Infinity®

TECHNOLOGY • PERFORMANCE • DESIGN

40TH ANNIVERSARY

INFINITY® PRELUDE® FORTY.

Advancing the Legend.

Introducing the Prelude® Forty.

The Infinity® Prelude name was first introduced more than a decade ago, with some of the most critically acclaimed and fondly remembered systems in Infinity history. The new Prelude Forty loudspeaker owes a clear design debt to the Prelude systems that have gone before. But with MRS™ flat-panel driver technology for exceptionally flat, broadband frequency response and uniform on- and off-axis dispersion, the Prelude Forty system achieves a level of sonic realism all its own, with a warmth that reveals the soul of any musical performance.

40TH ANNIVERSARY

THE BELIEF THAT FORM SHOULD FOLLOW FUNCTION HAS BEEN A GUIDING PRINCIPLE OF MODERN ARCHITECTURE FOR MORE THAN A CENTURY. THE FACT THAT AESTHETICALLY PLEASING NEW FORMS CAN ARISE FROM SONIC IMPERATIVES HAS BEEN A HALLMARK OF INFINITY DESIGN FOR 40 YEARS NOW.

Enclosure Construction

The exterior of the Prelude Forty enclosure exudes a simple beauty that utterly belies its complex inner structure. Structural bracing, independent subenclosures and damping materials all work together to ensure that the enclosure has no impact on the sonic character of the Prelude Forty loudspeaker.

Dual 8" woofers are placed in a force-opposition configuration, enabling the mechanical reactions of each woofer to cancel the other out. These woofers feature cast motor frames that have been computer-optimized for high strength and stiffness.

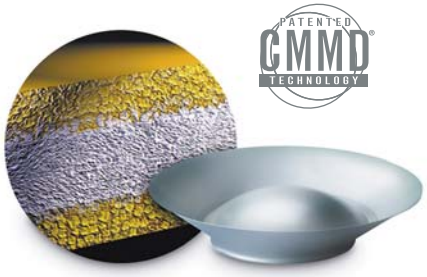
The 8" woofers in the Prelude Forty system are vertically staggered, enabling the enclosure's narrow front face. To improve coupling between the woofers, cross members were placed around each woofer frame for a more efficient transfer of mechanical energy.

The four flat-panel transducers are mounted in dedicated subenclosures. These subenclosures are identical, constructed of high-density molded plastic with extensive internal ribbing to add strength and stiffness. The mounting flange of the subenclosures was designed to be mechanically constrained between the enclosure's front baffle and the cast-metal frame mounting lip of the transducers. This enhances mechanical coupling and rigidity in the critical midrange transducer/back box/front baffle interface. Additionally, the narrow front baffle of the enclosure places the outer edges of the flat-panel drivers in proximity to the perpendicular joints formed along the front baffle and the enclosure sides. This provides superior structural strength, as the sides of the transducers are mounted nearly at the rigid enclosure joints. Additionally, wooden "window pane"-type braces are mounted directly above and below the flat-panel transducers in order to further improve mechanical coupling and structural rigidity in the critical transducer mounting areas. Enclosure-panel flexure can also be caused by internal pressure acting on the surface. To correct this, "window pane" braces and strategically placed side braces minimize any sonic contributions of the enclosure itself.

Cone Breakup Modes and Ceramic Metal Matrix Diaphragms (CMMD®)

Much of the history of high-fidelity audio has been an unflagging quest for the ideal diaphragm material, and Infinity engineers have often led the way. One recent Infinity success involves ceramics, a class of materials once thought too brittle for use in transducers.

While it seems obvious that a transducer diaphragm should be resonance-free within its operational range, the reality is that many loudspeakers violate this principle. The ideal diaphragm would operate as a perfect piston over its entire frequency range, meaning that all points on its surface would vibrate with the same velocity and phase. Most diaphragms operate this way – until they reach a frequency that causes the diaphragm material to bend, and then diametric and concentric resonances occur. This is called "breakup," because the velocity and phase of points on the diaphragm's surface are no longer uniform. In fact, many loudspeaker transducers exhibit diaphragm resonance or breakup within their operating range. This can manifest itself as audible discontinuities in the frequency response and directional characteristics of the loudspeaker.



Ideal loudspeaker diaphragm material needs to be very lightweight, while possessing very high stiffness. It should also be stable over a wide range of environmental conditions, such as temperature and humidity, and be relatively easy to manufacture consistently. Ceramics possess a good combination of low density, high stiffness and good environmental stability. However, pure ceramic diaphragms are brittle and tend to crack or shatter easily. Infinity engineers overcame this limitation by anodizing the outer surfaces of an aluminum diaphragm, essentially placing a ceramic skin on an aluminum substrate. This is the patented Infinity Ceramic Metal Matrix Diaphragm (CMMD) technology, and all Prelude Forty transducers use it. CMMD technology pushes the breakup mode of Prelude cones to frequencies well above the operating band of the drivers, ensuring pistonic operation over the driver's entire usable range. That completely eliminates audible coloration and dramatically reduces distortion.

For more information about Infinity CMMD cone technology, please refer to the CMMD white paper.

Serious listeners enter a Zen-like state of concentration, in which perfectly rendered musical details combine to create the illusion of a live performance. Even a momentary discontinuity can break the spell.

Violins to the left of you, cellos to the right of you, timpani and horns to the rear. The layout of a symphony orchestra should be as obvious from your sofa as from the best seat in your favorite concert hall.

Maximum Radiating Surface™ (MRS™) Transducer

The Prelude Forty system uses proprietary and patent-pending Maximum Radiating Surface (MRS) transducers to achieve high-performance mid-bass and midrange reproduction. The Infinity MRS transducer is an outgrowth of Infinity engineers' experience with planar magnetic transducer technology (flat diaphragms) and their expertise in conventional transducer motor topology (moving coils). MRS transducers have the advantages of each technology, with the negatives of neither. They retain the shallow profile of their planar magnetic counterparts, but with the high-excursion capability and efficiency of moving-coil designs.

The Infinity MRS transducer uses two very-large-diameter, oblong voice coils to uniformly energize a flat rectangular CMMD diaphragm. The design excels in high power handling with low power compression, which translates to exceptional dynamic range and SPL capability.

For more information about Infinity MRS transducers, please refer to the MRS white paper.

Contrary to popular belief, outstanding bass doesn't stand out. It doesn't crash, rattle or overwhelm. Rather, it surrounds you with tight, muscular sound that you feel, as well as hear.

Dual 8" Woofers

The low-frequency response of the Prelude Forty loudspeaker is generated by dual 8" woofers, which provide nearly the same volume displacement as a 12" woofer. But two transducers deliver better power handling and reduced thermal compression than a single woofer. Further, by mounting woofers on opposing sides of the enclosure, mechanical reaction forces are effectively canceled, reducing enclosure vibration. Any reduction of enclosure vibration, particularly along the axis of operation for the midrange and tweeter diaphragms, also reduces intermodulation distortion.

The low-frequency transducers used in the Prelude Forty system represent the state of the art in moving-coil loudspeaker design. In the heart of the motor are two high-energy neodymium magnets, coupled to a voice-coil-gap geometry that – together with the addition of an aluminum shorting ring placed inside the steel shield cup – provide a uniform, symmetrical magnetic field, even in the presence of high-current signals. The result is a significant decrease of flux modulation, which, in turn, reduces harmonic distortion.

Each motor features a 2" voice coil, edge-wound on high-temperature fiberglass for superior stiffness, temperature stability and reliability. This design allows improved transfer of coil heat to the steel around it, which helps to improve both power handling and dynamic compression. Venting through the motor's pole, along with small vent holes inside the steel shield cup, aids in removing trapped heat from within the motor structure, thus allowing high power handling. These vent holes also reduce air noise inside the voice coil and magnetic gap, further reducing third-order harmonic distortion at low frequencies.

Cast-aluminum frames provide superior rigidity and maintain precise alignment of transducer elements, without disturbing the magnetic flux. The spiders are constructed of a high-strength Nomex® blend material, with a geometry that has been optimized for increased linearity. This enhances the operational symmetry of the transducer's compliance curve and results in a reduction of second-order harmonic distortion at low frequencies. Locating the woofers low on the sides of the enclosure and in a back-to-back configuration delivers good room-coupling, as well as a means of reducing mechanical reaction forces from the woofer motors. Acoustic output from the two woofers is joined, essentially creating a bipole that is acoustically centered midway between the two woofers. The proximity of the woofers to the floor, as well as a 120Hz crossover frequency, ensures the smooth transmission of low-frequency output into the listening room.

Much like a gifted jazz ensemble, a loudspeaker system is a complex assemblage of specialized "players" that must work together to speak with a single, coherent voice.

Room-Friendly Design

A speaker company can design a loudspeaker that offers world-class performance in its own listening rooms, but this doesn't guarantee that the system will perform well in its customers' listening rooms.

When we listen to a speaker in a room, we are hearing three main components of sound. The first component is direct sound. Direct sounds from the loudspeaker are those that travel directly from the transducers to the listening position; thus, the first sounds to reach the listener are dominated by the on-axis response.

The second component comprises early reflections. The most significant reflected components are those reaching the listening position after a single reflection from a room boundary. These early reflections are measured at many – sometimes large – angles off axis.

The third component consists of reverberant sounds. Reverberant sounds are all of the sounds that arrive at a listener's ears after multiple reflections. The timbre of the reverberant sound field in a room correlates to the timbre of the sound-power curve of a loudspeaker. The sound-power of a loudspeaker is calculated by a weighted average of multiple measurements taken at points on the surface of a sphere surrounding the loudspeaker. The directivity index of a loudspeaker is the difference between the on-axis response (or "listening window") of the speaker and its sound-power.

The significance of the directivity index is that loudspeakers with a smooth directivity index allow greater flexibility in room placement without adversely affecting sonic quality. A smooth and nearly constant directivity index is an indicator that the off-axis sound of a loudspeaker has a similar timbre to the on-axis, or direct, sound.

The Infinity Prelude Forty speaker has been designed with particular attention to all three sound components to ensure that it will offer the highest possible performance in the listening rooms of audiophiles.

72 frequency response measurements are taken at different points around the loudspeaker, in one of four anechoic chambers. This allows for accurate analysis of a speaker's total performance before the listening tests even begin.

Controlled-Directivity Waveguide

The most common causes of directivity-index irregularities in a loudspeaker system are related to mismatches in the directivities of multiple transducers operating throughout a crossover frequency region. All real-world transducers exhibit frequency-dependent directional characteristics – more commonly referred to as "directivity effects." Among the factors that influence this are the physical size and shape of the radiating diaphragm. In general, a transducer with a smaller diaphragm will offer a wider dispersion pattern than a transducer with a larger diaphragm at the same frequency. The perception of a loudspeaker's sonic quality is related to both the timbre of direct, or on-axis, sound, as well as the timbre of the reverberant sound field. Response discrepancies between the on-axis and the reverberant field will degrade the listening experience. Because the reverberant sound field is mostly made up of off-axis response, it is apparent that the directional characteristics of a loudspeaker system are indeed crucial to the design of a high-quality loudspeaker system. Usually, the acoustic transition between the midrange and tweeter offers the largest source of variance in the system's directivity index. This is due to the inherent directivity mismatch between the midrange driver and the tweeter (or the woofer-to-tweeter transition in a two-way design). This can cause a loudspeaker to sound bright at times, and dull at others, depending on the frequency content of the program material and the acoustics of the listening room. To mitigate these effects, the Prelude Forty system utilizes a precision-cast, aluminum elliptical waveguide to help match the directivity of the tweeter to the upper two MRS transducers in the upper midrange frequency of the crossover. This waveguide exhibits 6dB of gain in the lower frequency region of the tweeter's operation. This allows the tweeter to operate at a much lower level, reducing excursion, coil heating and distortion.

People often use adjectives like "ethereal" or "crystalline" to describe their perception of clean, undistorted high-frequency sound. And the emotional response is often uplifting.

Audio reproduction can be measured scientifically. The performance of loudspeaker systems can be quantified and compared. But only the human ear can determine when true musical realism has been achieved.

Crossover Network

The design of the Prelude Forty crossover network is a balance of many factors, the most important being real-world listening tests. As a starting point, the basics of network design – maximizing power handling and minimizing distortion – were combined with consideration of the directional patterns of the transducers.

Through performance comparisons using various network prototypes, a three-and-a-half-way crossover design was chosen to provide the smoothest system response. The two 8" woofers operate below 120Hz. Above 120Hz, output transitions to all four MRS transducers, allowing the woofers to provide a solid low-frequency foundation for the system and relieving the MRS drivers from the need to reproduce high-excursion low-frequency signals. That improves the performance of the MRS transducers by further reducing power compression, as well as harmonic and intermodulation distortion throughout the upper-bass and midrange regions.

The system frequency response gradually transitions from the four MRS transducers operating above 120Hz to just the upper two operating above 400Hz. The benefits of tapering the frequency response of the lower two MRS transducers are considerable. The lower MRS transducers add foundation in the upper bass region, allowing higher acoustic output with reduced distortion. The tapering also reduces system response aberrations in the vertical plane throughout the midrange region.

The two top MRS drivers – one above and one below the tweeter – operate from 120Hz to 2kHz, forming a mid/tweeter/mid configuration with the tweeter. This forces the major lobe of the vertical polar pattern to be directly on the tweeter axis, resulting in very smooth integration of the soundstage and imaging throughout the listening room.

The Prelude Forty crossover network uses high-order acoustic slopes to minimize distortion and lobing effects and to maximize power handling. The physical construction of the network features high-quality components which are also mechanically secured to the circuit board to prevent buzzing and rattling problems. Low-inductance resistors, polypropylene capacitors and laminated-steel inductors are used within the critical signal path. Internal cabling uses 16 AWG oxygen-free copper wires to further enhance the signal path by minimizing signal loss.

The network is distributed among three high-quality printed circuit boards. One is used for the woofer section of the network and is located on the inside bottom of the enclosure. The second is for the upper-bass MRS transducers and is mounted to the outside rear of the lower-bass/midrange cup. The third network circuit board is mounted to the outside rear of the midrange cup, beneath the tweeter. This section of the network serves the bass/midrange MRS drivers, as well as the tweeter.

Network design for the Infinity Prelude Forty speaker was first carried out using numerical optimization software, operating on measured response data. The optimized results were prototyped, measured to verify performance, then submitted to the proprietary Multichannel Listening Lab for head-to-head listening tests against competitors' models. Infinity engineers also conducted numerous exhaustive and traditional listening evaluations. In the end, human listening tests proved that the Prelude Forty system was ready to proudly wear the Infinity name.

The Input Connections

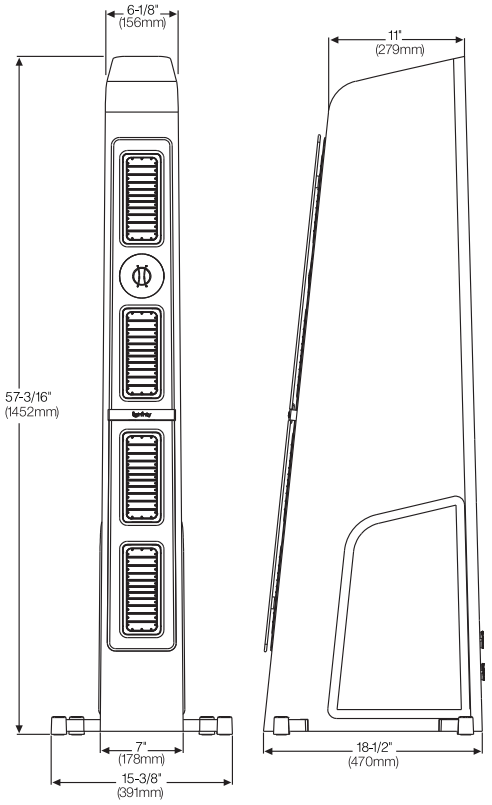
The input connection to the Prelude Forty crossover network is made using two sets of heavy-duty binding posts, mounted on a cast-aluminum input cup that is located on the lower rear of the enclosure. The two sets of input binding posts allow the flexibility of bi-wiring the high-frequency and low-frequency sections of the system. For standard connections, multistranded shorting wires with gold-plated spade plugs (included) are mounted between the two sets of binding posts.

Specifications

Frequency Response:	42Hz – 40kHz (±3dB) 36kHz (–6dB)
Recommended Amplifier Power Range:	50 – 250 Watts
Sensitivity:	85dB (2.83V @ 1 meter)
Nominal Impedance:	8 Ohms
Low-Frequency Drivers:	Dual 8" (200mm) CMMD,® cast-frame, magnetically shielded
Mid-Bass Drivers:	Dual MRS™ 7-3/4" x 3-3/8" (197mm x 85mm) CMMD,® magnetically shielded
Midrange Drivers:	Dual MRS™ 7-3/4" x 3-3/8" (197mm x 85mm) CMMD,® magnetically shielded
High-Frequency Driver:	1" (25mm) CMMD,® magnetically shielded
Weight:	82 lb (37.3kg)

Crossover Frequencies		
Driver	**Crossover Frequency**	**Slope**
8" Woofers	120Hz Low-Pass	12dB/octave
Top Two MRS™ Drivers	120Hz High-Pass 2kHz Low-Pass	24dB/octave 24dB/octave
Lower Two MRS™ Drivers	120Hz High-Pass 350Hz Low-Pass	24dB/octave 12dB/octave
1" HF Driver	2kHz High-Pass	24dB/octave

Dimensions:



Available in

Real-Wood Cherry Veneer

Real-Wood Rosewood Veneer

High-Gloss Black

Infinity®

Technology • Performance • Design

Designed, edited and digitally produced by the Harman Consumer Group Marketing & Design Center, Woodbury, NY
250 Crossways Park Drive, Woodbury, NY 11797 USA • 516.674.4INF • www.infinitysystems.com

Printed 8/08 Part No. PRELUDE40LIT8/08

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