



Owner's Manual For The

# Studio

Loudspeaker System



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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 Warranty**

Legacy Audio, Inc. extends to the original owner coverage of defects in materials and workmanship for a period of 90 days from the date of purchase. To extend this warranty to 10 years, please fill out the enclosed warranty card and return to Legacy Audio.

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.

### **Customer Record**

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

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

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

Owner \_\_\_\_\_

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

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

# Unpacking

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. If you do not have tone controls on your preamp, we can provide you with an external custom passive attenuator which can also be tuned for treating standing wave ("room boom") problems.

## Designer's Note from Bill Dudleston

The Studio loudspeaker system is among the finest compact monitors available. Capable of reproducing even the most subtle nuances, the Studio is a perfect addition to any stereo or multi-channel system.

Each Studio contains a 7.5" dual voice coil Kevlar® mid bass driver. The dual voice coil arrangement allows for added low frequency extension and counters diffraction loss below 400 Hz. Speed, articulation and impact are exceptional for a speaker of this size.

The high frequency section is delivered by our own 1" Titanium dome tweeter. Custom tuned networks are supplied to assure that the treble stays open and airy.

### **Studio is Flexible!**

Studio's acoustic polar pattern is uniquely optimized to cover both seated and standing listeners. This prevents major tonal changes from occurring when moving about the listening environment and allows Studio to be used as an elevated center or rear channel speaker with mounting heights as high as six feet.

When used as main front channels, stands with a height of 20" to 24" are ideal for listener distances of 8 feet or greater.

The design objectives are to provide good sensitivity and broad dynamic range in a compact and affordable design while maintaining uniform power response on axis.

The two-way system is crossed over at 2.8 kHz and has a minimum impedance of 4.5 ohms. Sensitivity exceeds 90 dB at 2.83 volts/1m.





The vertical lobing pattern is designed to provide a 30° listening window, about 18 degrees, (from 30° to 60° off the floor when speakers are located on 24" H stands at a listener distance of 2.5 meters).

Quite unusual for a two-way, the drivers are polarized in-phase/in-phase, thus providing exceptional transient response.

The high pass section is second order with a level pad and two equalization stages.

The low pass section is effectively first order electrically with phase compensation (not a conventional Zobel) to marry the drivers together.

In addition, there is a LF high pass section for the woofer (switch 1) which simply allows some shelving if utilized with a subwoofer. When coupled with an active high pass filter, this switch will allow a bit of slope contouring for acoustically blending with the sub.

The system also compensates diffraction loss by applying approximately a 1 dB/octave roll-out (with rising frequency) in the woofer stage. This is verified by near-field measurement of the woofer.

While the impedance curve implies a box tuning frequency of 32 Hz, the rear port actually achieves maximum output at 45 Hz. Tuning the system a bit lower allows a slightly lower cutoff frequency at the expense of some output, thus allowing the speaker to take advantage of a bit more room gain without peaking the frequency response.

Switch 2 provides a tweeter pad of 2.5 dB for nearfield listening.

In set-up, I recommend a speaker spread of about 7 ft for a listener distance of about 12 feet. The speakers should cross behind the listeners head (don't toe-in excessively).

The bottom end will be determined primarily by the distance from rear wall. I feel they can reach down to low E as anything near the size.

## The Cabinetry

Beneath the surface of Studio'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 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.



## Connections

At the rear of each of your loudspeakers you will find a terminal plate.

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

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

## 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 activate the 80 Hz first order high pass filter, which blends the Studios with the subwoofer.

Switch 2: can be used in the “down” position to reduce edginess in the treble region due to room flutter or bright program material.



# Specifications

**System Type:** 2-way, vented.

**Tweeter:** 1" Titanium dome.

**Midwoofer:** 7.5" dual voice coil KEVLAR®.

**Sensitivity:** 90.5 dB.

**Frequency response:** 46 Hz - 22 kHz +/- 2 dB.

**Crossover frequency (Hz):** 2.4 k.

**Recommended Amplification:** 10 - 200 watts/channel.

**Impedance:** 4 ohms.

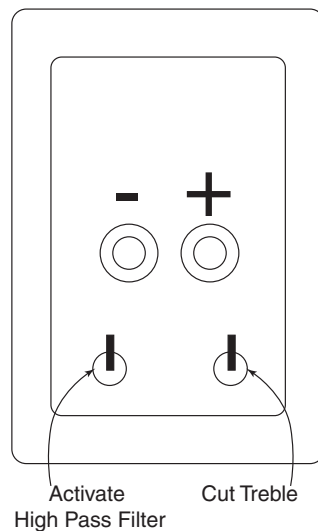
**Dimensions:** 13.5" H x 9.8" W x 10.2" D

**Weight:** 30 lbs.

## Additional Features:

Frequency response contouring via two switches on rear panel.

1. Lower bass attenuation switch (-3 dB centered @ 80 Hz).
2. Treble attenuation switch (-2 dB above 5 kHz).



## 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.

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.

# 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.*



## 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 or 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 one extra tweak.

If you wish to attenuate the energy in this range, simply contact Legacy Audio and we will exchange or modify your dome drivers with a resistor network that allows several soft steps of attenuation.

Another situation frequently encountered is the "one speaker in the corner, the other speaker open to the dining room" syndrome. Don't panic, we build high quality passive resonance trap circuits that will take the drone out of corner placements. These circuits may be placed in series with the woofer section of your speaker and will not effect your midrange or treble frequencies.

Even greater flexibility can be achieved with the Focus' by implementing the Steradian Environmental Processor (STEP One) into your system..