Owners Manual For The AERIS Loudspeaker System
THANK YOU FOR
CHOOSING
LEGACY AUDIO

Aeris is a full range loudspeaker system utilizing the present state of the art in driver, crossover, amplifier and acoustic radiation control technologies.

The system is designed, assembled and tested in Springfield, Illinois by a dedicated group of engineers, craftsmen, and music lovers.

Please take a few moments to learn more about the features and controls of these instruments to assure full enjoyment.
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Owners Record

The serial number is located on the rear of the unit. Record this number in the space provided below. Refer to this when calling your dealer regarding this product.

Model: AERIS
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.
The Cabinetry / Our Commitment

Handcrafted
Beneath the surface of AERIS’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”.

5
Legacy Audio supports its customers and products with pride. We cheerfully warrant our loudspeaker products we manufacture from defects in materials and workmanship for a period of seven (7) years. Electronic components such as internal amplifiers and digital processors are covered for three (3) years. Please register your product with Legacy Audio. Should you require service Legacy will require a proof of purchase in order to honor the warranty - so please keep your receipt.

- The warranty applies to the original owner and is not transferable.
- The warranty applies to products purchased from an "Authorized Legacy Dealer".
- The warranty on active components such as digital processors or internal amplifiers is limited to three (3) years of coverage.
- The warranty on dealer stock will extend for a maximum of two years from invoice.

The warranty does not cover transportation costs of product to or from the customer, distributor or dealer, or related shipping damage.

**Exclusions from Warranty**

The following situations or conditions are not covered by the Legacy Audio warranty:

- Accidental damage, electrical abuse or associated equipment failure.
- Use inconsistent with recommended operating instructions and specifications
- Damage caused by modification or unauthorized service
- Costs associated with the removal and reinstallation of defective products. Consequential damage to other products.
- Normal wear such as fading of finishes due to sunlight.
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 10-12 feet, begin by placing the speakers approximately 8-10 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 XP-4080 or with your preamp's bass tone control.
Hooking Up Cables

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

<table>
<thead>
<tr>
<th>Cable</th>
<th>Ωs/ft</th>
<th>pF/ft</th>
<th>µH/ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 ga.</td>
<td>0.0033</td>
<td>24</td>
<td>0.21</td>
</tr>
<tr>
<td>14 ga.</td>
<td>0.0048</td>
<td>17</td>
<td>0.13</td>
</tr>
<tr>
<td>16 ga.</td>
<td>0.0079</td>
<td>16</td>
<td>0.18</td>
</tr>
<tr>
<td>18 ga.</td>
<td>0.0128</td>
<td>28</td>
<td>0.21</td>
</tr>
</tbody>
</table>

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.
Hooking Up Cables

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 onehalf 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 omnidirectional 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

Connecting the Speakers
Connect the L, R speaker cables from each upper range amplifier channel to the respective speaker’s +, - binding posts. You may use spades, bare wire or locking banana pins. Be sure that no stray wires bridge between the input posts to prevent electrical shorting and take care that correct polarity (+, -) is observed.

When wiring connections are completed as above, complete the AC connection to the external socket of the internal amplifiers of each Aeris speaker by connecting the provided cord to the room wall plate, power strip or power filtration unit. Power up the processor next via the rear panel switch, and finally rock the I/O switch on the rear panel of the Aeris to the “I” position to turn on the internal amplifiers. Note that these amplifiers are green compliant, idling at a few watts. They will automatically turn themselves on when a music signal is present, providing up to total of 1000 watts of power to the woofers.

Crossover Illumination
Aeris benefits from premium Clarity capacitors, Kimber HF Silver wire and custom wound copper coils. We have made it possible to view the internal crossover and the dipolar midrange/midbass alignment by rocking the Crossover Illumination switch to the ON position. A series of low-voltage, long-life LEDs will allow viewing. To defeat the illumination feature, simple rock the switch into the down position.
Speaker Connections

XP-4080 Processor Cable Connections

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left channel of preamp output</td>
<td>Processor Input 1 and Input 3* <em>(use Y adapter)</em></td>
</tr>
<tr>
<td>Right channel of preamp output</td>
<td>Processor Input 2 and Input 4* <em>(use Y adapter)</em></td>
</tr>
<tr>
<td>Processor Output 1</td>
<td>Left Aeris rear panel Bass Input (XLR)</td>
</tr>
<tr>
<td>Processor Output 2</td>
<td>Left channel input to amplifier driving Aeris upper range</td>
</tr>
<tr>
<td>Processor Output 5</td>
<td>Right Aeris rear panel Bass Input (XLR)</td>
</tr>
<tr>
<td>Processor Output 6</td>
<td>Right channel input to amplifier driving Aeris upper range</td>
</tr>
</tbody>
</table>

*The redundant feed of left and right input signals to the processor allows a low frequency correction algorithm to be applied. This compensates for the decrease in channel separation at longer wavelengths in listening rooms. This algorithm may be defeated at any time by muting inputs 3,4 on the processor’s front panel.*
Wave Launch Processor

The high definition Digital Wavelaunch Processor hosts a LEGACY custom algorithm which automatically loads when the processor is powered on. Factory settings are ‘plug and play’, and do not require a computer to utilize. Connections between the preamp, power amplifier, and speakers should be as shown on previous page.

Selecting the Program
1. Press the MENU left arrow
2. Scroll through the programs using the job wheel
3. Press enter to select the program of choice
4. Press enter again to confirm selection. The program will now load.

Users are welcome to load the included software and learn to make individual adjustments as desired. However it is recommended that any changes be saved as Program 6 or higher to avoid overwriting the factory settings.
Wave Launch Processor

Downloading and Installing the XConsole software

**Downloading**

From Included CD
Your Wave Launch Processor will come with a CD or USB drive containing the XConsole software. Insert the CD and find the install file. Move/Save the install file to your computer.

From Xilica Website
- Go to www.xilica.com
- Click on the “Downloads” tab at the top of the screen
- Click “XConsole” on the Left and then Click “Software”
- Click “XConsole software” to start the download
- Save and Extract the installation file on your computer

**Installing**
- Double click on the install file and follow the on-screen instructions to install the software.
Wave Launch Processor

The XP processor will allow you to make adjustments to your system from a laptop computer from your listener position.

Connecting Your Computer with the XP-4080 Processor
- Connecting will require a long USB Device cable. These can be found at most electronic or big box stores. It is the same cable that a USB printer would use. This 16 ft cable is available at Radio Shack.

- Once the cable is connected, start the XConsole software. It will ask “Do you want to connect to the device?”, answer “No” for now.

- You now must access the Windows Device Manager. This processes can vary depending on the version of Windows in use, but typically it is found in the Control Panel. Then click on “System.” On the tabs across the top, click “Hardware” and then “Device Manager” This will bring up a list, find “Ports (COM & LPT)” and click the plus (+) next to it. You should then find a device called “Silicon Labs CP210x USB to UART Bridge” with a COM number listed next to it. This number will change on all computers, but take note of this number.
Wave Launch Processor

- Go back to the XConsole software. At the top of the screen click “Setup” then “Port Connections.” This bring up a new dialog box. Select the COM port number you obtained from the device manager and click “OK.” The software will warn you that you must restart the software for your changes to take effect.

- Restart the XConsole software. This time, when it asked “Do you want to connect to the device?”, answer “Yes”.

- You should now be connected to the device and ready to use.

Room Equalization
Before making adjustments with your processor, a basic understanding of parametric and graphic equalization is needed.

Parametric filters allow you to control the three primary parameters of a useful band-pass filter. These parameters are amplitude (boost or cut), center frequency (pitch) and bandwidth (tonal range). Bandwidth is typically labeled "Q" on the unit, which stands for Q factor. The amplitude of each band can be controlled, and the center frequency can be shifted, and widened or narrowed.

Simpler graphic filters are fixed in frequency and bandwidth, so the music spectrum is divided into uniform third-octave spacings.
Making Adjustments with Wavelaunch Processor

After installing the included software, connect the processor to the computer via a USB cable. Launch the XConsole software.

When asked if you want to connect to the device, click yes.

In the Device List, click on the device that is connected. This will launch the program that is currently on the processor.
Wave Launch Processor

In the Device List, click on the device that is connected. This will launch the program that is currently on the processor.

Adjustments to the processor can be made to "Input 1: Left" and "Input 2: Right". Clicking on "In 1: Left" opens the controls for the Left speaker.

In this window, you are presented with 31 channels of graphic EQ and 8 channels of parametric EQ.
Making a boost with the parametric EQ

In this example, we have selected Parametric EQ 2 (PEQ2) by clicking in its box, which will turn red to indicate your selection. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain, frequency and Q of the selected parametric EQ. This column shows a 4.00 dB boost at 41 Hz with a Q of 6.551. A larger Q affects a narrow range of frequencies, while a smaller Q affects a broader range of frequencies. We can adjust gain, frequency and Q by clicking in the corresponding box. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain, frequency and Q settings.
Making a cut with the graphic EQ

In this example, we have selected Graphic EQ 8 by clicking in its box which will turn red to indicate your selection. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain of the selected graphic EQ. This column shows a 4.00 dB cut at 100 Hz. Only gain is adjustable in the graphic EQ section because graphic equalizers have a fixed frequency and Q.

After adjusting the left speaker, you may close the window, and click “Input 2: Right” to make adjustments to the right speaker.
Wave Launch Processor

Adjusting using the EQ plot
Adjustments made to both the parametric and graphic EQ are reflected in the graph occupying the upper portion of the screen. You can select them by clicking on their number, and dragging up to boost, and down to cut. Dragging to the left decreases the frequency, while dragging to the right increases the frequency.

Recommendations
Boosts greater than 6 dB can result in ringing, driver overload, or mechanical buzzing.

Boosting and cutting with a smaller Q will affect a broad range of frequencies, and can be helpful for brightening an otherwise dull recording.

Boosting and cutting with a large Q will affect a narrow range of frequencies, and is useful for making precise adjustments.

For the Ambitious: Technical measurements
We highly recommend free measurement software, Room EQ Wizard. This software allows you to measure the in room response of your system. While we obviously cannot provide the technical support for this software, all one needs is a calibrated microphone and a soundcard with microphone preamp and you are off and running.
http://www.hometheatershack.com/roomeq/
Continuing the Pursuit of Perfection  
(Legacy Air Motion Ribbons)

LEGACY Audio has been benefiting from low mass ribbon and leaf drivers since 1984. I have a collection of ribbon tweeters from the world over and always loved the way good ribbons reproduced the swishing sound of brushes on a snare- and the simple honesty in the reproduction of strings without imparting an edgy ringing effect found in most tweeters. There’s just something right about the sound — like a C12 mic capsule. If one could increase the dynamics to natural levels and extend the range of ribbons without beaming undesirably, the benefit would be considerable musically.

I have always been a proponent of low mass, high acceleration drive elements. The acceleration capability of the drivers ultimately determines the transient or waveform tracing capability of the loudspeaker. To build a better speaker, one MUST first acknowledge that loudspeakers are dreadfully slow by nature. Their responsiveness lags the electrical waveforms settling time by orders of magnitude (Logically so, if one contrasts the mass of an electron to the mass of a speaker diaphragm.).

Typical of transducers (devices that convert one form of energy to another), speakers are also extremely inefficient - wasting more than 98% of their input power in the form of heat and out of phase motion.

For these two reasons I have been working with speaker driver motors with magnetic field strengths as high as 2 Tesla (60,000 times the field strength of our planet Earth) to overcome these limitations. With such field strength, greater levels of articulation are possible at the lower limits of a transducer. For example, the reproduction of a simple strike of a heavy anvil will reveal tones that are richer, darker and more complex than otherwise possible.

In 2006 Legacy Audio introduced our first air motion transducer; a modernized version of the AMT tweeter developed by Oskar Heil in the 1970s. Legacy’s first version utilizes a folded Kapton (not mylar) diaphragm and R45 neodymium wafers instead of ceramic magnets. The result was higher efficiency and greater power handling. This translated to significant gains in dynamic range and reduced distortion. We soon adapted an existing 4” planar ribbon (the one with the round faceplate) to work in conjunction with this tweeter to facilitate the voicing of the hand-off to our 7” driver.
Continuing the Pursuit of Perfection
(Legacy Air Motion Ribbons)

The recent Aeris loudspeaker development gave me the opportunity to tool a new AMT folded ribbon tweeter to integrate with the smoothest high efficiency 8" midrange built to date. I have yet to find a driver to challenge it. This silky 8" mid has a range of 7 octaves with nary a wrinkle in the response, yet a sensitivity of 98 dB. My initiative of providing a 4” AMT that could compliment these capabilities was met with the challenge of accordion-folding sixteen square inches of Kapton into the 4” long, 1” wide chamber. Neodymium again was employed to provide the flux density required. But the solution was made even more elegant by mounting the new 4” ribbon on the same faceplate as its complementary 1” AMT ribbon super-tweeter. The results were more uniform dispersion and tremendous attack. Treble now had weight instead of tizz. A natural fullness in the treble is exhibited that reminds us why we love high-end audio so much. The effortless way it forcefully squeezes out acoustic energy is readily verified by placing ones hand over the driver faceplate and feeling the suction against your palm (nope, you won’t hurt it). These new drivers may be refined, but are equally rugged.

I am fortunate to have chosen loudspeaker development as my life’s work. It has utilized my chemical engineering, physics and mathematics background almost daily. It has offered moments of both humility and glory, but most gratifying is the reward of continual, stair-stepped successes even after 30 years. I sense that this is a never ending staircase to be followed for generations as we asymptotically approach unattainable perfection.

Bill Dudleston, Chief Designer, Founder of Legacy Audio
## Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Type:</strong></td>
<td>6 drivers, 4.5 way</td>
</tr>
<tr>
<td><strong>Tweeter:</strong></td>
<td>Dual Air Motion Tweeter System— 4” AMT Tweeter, 1” AMT Super Tweeter</td>
</tr>
<tr>
<td><strong>Midrange:</strong></td>
<td>8” Titanium encrusted, Accordion Edge</td>
</tr>
<tr>
<td><strong>Midwoofer:</strong></td>
<td>10” Accordion Edge</td>
</tr>
<tr>
<td><strong>Woofer:</strong></td>
<td>2 x 12” spun aluminum diaphragm, rubber surround, total enclosed neo motor, long throw suspension, with cast frame</td>
</tr>
<tr>
<td><strong>Frequency Response:</strong></td>
<td>16Hz – 30 kHz</td>
</tr>
<tr>
<td><strong>Impedance:</strong></td>
<td>4 Ohms</td>
</tr>
<tr>
<td><strong>Sensitivity:</strong></td>
<td>95.4 dB (Room, <a href="mailto:dB@2.83V">dB@2.83V</a>/1m)</td>
</tr>
<tr>
<td><strong>Recommended Amplification:</strong></td>
<td>60-500 Watts</td>
</tr>
<tr>
<td><strong>Internal Amplification:</strong></td>
<td>2 X 500 watt ICEpower® modules for bass section</td>
</tr>
<tr>
<td><strong>Crossover Frequency:</strong></td>
<td>80, 2.8K, 8K</td>
</tr>
<tr>
<td><strong>Cabinet Dimensions (HxWxD):</strong></td>
<td>58” X 14.5” X 16”</td>
</tr>
<tr>
<td><strong>Base Dimensions (HxWxD):</strong></td>
<td>1” X 19” X 15”</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>Approximately 200 pounds</td>
</tr>
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</table>
CE Declaration of Conformity

Legacy Audio
3023 E. Sangamon Ave.
Springfield, IL 62702 USA
800-283-4644

States that this product is in conformity with the essential requirements and other relevant provisions of:
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

WEEE Compliance

Product Disposal—Certain international, national and/or local laws and/or regulations may apply regarding the disposal of this product. For further detailed information, please contact the retailer where you purchased this product or the Legacy Audio Distributor in your country. A listing of Legacy Audio Distributors can be found on the Legacy Audio website www.legacyaudio.com or by contacting Legacy Audio at: 3023 E. Sangamon Ave., Springfield, IL 62702, USA—Phone: +1 217 544-3178.