LEGACY

Owner's Manual For The

FOCUS 20/20

Loudspeaker System

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

FOCUS 20/20

FOCUS 20/20 utilizes controlled directivity to improve image resolution. This special driver array minimizes coloration's due to floor and ceiling reflections. The speaker system offers more than 400 square inches of total piston area, more than double of our closest competitor.

The FOCUS 20/20 system represents the latest advancements in controlling acoustic radiation patterns with conventional speaker systems. Two 7" double layered Kevlar® Hexacone drivers are strategically separated to provide a null off-axis vertically. Floor and ceiling reflections are reduced by an incredible 20 decibles through the critical midband (500 Hz-4 kHz). This reduction of early reflections allows fragile low level ambient information found in recordings to be heard over the listening room's sonic signature. Images are clearly defined and localization is consistent with frequency.

The Kevlar Hexacone drivers used in FOCUS are among the most expensive and elaborate ever developed. The cone material is more than 70 times stiffer than polypropylene and paper cones, yet weighs 30% less. An enormous motor structure and a vented pole piece assure unsurpassed dynamics and clarity. These special midrange drivers are mounted into rigid PVC sub-enclosures, which are filled with polyester fiberfill to absorb the backwave energy.

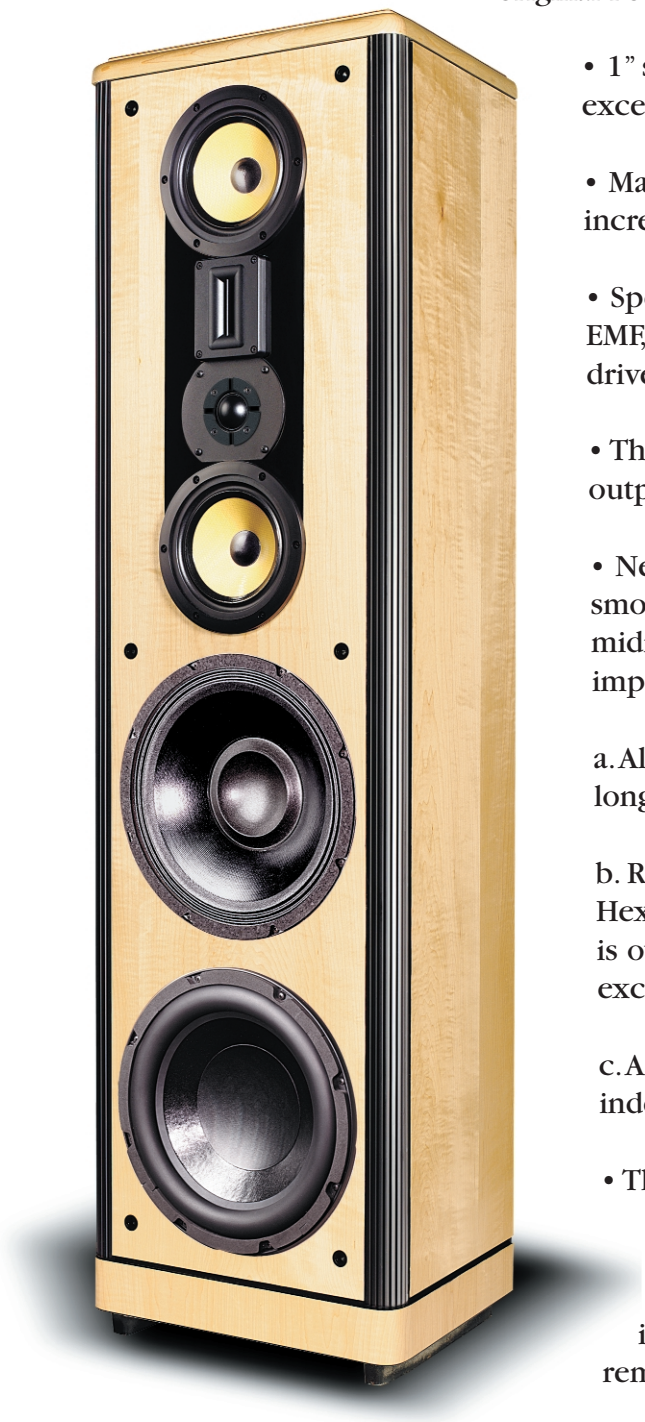
The end result is a speaker system with literally the finest midrange qualities in the world, next to our Whisper that is!

The treble region is handled precisely by a specially treated 1.25" woven dome tweeter with a 48 ounce magnet structure. This dome hands off to a 4" ribbon supertweeter outfitted with a custom designed waveguide faceplate for controlled dispersion. This ribbon provides an ultra-linear horizontal radiation pattern for a broad listener sweet spot and effortless shimmering highs. Gone is the irritating "tingy" treble associated with so many underdamped metal domes.

The bass section of FOCUS 20/20 features the following improvements from Focus:

• A newly engineered subwoofer section featuring dual 12" drivers from the Legacy "True Physics" series, the same used in the Deep Impact Subwoofer.

• Diaphragms for the dual 12" drivers are made of a carbon/pulp composite instead of the poly version used on the original Focus.



• 1" surrounds are used to accommodate exceptionally long throw.

• Massive motor structure of one driver weighs an incredible 20 lbs.

• Special braking system cancels induced back EMF, allowing higher current delivery to the drivers and greatly enhancing transient response.

• This subwoofer section is capable of 118 dB of output below 40 Hz.

• New 12" midwoofer has been developed to smooth the transition from the midbass to lower midrange region. The addition of this driver improves performance in three critical areas.

a. Allows the subwoofers to independently stroke long without blurring midbass attack and punch.

b. Reduces intermodulation distortion in the Hexacone midrange drivers by a factor of 4. This is owing to the dramatically reduced Kevlar cone excursion at their higher crossover point.

c. Affords an unprecedented level of boundary independence, greatly easing room placement.

• The increased output capability of the new FOCUS 20/20 "bottom" has allowed us to open up the silk dome and ribbon combination. Removing this pad results in better transients, with detail more remarkable than ever.

The Cabinetry

Beneath the surface of FOCUS 20/20'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 housing two rows of jumpered binding posts. The upper row is the input to the "high frequency" portion of the speaker. The lower row is the input to the "low frequency" (the 3 12" woofers) 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!).

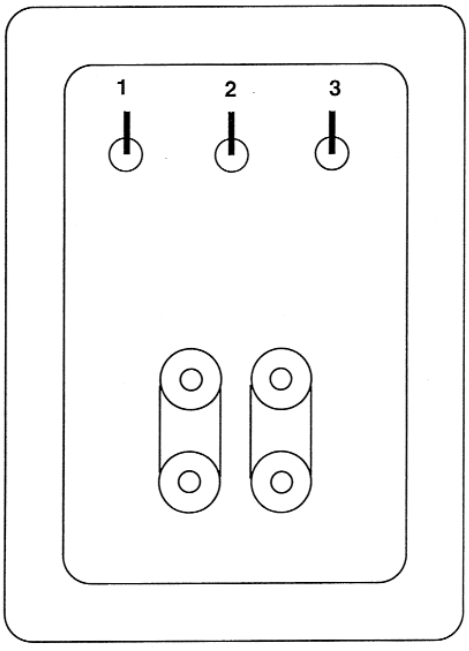
Connect each channel of amplifier to a loudspeaker via the five-way gold binding posts provided. Dual banana plugs or gold plated spade lugs are recommended means of termination.

Be sure that you observe polarity when making the connections. The positive (+) terminal of the amplifier should be connected to the positive terminal (red) of the loudspeaker. The negative (-) terminal 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: is a low frequency impedance contour when using amplifiers with high current capability. It is recommended that switch 1 be left in the up position which converts the FOCUS 20/20 from a traditional B4 alignment to a more sophisticated sixth-order Butterworth alignment, thus reducing distortion in the octave above system resonance. Lower powered receivers may prefer the down position.



Switch 2: can be used in the "down" position to soften midrange presence. This switch can be used to reduce the forwardness of certain recordings.

Switch 3: can be used in the "down" position to reduce edginess in the lower treble region due to room flutter or bright program material.

Specifications

System Type: 7 driver, 5 way.

Tweeter: 4" Ribbon.

Midrange: 1.25" soft textile dome.

Midwoofer: (1) Carbon-reinforced mid-bass radiator.

Subwoofer: (2) 12" Carbon-reinforced.

Low Frequency Alignment: B6 Assisted.

Sensitivity: 96 dB @ 2.83 V/1m.

Frequency response: 16 Hz - 30 kHz, 26 - 20 kHz +/- 2 dB.

Crossover frequency (Hz): 80, 300, 2.8k and 8k.

Recommended Amplification: 10 - 400 watts/channel.

Impedance: 4 ohms nominal

Dimensions: 55" H x 15"W x 13" D

Weight: 185 lbs.

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 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 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.

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.

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%) 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:

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 an 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 of treble frequencies.

Even greater flexibility can be achieved with the Focus 20/20 by implementing the Steradian Environmental Processor (STEP One) into your system.

Biamplification

Your Legacy speakers offer the options of conventional wiring, biwiring, passive biamplification or active biamplification. 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 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 biamplification 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 biamplification; Vertical biamping (which requires two identical stereo amplifiers or four monoblocs) and Horizontal biamping (which does not require identical amplifiers).

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: 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 should 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.