Owners Manual For The

# Classic

Loudspeaker System

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## Owners Record

The model and serial numbers are located on the rear of the unit. Record these numbers in the spaces provided below. Refer to them when calling upon your dealer regarding this product.

Model No. _____
Serial No. _____
Date of purchase: _____

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.

# The Cabinetry / Our Commitment

**Handcrafted**

Beneath the surface of Classic's elegant exterior lies rigid MDF construction. Interlocking joinery maximizes the strength of the cabinet parts. Polyester fiberfill is selected for internal damping. A sharp rap on the enclosure will leave you with little more than bruised knuckles.

Each cabinet is impeccably finished on all exposed surfaces with select veneers. The exquisite finish is hand-rubbed several times to assure a patina at home with the most elegant decor.

**Our Commitment**

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

Your purchase of this product is backed by the renowned "Legacy Satisfaction Guarantee".

# Unpacking Your Speakers

Your new speaker system has been very carefully packaged to insure that it travels to you safely. Each speaker is protected by a double-wall outer carton with heavy V-board corner protectors. Molded foam end caps are used to protect the elegant cabinetry, and a plastic liner is provided as waterproofing. Please save this packing for future transportation. If cartons become damaged or misplaced, new ones can be purchased from Legacy Audio.

## Speaker Placement

To allow more flexibility in seating arrangements, your Legacy loudspeaker is designed for broad lateral coverage. Optimal listener position is actually about 5 to 15 degrees off the axis normal to the loudspeaker baffle. Assuming a listener distance of about ten feet, begin by placing the speakers approximately 7 feet apart and about 1 – 3 feet from the wall behind them. In most rooms this will afford a speaker position at least 2 feet or more from the side walls. The amount of recommended "toe-in" is a function of the listening angle. As the overall listening angle increases from 40 degrees, the amount of toe-in should increase. Your Legacy speaker is optimized for a flat response in the far field. Best results are obtained vertically with the listener's ear at tweeter level with the loudspeakers gently toed in toward the listener. Increasing the degree of toe-in is recommended when placement next to sidewalls is required. Placing the loudspeaker or the listener near a room boundary will generally increase low frequency impact. If you are forced to position one or both of your loudspeakers in a corner, be prepared to reduce bass output via the control switches on the rear terminal plate of each loudspeaker. You may also wish to reduce low frequency output with your preamp's bass tone control.

# 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 | Ωs/ft | pF/ft | μH/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 20 foot run of 18 gauge cable can cause up to 10% deviations of crossover center frequencies. That same 20 feet can un-damp your damping factor and reduce your systems' output by one-half decibel.
In summary, there are no perfect cables. The best way to approximate the ideal would be to keep loudspeaker leads as short as is practical.

# Amplification

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.

# Amplification

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 that 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%)

# Amplification

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 example below.

*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.*

# Speaker Connections


**The Terminal Plate**

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 "subwoofer" 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.)

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 of 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.

# Speaker Connections

**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. When biwiring, we recommend the use of gold spade lugs or dual banana plugs. This 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 biamplification allows low frequency current to be routed to a separate channel of amplification, reducing strain on the satellite amplifier and preventing subwoofer back-EMF from modulating with the upper frequencies. There are two types of passive biamplification; Vertical biamping (which requires two identical stereo amplifiers or four MonoBlocs) and Horizontal biamping (which does not require identical amplifiers).

# Speaker Connections

***1. Vertical Biamping***

Vertical biamplification 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

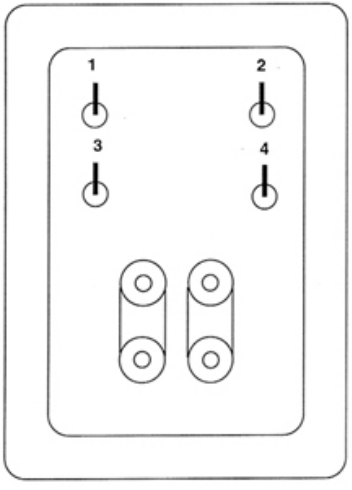
either the subwoofer or satellite binding posts. *NOTE: This only applies to loudspeakers that incorporate the subwoofer and satellite section in a single enclosure. It does not apply towards the separate powered subwoofer/satellite configuration. You must always observe the polarity when connecting 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.

# Fine-tuning




To facilitate proper set-up of your speakers in a variety of room situations, we have included several heavy duty toggle switches on the terminal plate, located on the back of the loudspeaker. All switches in the “up” position represent the “anechoic flat” position.
Switch 1: can be used in the “down” position to provide a warmer sound by shelving information above the 400 Hz by 2 dB. This can be helpful in restoring system balance with closely miked program material or near field listening positions. Switch 2: can be used in the “down” position to reduce edginess in the lower treble region due to room flutter or bright program material. Switch 3: is a low frequency impedance contour when using amplifiers with high current capability. It is recommended that switch 3 be left in the up position which converts the Classic from a traditional B4 alignment to a more sophisticated sixth-order Butterworth alignment, thus reducing distortion in the octave above system resonance. Switch 4: can be used in the “down” position to defeat the rear-firing ambience tweeter.

# Designer's Note (From Bill Dudleston)

The Classic Series Loudspeaker is the result of more than a decade of research and development. The design offers several important advantages over conventional designs. A very uniform dispersion pattern provides a much broader sweet spot for the listener(s).This wide power dispersion is owing to the diminishing line source design philosophy, which demands low crossover frequencies and high temperature voice coils. Due to the inherent ruggedness of the drivers used, no degrading overload protection devices are needed.

Distortion levels are kept below the threshold of audibility across the spectrum via the use of six custom designed drive elements. Peak levels of 120 dB can be achieved over most of the audio spectrum with the appropriate amplification.

**The Diminishing Line Source Philosophy**

In the past, the point source was considered the ideal in loudspeaker design. The smaller the driver, the broader the dispersion pattern at rising frequencies. However, this simple model overlooked one important factor.

## Designer's Note (From Bill Dudleston)

In the real world, distortion from a transducer is roughly proportional to displacement. The longer the throw (or smaller the piston area) required to generate a given volume displacement, the greater the distortion generated for that given displacement (or loudness level). Let's look at a simple equation for the volume displacement of a circular piston.
**Volume Displacement = Travel x Surface Area**

As you can see, if we want to keep travel at a minimum, then surface area must increase accordingly. In fact, for a given size piston, displacement requirements increase by a factor of FOUR every time we drop one octave in frequency. Its now quite clear that the ideal model should be revised to one which maintains constant directivity while increasing in piston area with falling frequency.

The Classic loudspeakers dedicate dual 10" carbon-filled bass drivers with a total of 20 pounds of motor structure and a free air resonance frequency of 18 Hz. The midbass is picked up by an ultra-quick 7" Kevlar® Hexacone with graphite frame.

## Designer's Note (From Bill Dudleston)

A sophisticated 1.25” textile dome with an oversized magnet (3 times larger than standard) details the midrange. A compact ribbon with 3/8” apertures and a Samarium Cobalt magnet articulates up to 30 kHz.

A rear firing 1” titanium dome ambience driver (defeatable via switch 4) is used to enhance treble distortion. This driver allows the sound staging and “air” of a dipolar response without the ragged midrange anomalies and cancellation effects.

An additional advantage of the rear tweeter is the preservation of depth. An inherent limitation of the stereo process dictates that depth is largely determined by amplitude differences; i.e. the louder the source, the closer it can appear. This can cause a saxophone player, for example, to jump forward every time he emphasizes a note. This occasionally makes even accurate speakers feel aggressive. The rear tweeter helps to stabilize the soundstage by establishing a balance between the front and rear output, resulting in more uniform power distribution.

# Specifications

**System Type:** 6 drivers, 4 way.
**Tweeter:** 4” Ribbon.
**Midrange:** 1.25” soft textile dome.
**Midwoofer:** 7” Kevlar®.
**Subwoofer:** (2) 10”Treated Paper.
**Low Frequency Alignment:** B4 Reflex.
**Sensitivity:** 92 dB @ 2.83 V/1m.
**Frequency response:** 22 Hz - 30 kHz +/- 2 dB.
**Crossover frequency (Hz):** 120, 2.8k, 10k.
**Recommended Amplification:** 25 - 300 watts/channel.
**Impedance:** 4 ohms.
**Dimensions:** 44” H x 12”W x 12” D
**Weight:** 110 lbs.



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