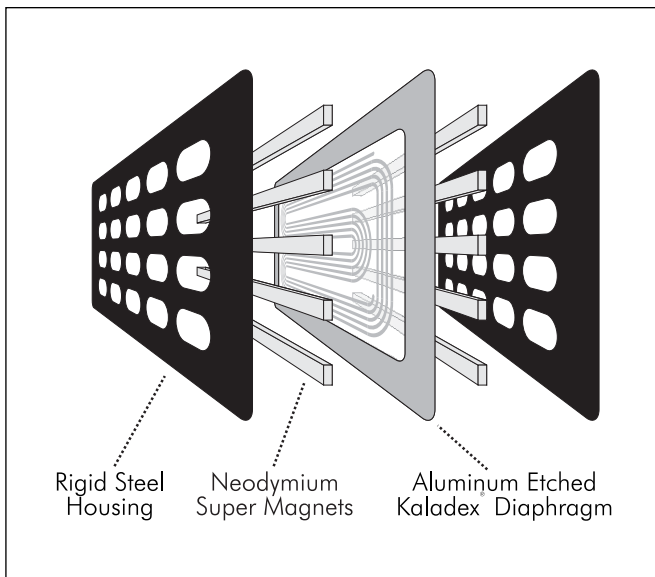
## ATF Operation

The MartinLogan ATF transducer consists of a micro-thin, low-mass Kaladex diaphragm with an ultra-light, etched conductive aluminum surface suspended between two high field strength neodymium super magnet arrays (see figure 5). When an electrical current (music signal) passes through the etched aluminum on the diaphragm's surface it is simultaneously pulled towards one of the neodymium arrays and pushed away from the opposing array. When the direction of current is reversed the diaphragm is simultaneously pushed and pulled in the opposite direction, thus producing sound.

## Extremely Low-Mass Diaphragm —Blazing Speed and Inner Detail

Low-mass diaphragms are crucial to a loudspeakers ability to accurately reproduce sound. As the mass of a transducer's diaphragm decreases, its ability to resolve detail increases. With extremely low-mass characteristics, the ATF transducer tracks the audio signal with almost perfect accuracy.

MartinLogan ATF diaphragms are constructed of extremely low mass Dupont Kaladex® PEN (polyethylene naphthalate) —a material chemically similar to the low-mass PET (polyethylene terephthalate) film used in MartinLogan's generation 2 electrostatic transducers, yet capable of handling the high thermal requirements required for stable magnetic thin film operation.



**Figure 5.** Cut away view of an ATF transducer. Note the simplicity due to minimal parts usage.

## High Field Strength

### —Superb Control and Efficiency

With a field strength almost 2000% more powerful than traditional systems, Neodymium iron boron (NIB) rare-earth super magnets are one of the world's strongest commercially available magnetic materials. This incredible field strength proves ideal for maintaining perfect control over the low-mass Kaladex diaphragm. Super-low distortion levels, high-resolution, and crystal-clear transparency are just a few of the benefits resulting from this superb combination of low-mass diaphragm and high field strength.

## Push-Pull Operation = Ideal Linearity

Linearity is another factor contributing to a loudspeaker's ability to achieve ultimate clarity, detail and resolution. By positioning neodymium magnet arrays in a push-pull configuration, MartinLogan ATF transducer technology maintains uniform diaphragm control, regardless of position as it traverses the entire audio signal. The push-pull concept is a major contributor to the linearity and sonic superiority of ATF transducers.

## Direct Full-Surface Drive Provides Outstanding Clarity

Unlike traditional voice coil driven systems, ATF diaphragms are directly and uniformly driven throughout their entire surface. This full-surface drive system results in ultra-fast transient response with no cone break up and the ability to accurately reproduce sound with great delicacy, nuance and clarity.

## Dipole Design For A Realistic, Open Sound Stage

The audio industry has long recognized that late arrival reflective information significantly enhances the ambient nature of sound reproduction. This ambient reflective information dramatically contributes to a realistic, "you are there" listening experience. MartinLogan's dipole radiation pattern (radiating out of phase information from both the front and back) ideally interacts with your listening environment to create this realistic sound stage. We have contoured Montage's radiation pattern to emulate the same dipole characteristics as our world standard setting electrostatic technology, resulting in the same outstanding sound staging and 3-dimensionality.

# FREQUENTLY ASKED QUESTIONS AND TROUBLESHOOTING

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## Frequently Asked Questions

### How do I clean my speakers?

Just use a dust free cloth or a soft brush to remove the dust from your speakers. We recommend a specialty cloth (available at the Xtatic shop at [www.martinlogan.com](http://www.martinlogan.com)) that cleans your speakers better than anything else we have tried. **Do not spray any kind of cleaning agent on or in close proximity to the ATF element.**

### What size amplifier should I use?

We recommend an amplifier with 100 to 150 watts per channel for most applications. Probably less would be adequate for our smaller hybrids or when used in home theater where a subwoofer is employed. Our hybrid designs will perform well with either a tube or transistorized amplifier, and will reveal the sonic character of either type. However, it is important that the amplifier be stable operating into varying impedance loads: a stable amplifier will be able to deliver twice its rated wattage into 4 Ohms and should again double into 2 Ohms.

### Could you suggest a list of suitable electronics and cables that would be ideal for MartinLogan speakers?

The area of electronics and cable choice is probably the most common type of question that we receive. It is also the most subjective. We have repeatedly found that brands that work well in one setup will drive someone else nuts in another. We use many brands with great success. Again, we have no favorites; we use electronics and cables quite interchangeably. We would suggest listening to a number of brands—and above all else—trust your ears. Dealers are always the best source for information when purchasing additional audio equipment.

### Is there likely to be any interaction between my speakers and the television in my Audio/Video system?

We recommend that you keep your speakers at least one foot away from the TV because of the dynamic woofer they employ.

### Will exposure to sunlight affect the life or performance of my speakers?

We recommend that you not place any loudspeaker in direct sunlight. The ultraviolet (UV) rays from the sun can cause deterioration of grill cloth, speaker cones, etc. Small exposures to UV will not cause a problem. In general, the filtering of UV rays through glass will greatly reduce the negative effects.

## Troubleshooting

### Output

- Check that all your system components are turned on.
- Check your speaker wires and connections.
- Check all interconnecting cables.

## Specifications

### System Frequency Response

47–20,000 Hz  $\pm$  3 dB

### Sensitivity

90 dB/2.83 volts/meter

### Impedance

5 ohms

### Crossover Frequency

2500 Hz

### Components

Air core coils, metal film and low dissipation electrolytic capacitors

### Woofers/Mid-Range Drivers

2 x 6.5" (16.5cm) high rigidity aluminum cones with extended throw drive assembly, non-resonance asymmetrical chamber format; bass reflex

### High Frequency Driver

1.5" x 2.25" (3.8cm x 5.7cm) ATF Transducer

### Power Handling

150 watts rms

### Weight

30 lbs. each (13.6 kg)

### Size

9.44" W  $\times$  11.69" D  $\times$  38" H  
(24cm W  $\times$  29.7cm D  $\times$  96.5cm H)

## Serial Number

The serial numbers for your new Montage loudspeakers are located on the bottom of the speakers.

## Warranty and Registration

*Your Montage speaker is provided with an automatic Limited 90 Day Warranty coverage.*

You have the option, at no additional charge, to receive a Limited 5 Year Warranty coverage. To obtain the Limited 5 Year Warranty coverage you need to complete and return the Certificate of Registration, included with your speakers, and provide a copy of your dealer receipt, to MartinLogan within 30 days of purchase.

For your convenience MartinLogan also offers online warranty registration at [www.martinlogan.com](http://www.martinlogan.com).

*MartinLogan may not honor warranty service claims unless we have a completed Warranty Registration on file!*

If you did not receive a Certificate of Registration with your new Montage speaker, you cannot be assured of having received new units. If this is the case, please contact your authorized MartinLogan dealer.

## Service

Should you be using your MartinLogan product in a country other than the one in which it was originally purchased, we ask that you note the following:

- 1 The appointed MartinLogan distributor for any given country is responsible for warranty servicing only on units distributed by or through it in that country in accordance with its applicable warranty.
- 2 Should a MartinLogan product require servicing in a country other than the one in which it was originally purchased, the end user may seek to have repairs performed by the nearest MartinLogan distributor, subject to that distributor's local servicing policies, but all cost of repairs (parts, labor, transportation) must be born by the owner of the MartinLogan product.
- 3 If, after owning your speakers for six months, you relocate to a country other than the one in which you purchased your speakers, your warranty may be transferable. Contact MartinLogan for details.

# GLOSSARY OF AUDIO TERMS

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**AC.** Abbreviation for alternating current.

**Active crossover.** Uses active devices (transistors, ICs, tubes) and some form of power supply to operate.

**Amplitude.** The extreme range of a signal. Usually measured from the average to the extreme.

**Arc.** The visible sparks generated by an electrical discharge.

**ATF.** The abbreviation for advanced thin film.

**Bass.** The lowest frequencies of sound.

**Bi-Amplification.** Uses an electronic crossover, or line-level passive crossover, and separate power amplifiers for the high and low frequency loudspeaker drivers.

**Capacitance.** That property of a capacitor which determines how much charge can be stored in it for a given potential difference between its terminals, measured in farads, by the ratio of the charge stored to the potential difference.

**Capacitor.** A device consisting of two or more conducting plates separated from one another by an insulating material and used for storing an electrical charge. Sometimes called a condenser.

**Clipping.** Distortion of a signal by its being chopped off. An overload problem caused by pushing an amplifier beyond its capabilities. The flat-topped signal has high levels of harmonic distortion which creates heat in a loudspeaker and is the major cause of loudspeaker component failure.

**CLS.** The abbreviation for curvilinear linesource.

**Crossover.** An electrical circuit that divides a full bandwidth signal into the desired frequency bands for the loudspeaker components.

**dB (decibel).** A numerical expression of the relative loudness of a sound. The difference in decibels between two sounds is ten times the Base 10 logarithm of the ratio of their power levels.

**DC.** Abbreviation for direct current.

**Diffraction.** The breaking up of a sound wave caused by some type of mechanical interference such as a cabinet edge, grill frame or other similar object.

**Diaphragm.** A thin flexible membrane or cone that vibrates in response to electrical signals to produce sound waves.

**Distortion.** Usually referred to in terms of total harmonic distortion (THD) which is the percentage of unwanted harmonics of the drive signal present with the wanted signal. Generally used to mean any unwanted change introduced by the device under question.

**Driver.** See transducer.

**Dynamic Range.** The range between the quietest and the loudest sounds a device can handle (often quoted in dB).

**Efficiency.** The acoustic power delivered for a given electrical input. Often expressed as decibels/watt/meter (dB/w/m).

**ESL.** The abbreviation for electrostatic loudspeaker.

**Headroom.** The difference, in decibels, between the peak and RMS levels in program material.

**Hybrid.** A product created by the marriage of two different technologies. Meant here as the combination of a dynamic woofer with an electrostatic or ATF transducer.

**Hz (Hertz).** Unit of frequency equivalent to the number of cycles per second.

**Imaging.** To make a representation or imitation of the original sonic event.

**Impedance.** The total opposition offered by an electric circuit to the flow of an alternating current of a single frequency. It is a combination of resistance and reactance and is measured in ohms. Remember that a speaker's impedance changes with frequency, it is not a constant value.

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**Inductance.** The property of an electrical circuit by which a varying current in it produces a varying magnetic field that introduces voltages in the same circuit or in a nearby circuit. It is measured in henrys.

**Inductor.** A device designed primarily to introduce inductance into an electrical circuit. Sometimes called a choke or coil.

**Linearity.** The extent to which any signal handling process is accomplished without amplitude distortion.

**Midrange.** The middle frequencies where the ear is the most sensitive.

**NAC.** The abbreviation for natural ambience compensation.

**Passive crossover.** Uses no active components (transistors, ICs, tubes) and needs no power supply (AC, DC, battery) to operate. The crossover in a typical loudspeaker is of the passive variety. Passive crossovers consist of capacitors, inductors and resistors.

**Phase.** The amount by which one sine wave leads or lags a second wave of the same frequency. The difference is described by the term phase angle. Sine waves in phase reinforce each other; those out of phase cancel.

**Pink noise.** A random noise used in measurements, as it has the same amount of energy in each octave.

**Polarity.** The condition of being positive or negative with respect to some reference point or object.

**RMS.** Abbreviation for root mean square. The effective value of a given waveform is its RMS value. Acoustic power is proportional to the square of the RMS sound pressure.

**Resistance.** That property of a conductor by which it opposes the flow of electric current, resulting in the generation of heat in the conducting material, usually expressed in ohms.

**Resistor.** A device used in a circuit to provide resistance.

**Resonance.** The effect produced when the natural vibration frequency of a body is greatly amplified by reinforcing vibrations at the same or nearly the same frequency from another body.

**Sensitivity.** The volume of sound delivered for a given electrical input.

**Stator.** The fixed part forming the reference for the moving diaphragm in a planar speaker.

**THD.** The abbreviation for total harmonic distortion. (See Distortion)

**TIM.** The abbreviation for transient intermodulation distortion.

**Transducer.** Any of various devices that transmit energy from one system to another, sometimes one that converts the energy in form. Loudspeaker transducers convert electrical energy into mechanical motion.

**Transient.** Applies to that which lasts or stays but a short time. A change from one steady-state condition to another.

**Tweeter.** A small drive unit designed to reproduce only high frequencies.

**Wavelength.** The distance measured in the direction of progression of a wave, from any given point characterized by the same phase.

**White noise.** A random noise used in measurements, as it has the same amount of energy at each frequency.

**Woofers.** A drive unit operating in the bass frequencies only. Drive units in two-way systems are not true woofers but are more accurately described as being mid/bass drivers.



**MARTIN LOGAN**®

the loudspeaker technology company

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