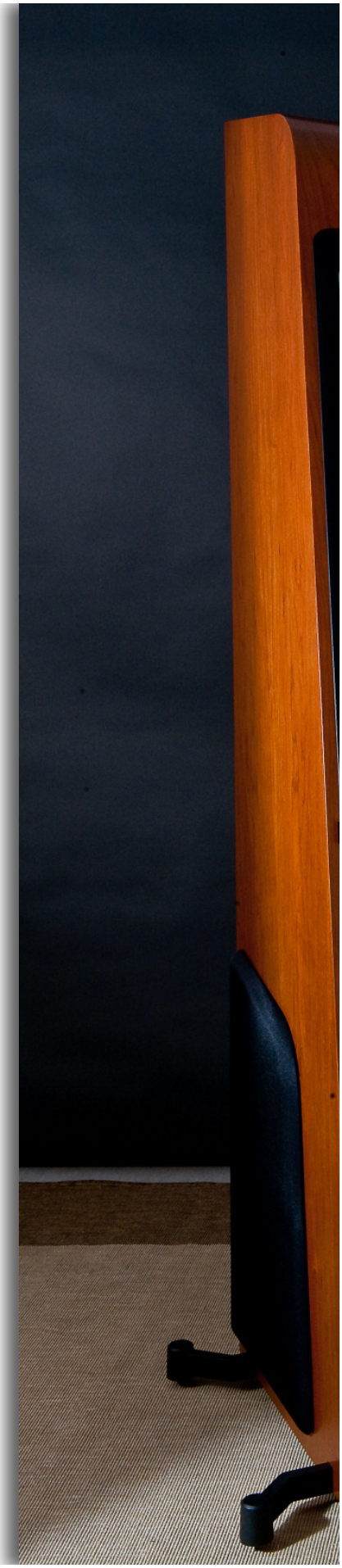
INFINITY PRELUDE FORTY
TECHNICAL ANALYSIS

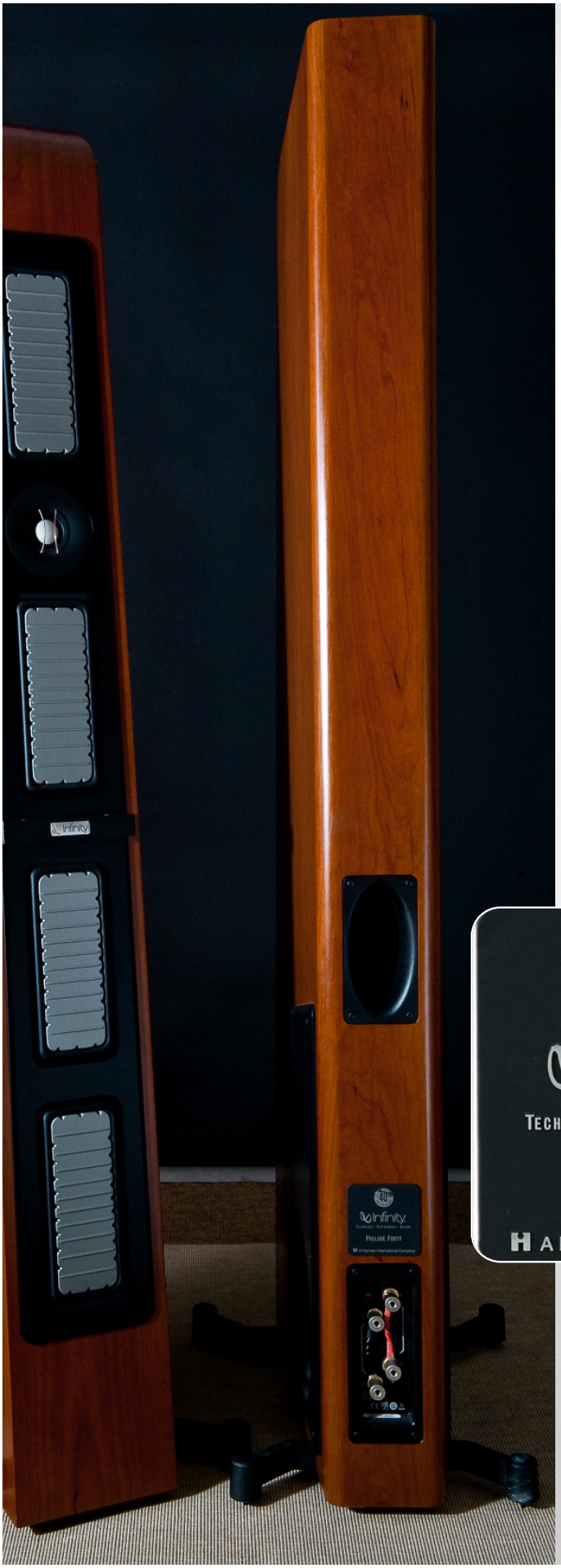
by **GIULIANO NICOLETTI**

The Infinity Prelude Forty speakers are impressive four-way floor standing speakers, encompassing in a slender and well finished unit several first-rate technical solutions; featuring particularly unconventional choices and new technologies of sound transduction, they represent today the apex of the potential of one of the leading producers for audio playback devices. So it was with great pleasure that I accepted the task of analyzing their technical characteristics and design choices.

The peculiarities of these speakers are already evident at first glance: the front panel is in fact almost entirely occupied by the four, flat membrane transducers, which the manufacturer calls the MRS (Maximum radiating Surface) flat-panel transducer. Recalling the traditions of the legendary EMI (Electro Magnetic Induction) transducer technology, which made some of Infinity's most popular creations truly unique, the designers have developed a new configuration of the entire transducer, to maintain the virtues of the old Emit and Emim components and obtain superior performances in terms of dynamics, bandwidth and acoustic pressure.

The lower range is entrusted to a pair of woofers of 8" in diameter, configured in reflex load with the tuning port open on the back panel, while the high range uses the services of a one-inch dome tweeter. The membranes of the three components are made of a specially developed material called CMMD (Ceramic Metal Matrix Diaphragm), a composite made by depositing, via anodizing, a thin film of ceramic on the body of the membrane, made of aluminum.



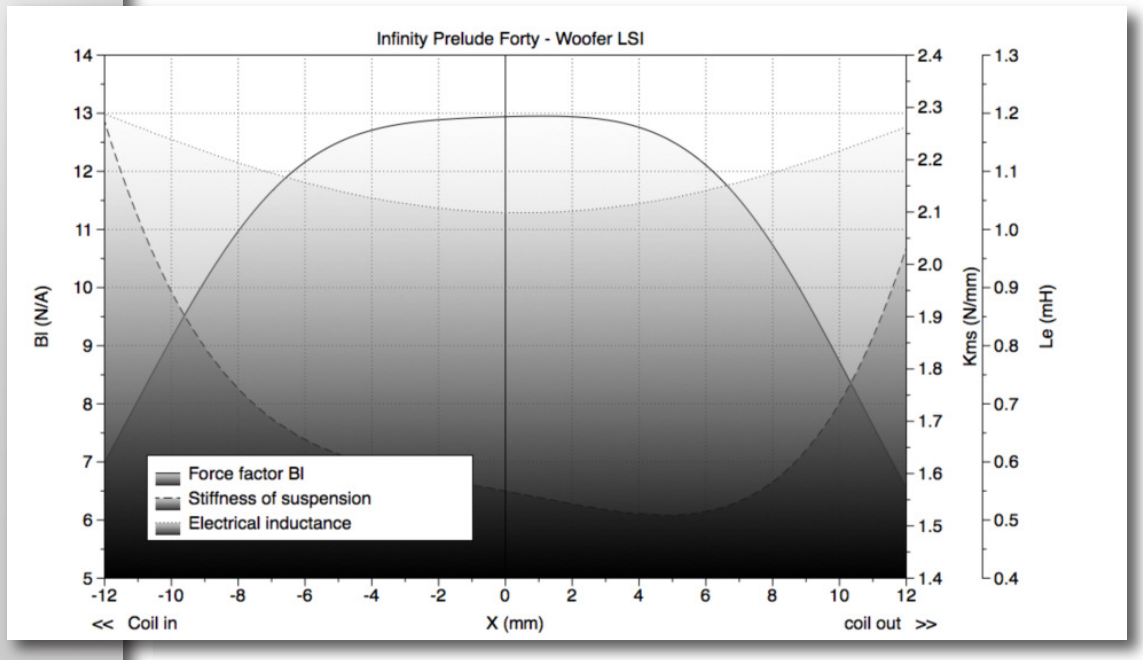


A full-on "white paper" produced by the manufacturer describes all the most important features of these exceptional speakers in detail, so I' d advise anyone who may just be intrigued by these beautiful acoustic towers to have a read of it, leaving me to get straight to the analysis.

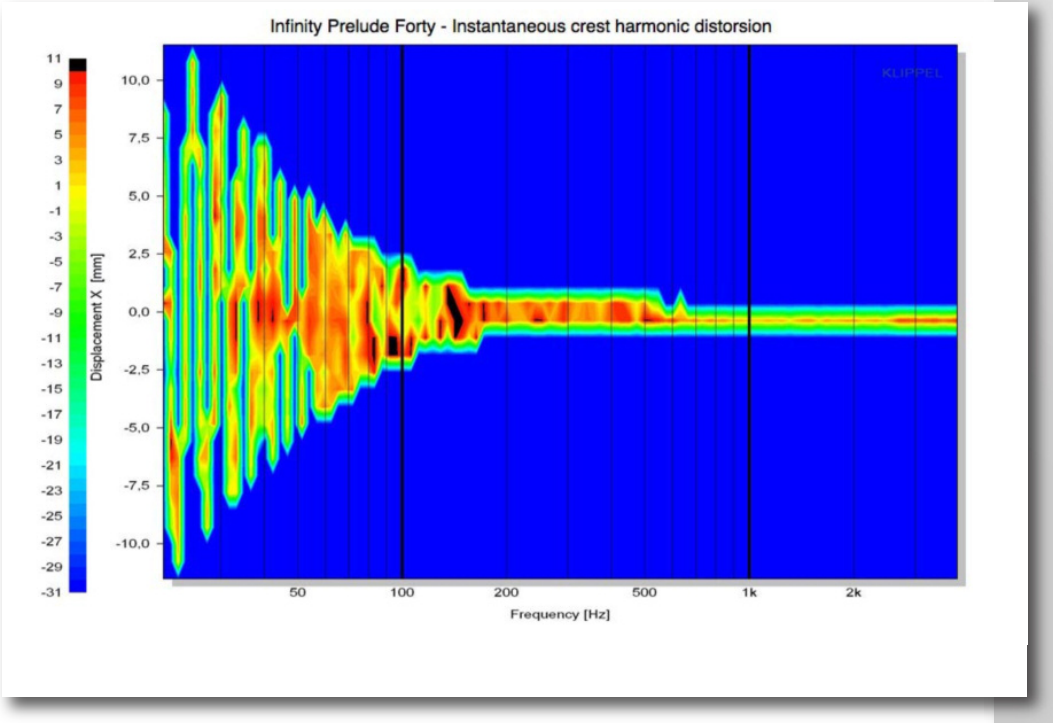
First of all, there' s an exceptional attention to detail: the five front speakers are lined up along the front through a pair of tapered panels in ABS, the block that houses the terminal is made of aluminum die-casting, just as is the outer part of the tuning port. The finish of the woodwork is excellent, and the under feet which broaden at the sides of the speakers to ensure stability have a pleasant design and finish, completing the overall elegant and discreet look.

Proceeding with the analysis of the speaker, first we come across one of the first two lower woofers, which make up the lower section of the system. This is a nice component with a neodymium magnet, die-cast basket and diaphragm in CMMD. The design of the spider is progressive, the upper suspension in butylic rubber.

The results of linearity tests performed by the Klippel DA (Distortion Analyzer) are excellent: I have to say that this is one of the most linear components ever tested in recent years, with well-centered parameters for use in reflex load and a refined design of the whole motor group.



As we can see from the analysis of lLSI (Large Signal Identification), the shiftment of the Bxl factor and the inductance of the coil is entirely symmetrical up to excursions above the 10 mm peak to peak, yielding a suspension which is still well balanced. This graphic demonstrates extremely careful design in terms of the magnet group, within which there are certainly devices for the linearization of the inductance, along with a careful attention to the interaction between the magnetic pole and the moving coil, and excellent precision during assembly. Wonderful.



The measure of the instantaneous harmonic distortion also displays simply outstanding behavior: 15 V rms for the sinusoidal sweep does not generate a single millimeter of offset on the moving assembly, with very low distortion and no sign of compression at maximum excursions, for a pattern very close to the theoretical ideal. The woofers have a decidedly custom continuous resistance, of around 10 Ohm, and are connected in parallel to the crossover filter, to obtain a total load simply drivable from the amplifier and a good level of Spl. The position of the two components is very close to the floor, which allows for a quite efficient loading effect of the low frequencies in the environment, and excellent performance in terms of maximum acoustic pressure and reduced distortion.

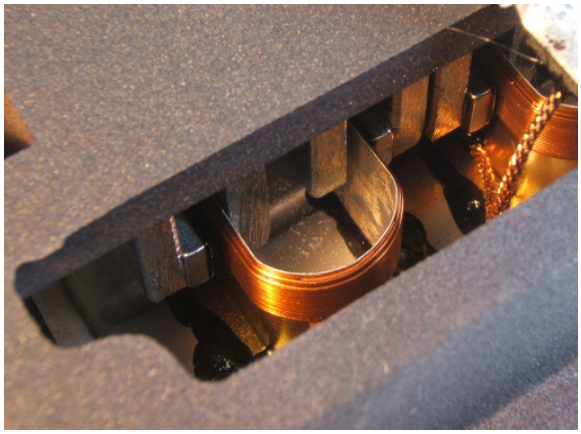
The midranges are all mounted in an under-ca-

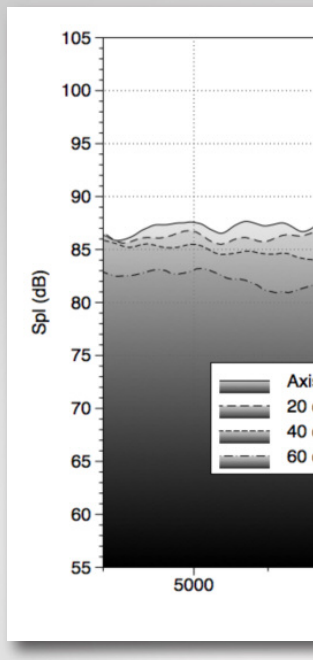
binet made of ABS, equipped with raised bands to minimize the resonances of the walls and completely filled with sound-absorbing acrylic. These boxes allow for the efficient installation of the four midrange in the main working volume, dedicated to the two woofers, effectively optimizing the separation of the load volumes for individual routes. The four midranges are all identical, but are filtered differently by the elaborate crossover distributed inside the cabinet of the speaker: the lower two components are coupled to a very narrow bandpass that limits the emission around 200 Hz, while the upper two continue until the crossover region with the tweeter, in a symmetrical configuration MTM (midrange-tweeter-midrange).

These midranges are without doubt the most inte-

resting part of the Prelude Forty: the membrane is made in the same sandwich of aluminum and ceramic, with a rectangular shape that optimizes the surface emission in ratio with the encumbrance and the raised bands laterally derived from the mold, which control the main break-up modes. The basket of the speaker is made with a die-cast aluminum alloy, within which are positioned the two elliptically shaped coils and their relative motor groups, made of soft iron rods and powerful neodymium. The only suspension that controls the movement of the moving element is the external one, made from butylic rubber, while on the back of the component the terminals of the two coils are arranged, also connected in series. In the details, shot at close range, one can observe the interesting geometry of the motor group and the coils: it looks like the coils are firstly wound in a circular form, before a special tooling process forms them in the final geometry.

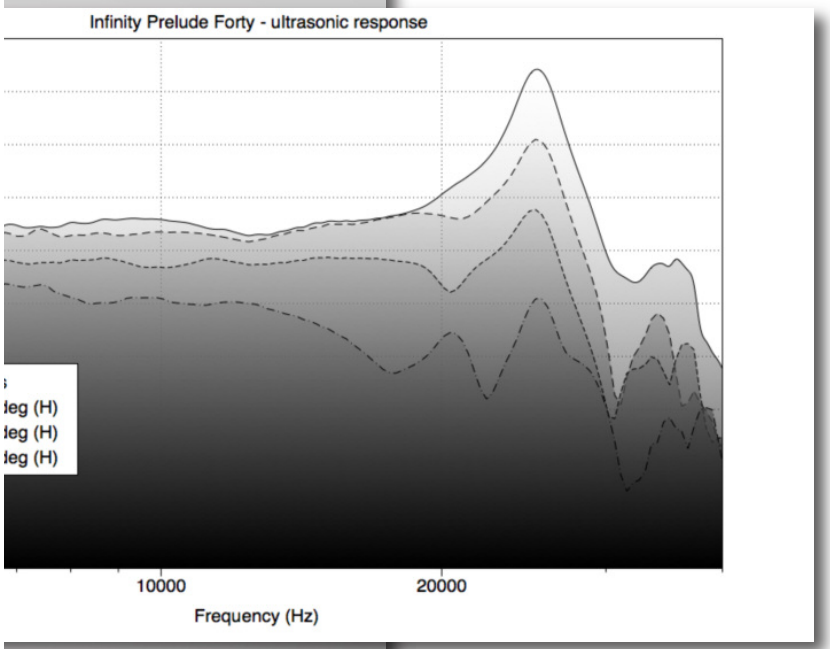
The air gap created by the motor is pretty tight, and the parameters measured confirmed the very good value of Bxl product, even considering the resistance higher than usual. The Klippel LSI measurements show a good linearity for excursions limited to about 5 mm peak-



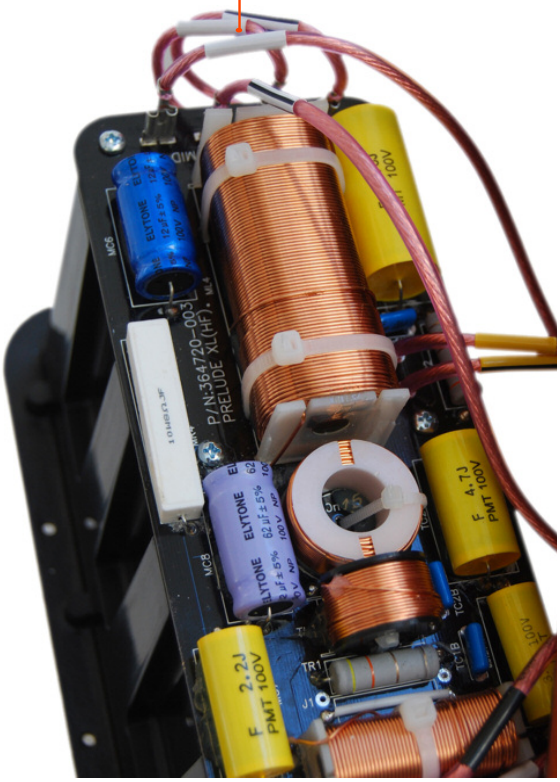


peak, but obviously the only external surround is unable to properly control the excursion of the moving assembly. The changement of the inductive component of the moving coil shows a substantial modulation in the value of Le (which has also a quite high module), which makes the speaker less suitable for use as a fullrange driver. Some small resonances of the membrane and the outer suspension, centered around the 800 Hz are clearly visible in the impedance module and could somehow characterize the acoustic emission of these components.

The last of the speakers to pass under scrutiny is the small and graceful tweeter: the flange is made from die-cast, with two small and transparent protecting ribs in steel. The component once again uses extremely rigid CMMD in the manufacture of the dome, with a magnetic group made from neodymium and employing the services of a small, rear decompression chamber, to extend the response to the lower frequencies and damp the high pass of the transfer function. The response in the ultrasonic range shows a pressure peak located around 28 kHz, well outside the audio range, but fairly persistent even at more angled measurements.



The crossover network, decidedly complex and impressive in its construction, is positioned on different PCBs scattered around the speaker: the woofer section is at-

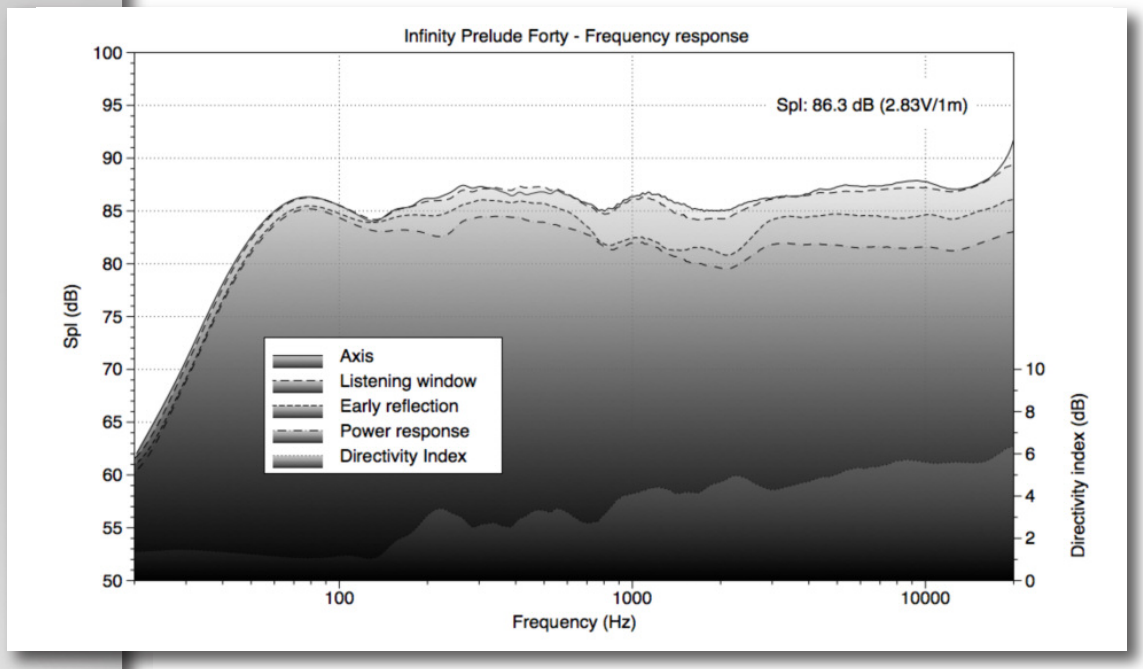


A SECTION OF THE CROSSOVER FILTER

tached to the base, while the other two panels are screwed onto at the rear of the two midrange boxes which are dedicated to the remaining routes: the components are of excellent quality once again, the layout is nice and well engineered, the wiring has been done with care and is always attached to the sides with screwed clips, to avoid the risk of any spurious vibrations. Everything has been carried out with the utmost attention, quality and care that only a large company can afford to take: the Infinity Prelude Forty is fully assembled in the United States with very strict quality control procedures, needed to produce this series (albeit limited) of such demanding and complex speakers.

The measurement of the transfer function of the Prelude Forty is very smooth both in the axis measurement and in the average of the listening window. The average of the early reflections also shows a good performance throughout the mid-high range, which holds perfectly at greater angulation but shows a quite evident deep in the crossover region, between the woofers and midranges; the MTM configuration of the midranges and the tweeter is

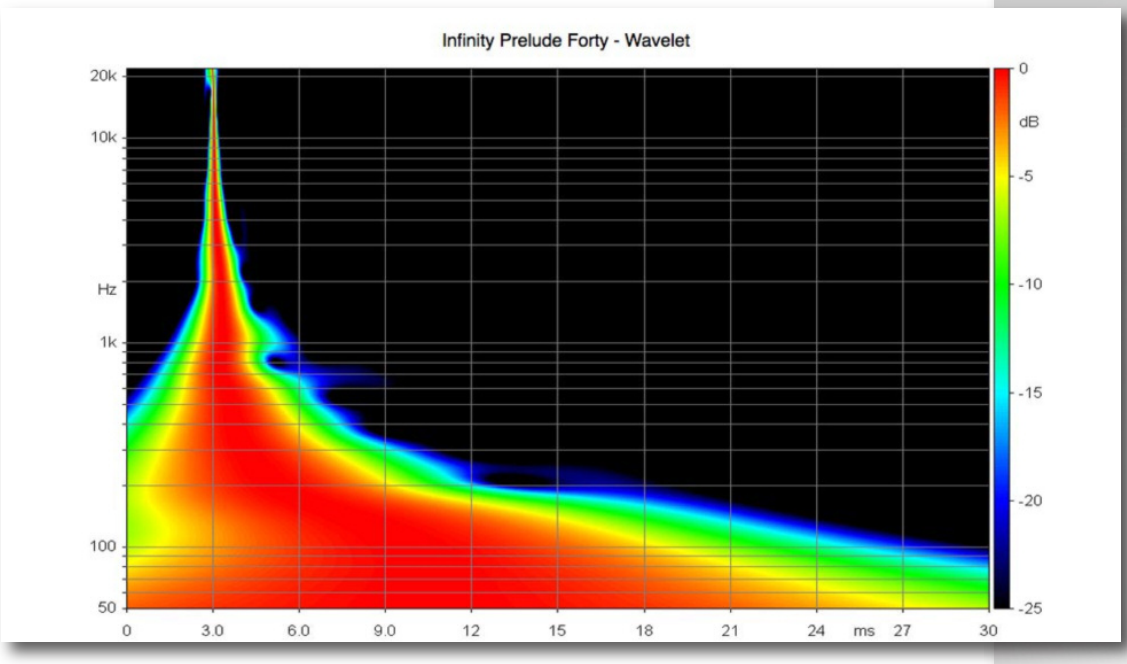
responsible for the depression located between 800 and 2000 Hz, due to the typical directivity in the vertical plane that goes with it, and must therefore be interpreted as a clear choice in the design, probably directed towards the optimization of the vertical plane in the composition of the acoustic image. The power response in fact shows a remarkable balance, with a partial compensation of both

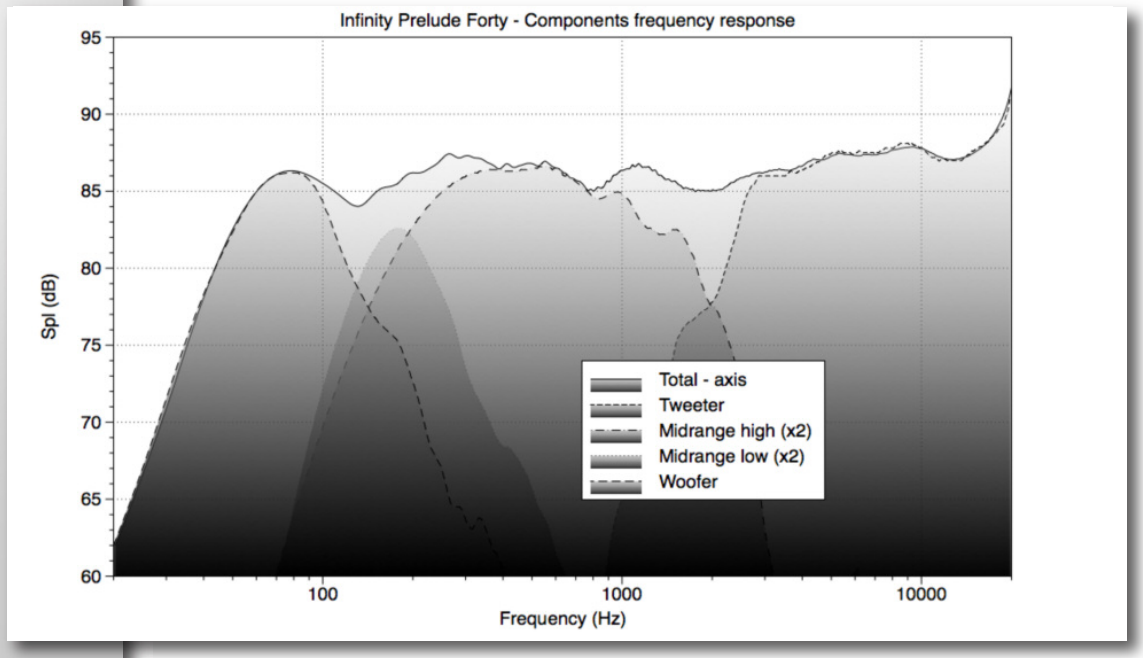


characterizations just described, and a very smooth directivity index, which only reaches 6 dB at 20,000 Hz.

I have not yet been able to hear these speakers, but I imagine that their characteristic tonal balance has been set to obtaining the maximum linearity of emission, an analytical and sincere sound. In listening tests Bebo Moroni has the last word. It' s worth mentioning their rather low sensitivity value, especially given the size of the speakers: watch out for their interfacing with the amp, especially if used in large environments, where the Prelude Forty certainly looks at ease.

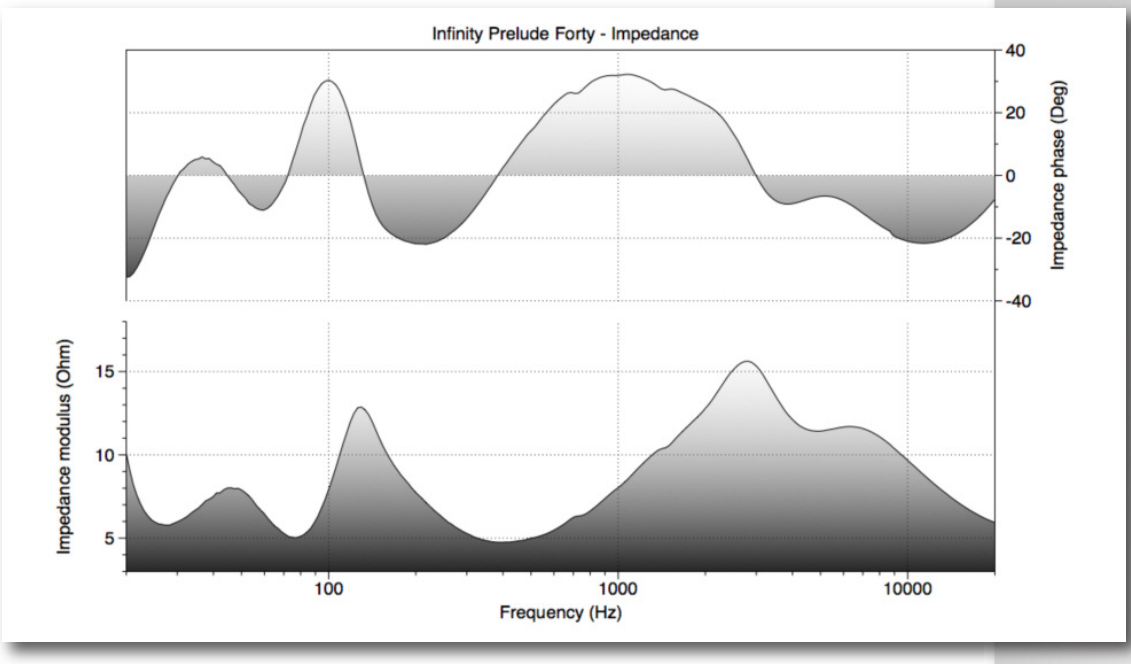
The Wavelet gives further confirmation of the strictness and characteristic determination of the Prelude Forty: the decay is fast and clean, with the exception of small resonances in the midrange, due to the modes of vibration of the midrange membranes and a slight uncertainty in the vicinity of 200 Hz, probably due to resonance components inside the cabinet.





The response of the single speakers clearly shows us the choices made in the design of the system: the small attenuation immediately above 100 Hz is due to the widening of the crossover region between woofer and the midbass section: doubtlessly it has to be assessed in view of its interaction with the room, and characterizes the operating range of the woofers in much the same way as would an external subwoofer. The two lower woofers are thus used as energy filler in this very sensitive range of frequencies, and in fact their acoustic phasing has been optimized for maximum uniformity of emission with the upper midrange. The crossover frequency between midrange and tweeter is quite low, at around 2000 Hz, but the steep slope of attenuation makes the work of the robust tweeter less stressing, and characterizes the vertical emission lobe, as just noted on the graphic of the transfer function of the complete system.

The impedance graphic shows a sufficiently linear load, and straightforward to drive: the minimum impedance is reached around 400 Hz, with a module of about 4.75 ohms, and a rising phase towards positive values. In any case, the amplifier used with the Prelude Forty still requires a consistent power output, due to the low sensitivity, but the stability of the load shouldn't constitute a real problem.




40TH ANNIVERSARY
Infinity
TECHNOLOGY • PERFORMANCE • DESIGN
PRELUDE FORTY
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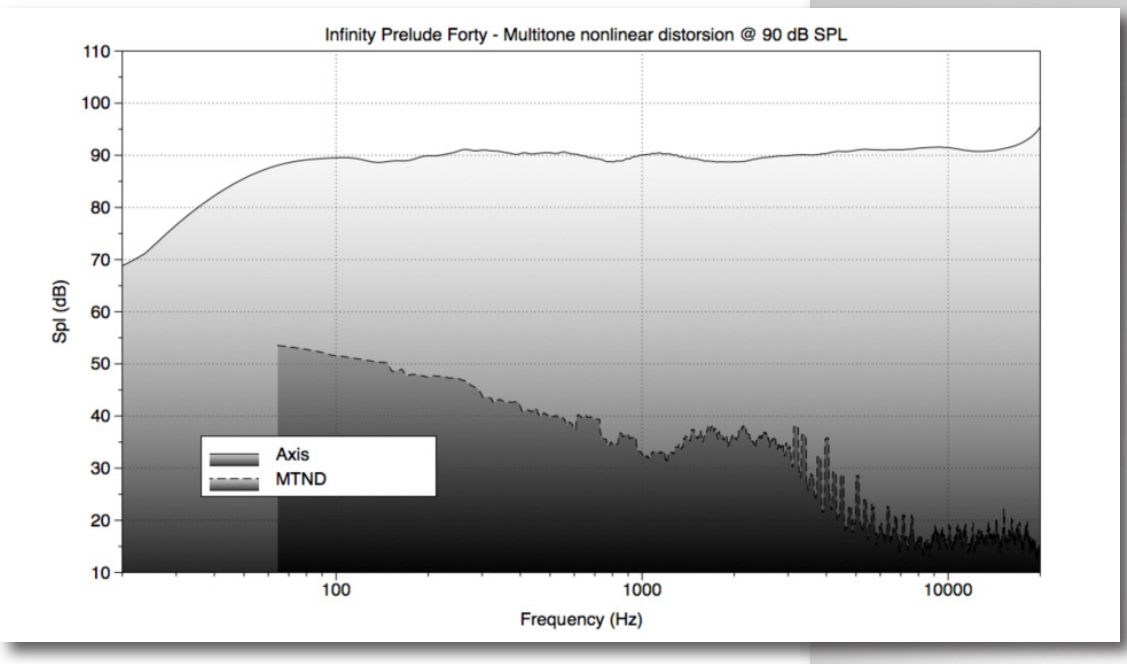
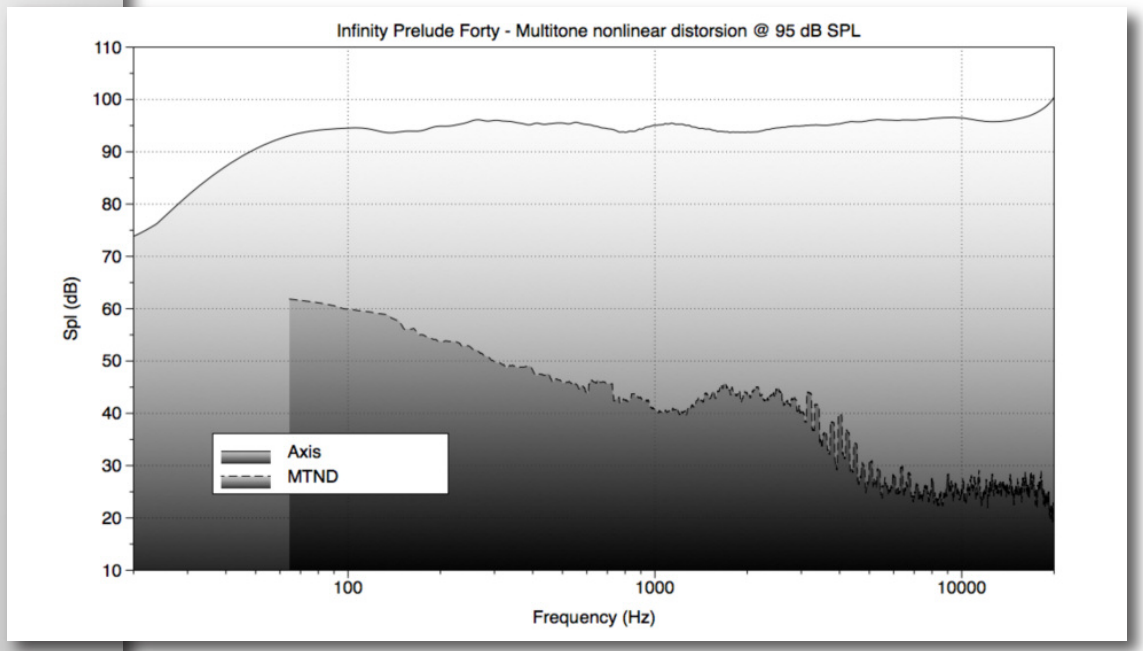
The results from the analysis of multitone distortion are excellent; the two woofers show an absolutely outstanding dynamic capability, confirming the analysis carried out on the individual components: the signal-distortion ratio remains constant right through until 100 dB, with an excellent value in the low range of almost 30 dB. Throughout the midrange it stays at very low values, with a dynamic above 40 dB and a small concentration of intermodulation around 2 kHz, probably linked to the inductance modulation of the voice coil of the two midranges and to the small resonances of their membranes. The tweeter on the other hand does not yield a single dB and remains on thresholds very close to the background noise, about 70 dB below the signal level. The Infinity Prelude Forty demonstrates a first class dynamic, and I am sure that listening experience will reflect those values ■




Infinity Prelude Forty - Multitone nonlinear distorsion @ 95 dB SPL
Spl (dB)
110
100
90
80
70
60
50
40
30
20
10
100
1000
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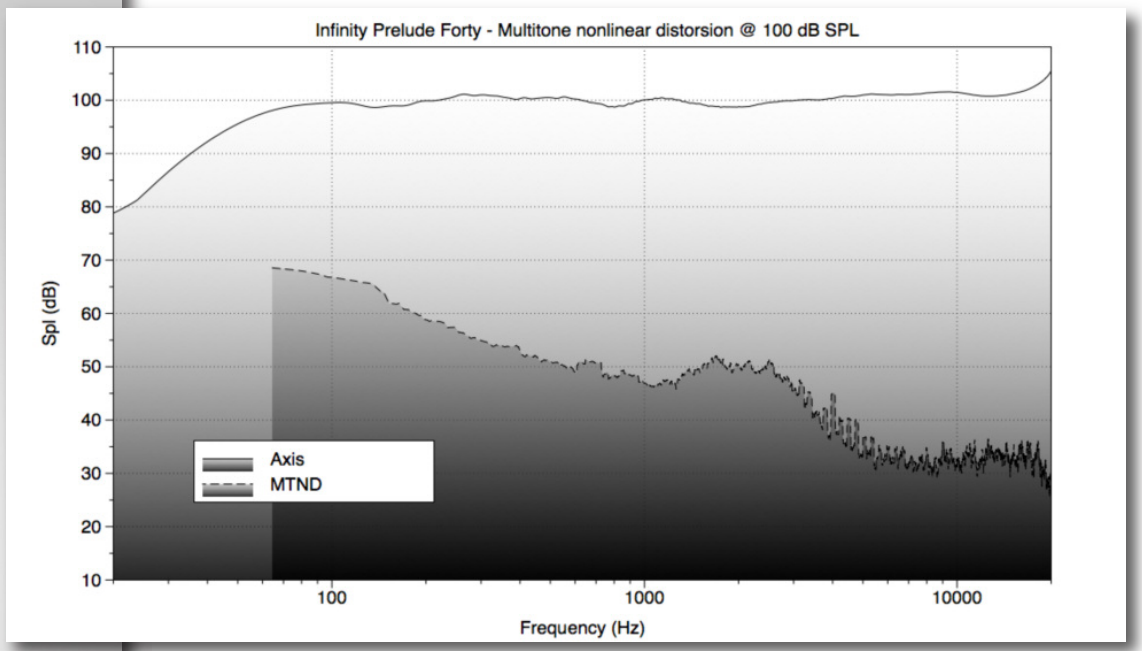
Frequency (Hz)
Axis
MTND


Infinity Prelude Forty - Multitone nonlinear distorsion @ 100 dB SPL
Spl (dB)
110
100
90
80
70
60
50
40
30
20
10
100
1000
10000
Frequency (Hz)
Axis
MTND