



Owner's Manual For The

# EMPIRE

Loudspeaker System



- 1. Warranty**
- 2. Our Commitment/Our Cabinetry**
- 3. The Design of Empire**
- 4. Specifications**
- 5. Unpacking**
- 6. Placement**
- 6. Speaker Connections**
- 7. Hook-Up Cables**
- 8. The Amplifier**
- 9. Bi-Amplification**
- 11. For The Tweakers**

Thank you for selecting a Legacy Loudspeaker System. These hand-crafted instruments will provide you with many years of listening enjoyment. Please take a few moments to read this brief manual to insure maximum benefit from your speaker system.

### **Limited Ten Year Warranty**

Legacy Audio, Inc. extends to the original owner coverage of defects in materials and workmanship for a period of ten years from the date of purchase.

This warranty does not include a) damage in shipment, b) damage caused by accidental or intentional misuse or abuse, c) units not registered with Legacy Audio, d) damage resulting from unauthorized modifications or repairs. Liability is limited to the repair or replacement, at our option, of any defective component and shall not include property or consequential damages which may result from the failure of this product.

If this product should ever require servicing, simply call 1-800-283-4644 for immediate assistance. Every Legacy speaker system is completely modular and requires little more than a Phillips screw driver and a soldering iron to service.

### Customer Record

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date of Purchase \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Owner \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_ Zip \_\_\_\_\_

## Our Cabinetry

The Empire front baffle is constructed with a 1 1/2" ultra light medium density fiberboard. The baffle is milled using a computer numerically controlled (CNC) machine. The baffle then goes through multiple processes by hand until finishing. The baffle and base receive nine coats of various finishes with hand sanding between coats. The baffle and base then receive an external skin through a process known as a "heat and pressure lamination." This involves a synthetic membrane heated to increase its elasticity. Pressure differential is used to vacuum form the membrane to the contours of the Empire baffle and base.

Please Note: Due to the nature of the material, Windex® or other non-abrasive cleaners should be used to polish the finish.

## Our Commitment

A great deal of forethought, love and satisfaction is instilled into each piece of Legacy workmanship. We take pride in coming to know many of our customers on a first name basis.

Your purchase of this product is backed by the renowned "Legacy Satisfaction Guarantee". We continue to stand behind it with a solid ten year warranty, more than twice the industry standard.



# EMPIRE

EMPIRE, the cornerstone of the MANHATTAN SYSTEM, is designed for how we live. Several years ago, LEGACY AUDIO set the audio world on its ear with the introduction of the Whisper speaker system. Whisper's full-range, controlled directivity design provided more clarity than any speaker to date. EMPIRE is derived from this acclaimed technology.

## EMPIRE IS UNIQUE.

EMPIRE looks unlike other speakers and sounds unlike other speakers. An elegant 4.5' tower, EMPIRE will grace your living room and give you thousands of hours of enjoyment listening to your favorite music and videos.

EMPIRE is an "open air" design with dispersion analogous to the pick-up pattern of the world's finest microphones. Unlike other speakers that suffer from enclosure resonances, EMPIRE will never sound "boxy," because there is no box.

With 50 lbs. of magnet structure, EMPIRE can start and stop more accurately than conventional speakers. This reveals the natural contrast between loud and soft sounds.

## EVOLUTIONARY DESIGN

The design of EMPIRE posed some unique engineering challenges.

A new material called KEVLITE-Ti™ (comprised of KEVLAR™, Graphite, and Titanium) was developed for our 5.25" drivers to bestow the "breath of life" on vocals, and impart a rich luster to the glow of brass.

A special magnetic material called Neodymium was employed to lend crystalline clarity to our NEOdome™ tweeters. A magnet made of Neodymium is more than ten times stronger than conventional magnets.

To convey the treble in the most open and diffraction-free manner, this ferro-fluid cooled, NEOdome tweeter was mounted in free air, equi-distant from each midrange, and concentric to the 12" midwoofer.

A conventional woofer alignment simply would not suffice. Such alignments would lag behind the pace set by the upper range drivers. Fortunately, Legacy thinking is never limited by convention.

Bill Dudleston and his team developed a special 12" tri-woofer configuration fortified with i-damp, a circuit which prevents uncontrolled cone motion or "overshoot."

Enhancing the transient characteristics of EMPIRE aids the listener in other ways. Subtle ambient cues and low level details previously masked now become apparent. Listener fatigue is greatly reduced, even after lengthy listening sessions.

LEGACY'S exhaustive research regarding room interaction enabled us to specify a more optimal directivity pattern. The resulting improvement in clarity is remarkable, even to the novice.

EMPIRE is designed to direct sound across the living room, minimizing unwanted reflections from the side-walls and floor. This broadening of the "sweet spot" allows everyone to enjoy a proper soundstage even when seated off axis.

## AN ARCHITECTURAL ACHIEVEMENT

EMPIRE's elaborate baffle and base are machined from a 1.5" thick slab of Ultra-LITE. This material is much more rigid than MDF, yet allows EMPIRE's weight to remain practical.

To further enhance Empire's elegant design the high luster, black lacquer finish is trimmed with solid, hand-finished Rosewood.



# Specifications

**System Type:** 6 driver, 4 way.

**Tweeter:** 1" NEOdome.

**Midrange:** (2) 5.25" KEVLITE-Ti.

**Midwoofer:** 12" carbon/cellulose.

**Woofers:** (2) 12" carbon/cellulose.

**Low Frequency Alignment:** Open air i-damp configuration.

**Sensitivity:** 95 dB @ 2.83 V/1m.

**Frequency response:** 38 Hz - 25 kHz +/- 2 dB.

**Crossover frequency (Hz):** 80, 400, 3k.

**Recommended Amplification:** 10 - 400 watts/channel.

**Impedance:** 4 ohms.

**Dimensions:** 54" H x 13" W x 10" D

**Weight:** 100 lbs.

These next few pages are provided to aid in unboxing and the setup of your Empire loudspeakers.

Your Empire loudspeakers are packaged very carefully and shipped in two separate packages:

If any shortages or damages have occurred, notify us immediately at 800-283-4644.

## Unpacking the Empire

Please read this completely before beginning to unpack your speakers. Although it is possible for one person to successfully unpack the Empire two will make it much easier. Tools you will find useful:

Phillips screw driver (cordless electric is best)  
Utility knife

Begin with removing the cardboard boxes:

1. **Lay boxes horizontally.**
2. With the utility knife **cut along the tape** to open the bottom box flaps.
3. Open all four flaps, **fold the flap** closest to the floor underneath the box.
4. **Stand speaker up** so that speaker is standing right side up and the open portion of the box is on the bottom. All 4 flaps should be visible outside the box on the floor.
5. Carefully **lift the cardboard box up** and off of the internal wood packaging frame.
6. Once the box is removed, **remove the screws at each corner** that connect the wood planes on top and bottom to the 2 x 4's.
7. Once the 2 x 4's are removed **lay the speaker on its back.**
8. **Remove the foam base** from the bottom.
9. **Stand speaker back up.**
10. **Remove foam cap** from top of speaker
11. Then carefully **lift center foam piece up** and off of the speaker.

Now that the Empires are unpacked and the boxes are out of the way, you should position your speakers. No need to unpack the other items as they will just be in your way. Resist the temptation to install the grills or cones until the speakers are positioned where you want them.



# Placement of Empire

Positioning Empire for good performance is quite a bit easier than for most speakers. Remember that Empire is actually an dipole with a highly controlled directivity pattern. Corner placements are actually quite workable though not necessarily optimal. Empire will not become “boomy” like a conventional system and it will not interact strongly with the sidewalls of your room.

Simple guidelines:

1. You may position the Empire speakers farther apart than most other speakers. This will help to acoustically shadow the head properly and maintain better channel separation. Experiment with what works best in your room.
2. Toe In: In most circumstances crossing speaker axes just behind the listener’s head works best. This will broaden your sweetspot horizontally. If dispersing into an “L” shaped seating arrangement, you might find the best results by aiming the left speaker at the right-most seating position, and the right speaker at the left-most seating position.
3. Hearing natural ambience present in recordings while minimizing effects from your room favors a listener position that is no farther from the plane of the speakers than the geometric width of your room. More simply, if the room is 16 feet wide, then sitting closer than 16 feet will allow you to hear more of the recording and less of your room.

## Speaker Connections

At the rear of each of your loudspeakers you will find a terminal plate housing two rows of jumpered binding posts. The upper row is the input to the “satellite” portion of the speaker. The lower row is the input to the “bass” portion of the speaker. When left in place, the factory-installed jumper bars allow the speaker to be driven with a single channel of amplification. If biamping, or biwiring, be sure to remove the jumper bars. More on this later!

Connect each channel of your amplifier to a loudspeaker via the five-way gold binding posts provided. Dual banana plugs or gold plated spade lugs are recommended means for termination.

Be sure that you observe polarity when making the connections. The positive (+) terminal of the amplifier should be connected to the positive terminal of the loudspeaker. The negative (-) terminal of the amplifier should be connected to the negative terminal of the loudspeaker.





# Hook-up Cables

The ideal conductor would have negligible resistance, inductance and capacitance. The table below shows how a few actual speaker cables measure up.

Cable	$\Omega$ s/ft	pF/ft	$\mu$ H/ft
12 ga.	0.0033	24	0.21
14 ga.	0.0048	17	0.13
16 ga.	0.0079	16	0.18
18 ga.	0.0128	28	0.21

Capacitance is considered insignificant in each cable because its effect is well out of the audio bandwidth; inductance can be decreased (at the expense of increased capacitance) by keeping the conductor pair closely spaced.

How long would a cable have to be before inductance effects would impinge on the audio spectrum? Approximately 300 feet of 12 gauge would be required to establish a corner frequency of 20 kHz with an 8 Ohm loudspeaker. As you see, inductance is not a problem for most of us.

What about phase shift due to frequency dependent travel times down the speaker cable? Measurements show that 100 Hz waves will be delayed about 20 billionths of a second behind 10 kHz waves when traveling to the end of a 10 foot speaker cable. Since the cilia of the ear requires 25,000 times longer than this just to transmit phase information, phase shifting is obviously not the primary concern when considering speaker cables.

What about resistance? Finally we are getting somewhere. Resistance is the controlling factor of the amplifier/loudspeaker interface.

Excessive resistance can cause major shifts of speaker crossover frequencies. The lower the impedance of the loudspeaker, the greater the effects of series resistance. A run of 20 feet of 18 gauge can cause up to 10% deviations of crossover center frequencies. That same 20 feet can undamp your damping factor and reduce your systems' output by one-half decibel.

The best way to approximate the ideal would be to keep loudspeaker leads as short as is practical.

Our recommendation is the Legacy Transmission Line Cable. Transmission Line is available in ready made 10 ft. runs or custom lengths are available as well. Please call the factory at 1-800-283-4644.

# The Amplifier

Ideally the loudspeaker would be among the first components selected when assembling a playback system. This would allow the user to choose an amplifier capable of delivering adequate amounts of current into the frequency dependent load presented by the loudspeaker. However, when upgrading a system, audiophiles may find themselves matching their new loudspeakers to their existing amplification. For this reason, extensive measures have been taken to ensure that each Legacy speaker system represents a smooth, non-reactive load to virtually any amplifier.

Often there is much confusion regarding amplification and loudness levels. It should be understood that the role of the amplifier goes beyond that of driving loudspeakers to a given sound pressure level. The amplifier should be able to CONTROL the loudspeakers across the entire music spectrum. This means that parameters such as damping factor (values greater than 60 are acceptable) and dynamic headroom should not be overlooked when comparing amplifiers.

How much power will your new speakers need? That ultimately depends on your listening environment and musical tastes. As little as five watts per channel should drive them to a level satisfactory for background music. A typical 45 watt per channel receiver may fill a room with the compressed mid-band energy of “heavy metal,” but seem to lack weight or control with classical recordings. Some audiophiles feel that 200 watts per channel is the bare minimum to avoid audible clipping distortion when reproducing music at “live” playback levels. Your Legacy speakers are designed to take advantage of “high-powered” amplifiers, so don’t be afraid to put them through their paces.

How much is too much power? Rarely is a drive unit damaged by large doses of music power. More often than not the villain is amplifier clipping distortion. Even through decades of refinement, loudspeakers are still notoriously inefficient transducers, requiring huge amounts of power to recreate the impact of the live performance. Typically less than 1% of electrical power is converted into acoustic output. For example, an omni-directional transducer with an anechoic sensitivity of 90 dB @ 1w/1m has a full space efficiency of only 0.63%. When an amplifier is unable to fulfill your loudspeakers demands, a damaging harmonic spike may be leaked to the high frequency drivers.

Another important point regarding loudness is that the dB scale is a logarithmic one. This means that a 150 Watt amplifier will potentially sound only twice as loud as a 15 Watt amplifier.

If all of this discussion of power and loudness seems a bit abstract, consider the the example to the left:

*The average acoustical power developed by a person speaking in a conversational tone corresponds to a mere 0.00001 Watts. The power that would be developed by the entire population of the city of New York speaking at once would barely illuminate a single 100 Watt light bulb.*



# **Biamplication**

Your Legacy speakers offer the options of conventional wiring, biwiring, passive biamplication or active biamplication. The following is a summary of these options.

## *CONVENTIONAL WIRING*

This format is the simplest way to connect your loudspeakers to your amplifier. A single twin-conductor cable is used to link the loudspeaker to a single channel of amplification. Jumper wires must be left in place on the loudspeaker.

## *BIWIRING*

Biwiring allows one to minimize the cable losses between the amplifier and the loudspeaker. This is accomplished with a single stereo amplifier by running separate sets of cables to the satellite section and the subwoofer section from the same channel of amplification.

This technique allows one to “play” with wire parameters a bit (such as heavy gauge wire on the sub sections and light gauge solid core on the satellites).

When biwiring, the use of gold spade lugs or dual banana plugs can make the task much easier and safer than bare wire connections. Again, the major reasons for biwiring over conventional wiring are greater power transfer (improved efficiency) and tighter control over the drivers (better damping).

## *PASSIVE BIAMPING*

This option can yield even better results than biwiring due to broader distribution of power requirements.

Passive biamplication allows low frequency current demands to be routed to a separate channel of amplification, thus reducing strain on the satellite amplifier and preventing subwoofer back-EMF from modulating with the upper frequencies. There are two types of passive biamplication; Vertical biamping (which requires two identical stereo amplifiers or four monoblocs) and Horizontal biamping (which does not require identical amplifiers).

### **1. Vertical Biamping**

Vertical biamplication requires the dedication of a single stereo amplifier for the left speaker, and another stereo amplifier for the right speaker. This configuration improves channel separation and can improve imaging slightly. If your preamp does not have two sets of left/right outputs, you will need a pair of Y-adapters or a signal splitter, such as a dual amp balancer, which will also allow adjustment of subwoofer/satellite input levels.

## 2. Horizontal Biamping

Any two stereo amplifiers may be utilized in horizontal biamplification. Many audiophiles prefer the "sweetness" of tubes on the satellite portion of the loudspeaker while favoring the "control and weight" of solid state amplifiers on the subwoofer section.

The biggest drawback of such a marriage of amplification is that the two amplifiers may have different input sensitivities or output polarities. Differences in the input sensitivities may be overcome by using a dual amp balancer. This unit allows independent balancing of the left subwoofer/satellite ratio and right subwoofer/satellite ratio.

It's also a good idea to check the owner's manuals to establish if the amplifiers are inverting or non-inverting. If the two amplifiers are of opposite polarity, then you should reverse the polarity at the inputs of either the subwoofer or satellite binding posts.

*NOTE: The above only applies to loudspeakers that incorporate the subwoofer and satellite section in a single enclosure. It does not apply towards the separate powered subwoofer/satellite configuration. You must always observe the polarity when connecting the speaker wire to a powered subwoofer.*

### ACTIVE BIAMPING

This option requires the utilization of an electronic (powered) external crossover. Active biamplification is the most appealing means of interfacing a subwoofer/satellite system due to the control possibilities offered, but can also be the most costly.

An active crossover is inserted between the preamplifier outputs and the inputs of two stereo amplifiers. Vertical or horizontal biamping considerations are also applicable here.

A well designed active crossover will offer the user independent high pass / low pass turnover frequencies for optimally blending the satellites with the subwoofer sections of the speaker system. Other features usually found are separate level controls for the high pass or low pass sections and a choice of inverted or non-inverted low frequency outputs (needed when strapping an amplifier to mono). Also helpful is bass equalization and subsonic filtering.

When cascading active filters with the existing passive filters within the speaker system, be sure to allow for adequate frequency overlap. For instance, if the passive crossover is set at 500 Hz, select a low pass corner frequency of 600 Hz and a high pass corner frequency of 450 Hz to prevent a suck-out in the response at 500 Hz.

The controlled distribution of power afforded by the active crossover results in less amplifier strain (better clarity), greater dynamics, and lower intermodulation distortion. However, a basic understanding of crossover slopes and crossover frequencies within your loudspeaker will be needed to implement the active crossover successfully.

## For the Tweakers

Your Legacy loudspeaker is a true reference monitor designed to reproduce all program material with an absolute minimum of coloration. Occasionally we encounter a customer who simply has a characteristic sound that he or she desires to achieve. Rather than take on the close-minded position that this customer is wrong and simply has one oar in the water, we would prefer to offer our assistance.

We have found that the human ear is incredibly sensitive in the range of 3 kHz. In fact, at some listening levels the ear is as much as 15 dB more sensitive than at neighboring frequencies. Therefore, a peaky studio microphone may occasionally raise the hair on one's neck. (One needs only to listen to the Stereophile microphone test CD to find out just how bad some microphones really are).

It seems that the presence band of 3 kHz to 8 kHz effectively dictates the degree of forwardness, depth, detail, brightness, or sweetness of a recording. Because of the sensitivity of this range, we allow you some small adjustment.

The rear panel switch located near the binding posts may be placed in the "down" position to reduce brightness in this region.

