

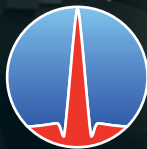
HANIWA

Accurate Wave Form

HANIWA Speaker Systems

True, vivid audio as you've never experienced it.

HANIWA speakers fundamentally redefine audio reproduction with the Cybernetic Control Loop -- the world's first closed-loop phase shift control system.



FPIC

Frequency & Phase Independent Control



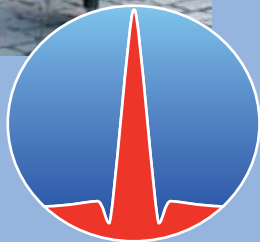
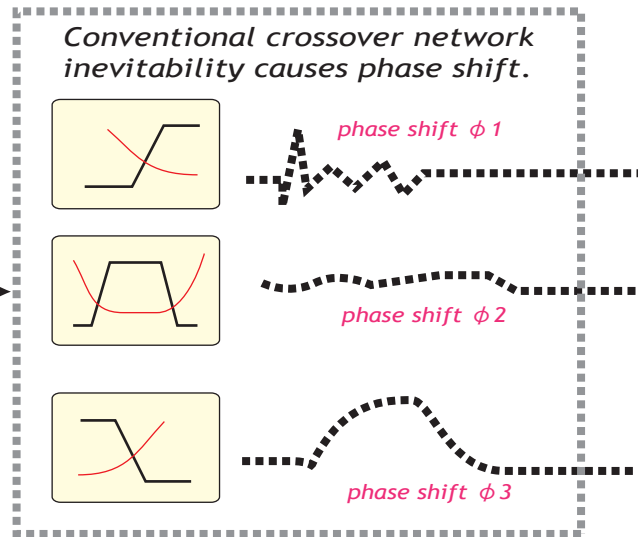
KUBOTEK

Fact: If the Wave Form Is Wrong

It's simple. Conventional crossover networks can distort the wave form, causing phase shift. If the waveform is wrong, then the sound is going to be wrong.

The striking of a drumhead. The scraping of a violin bow across a string. The hammering of piano keys. True sound is most vividly and accurately experienced by the sharp impact of sound at its source.

If sound is robbed of its vivid impact it becomes deadened and dull. How can this be avoided? By preserving and reproducing the original impact portion of the sound, from the deepest bass to the highest harmonics, through the elimination of phase shift.



Independent Freq & Phase Control + Delay Control

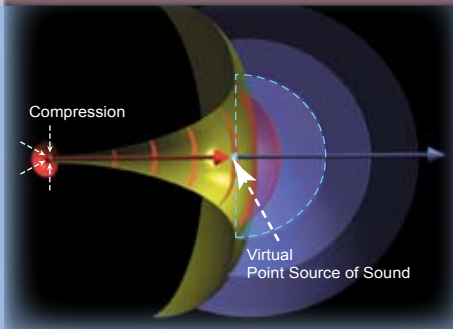
FPIC-100

Perfectly compensates frequency and phase characteristics of the speaker system.



Cybernetic

Tractrix Horn creates a Virtual Point Source of Sound.



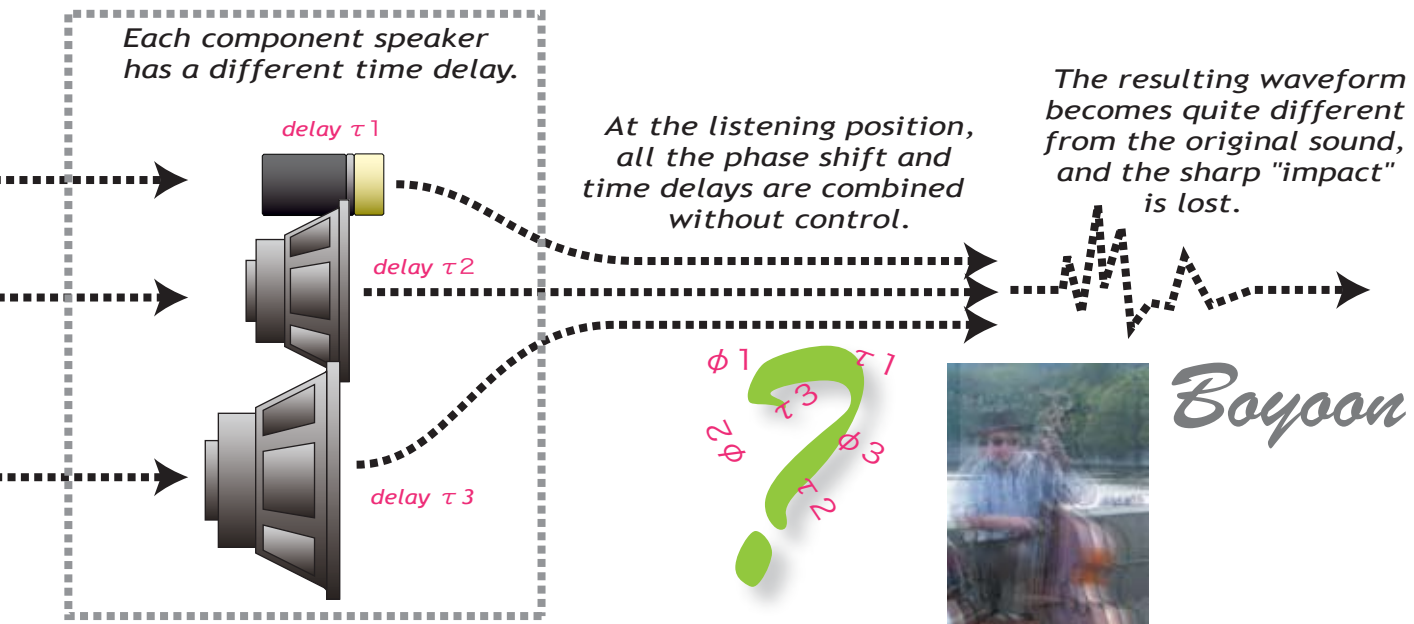
The heart of the unique HANIWA speaker system is our own proprietary version of the classic Tractrix horn shape. Unlike conventional diaphragm-type speakers, horn speakers use compression drivers to reproduce and focus the sound to create increased sound level pressure – ideal for reproducing the sharp transient wave form which defines the tone of musical instruments and other sound sources.

HANIWA speakers feature a spherical horn evolved from the original Tractrix horn design to include a smoothly rolled horn mouth edge, ideal for releasing the mid-low frequency and eliminating the unnatural deflection of sound found in traditional horn designs that create audio image "ghosting". With Tractrix horns, a virtual point source

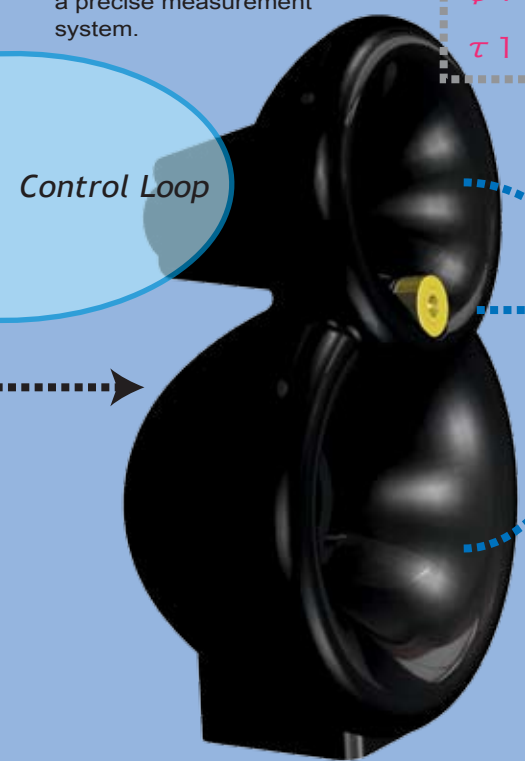
of sound is formed at the center of the horn mouth, linearly aligned between the woofer and the tweeter. This source alignment results in a clear, horizontal definition of sound.

Because all HANIWA speakers use horns, they are remarkably efficient, reproducing sounds with a small stroke that can be driven by low voltage. The result is astonishingly accurate sound reproduction at all volume levels with dramatically reduced distortion.

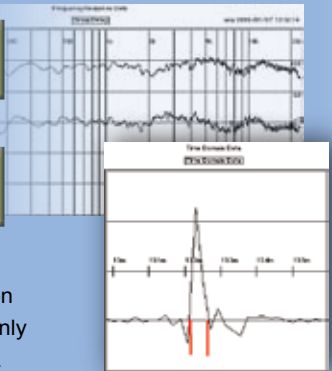
..... the Sound Is Wrong.



Characteristics of speaker units are gathered by using a precise measurement system.



Full Flat Freq/Phase Curve in the Frequency Domain means The Cleanest Impulse Response in the Time Domain.



The 250Hz-15KHz frequency range is critical for reproduction of subtle musical nuances. However, many horn speakers only cover 700Hz and higher to avoid an undesirable phase shift.

To cover this crucial frequency range, HANIWA speakers feature a mid-range horn with correct phase shift compensation and a flat frequency curve. The result is a correct wave form reproducing the clean, sharp impact of the original sound for a fuller, richer, more realistic sound.

HANIWA Speaker System

HANIWA

CYBERNETICS TECHNOLOGY



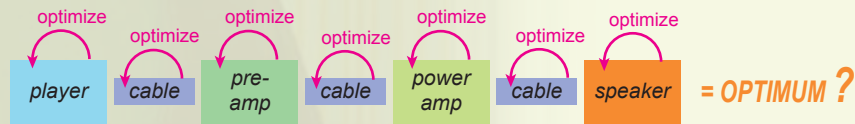
The unique HANIWA system was developed by Dr. Kubo, president of Kubotek, who has dedicated himself to designing the ultimate speaker system to reproduce the true vividness of music with unparalleled accuracy.

At the heart of Dr. Kubo's HANIWA Cybernetic Audio System is something called Cybernetics Technology, which consists of four basic technical components: Machine, Control, Measurement, and Network.

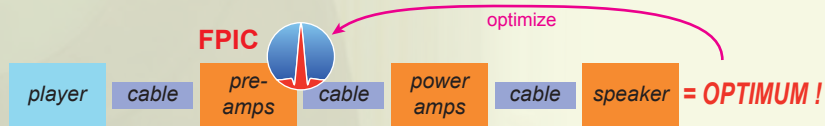
Cybernetics Technology integrates a new all-digital musical signal processing unit and a unique new horn speaker cabinet concept with a revolutionary audio reproduction theory and methodology. This creates a speaker system that achieves previously unobtainable levels of vivid, realistic music reproduction. So different is this technology that we've named the system and concept the Cybernetic Audio System.

Most conventional, component-based speaker systems consist of various disparate elements that, while perhaps high quality, are developed and manufactured separately without the total optimization necessary for the most accurate, vivid sound. The Cybernetic Audio System, on the other hand, uses a closed-loop feedback system to compensate for phase shift to optimize the sound. The result is total optimization of all components for the most efficient, natural sound reproduction possible.

Component-Based Audio System



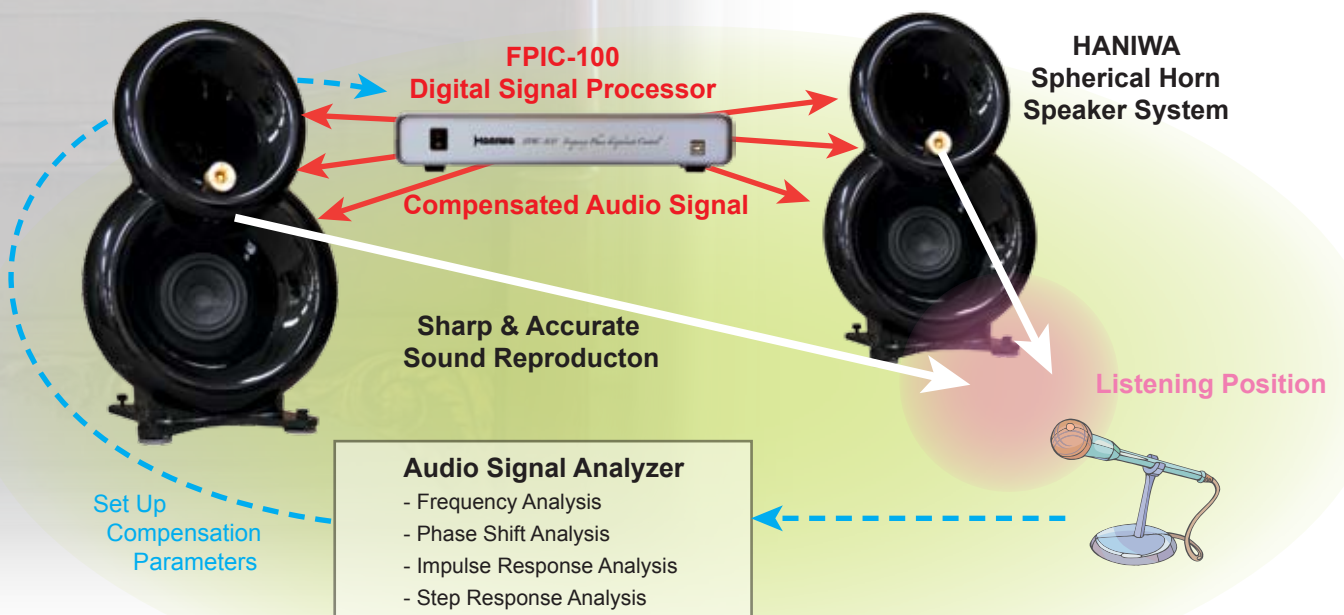
Cybernetic Audio System



<<<<<<>>>>

THE CYBERNETIC AUDIO CONCEPT

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FPIC *Frequency & Phase Independent Control*

Cybernetic Audio System technology employs a unique closed loop feedback system to custom-tailor your listening experience. A microphone captures the speaker output in your listening area, feeding it into our FPIC-100 Digital Signal Processor which uses that data to custom adjust the output and correct phase shift before amplification to optimally condition the speaker output for your listening situation. The result is the vivid reproduction of every note for a natural, room-filling sound.

Natural Performance of Tractrix Horn

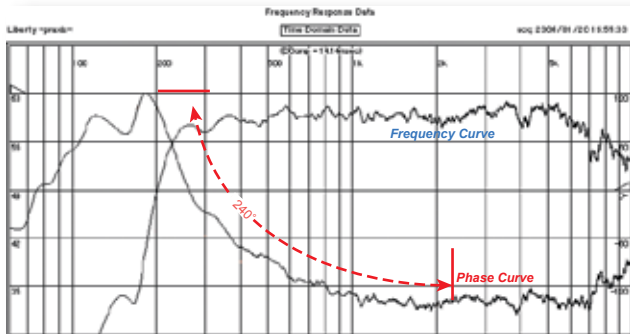


Fig.1 Frequency and Phase Curves of Tractrix Horn Squawker

The frequency curve is kept flat down to the cut-off of 300Hz. But the phase curve rises up to 240°, from 2kHz down through 200Hz.

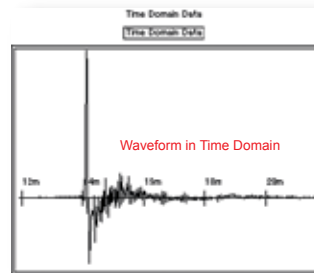


Fig.2 Impulse Response of Fig.1.

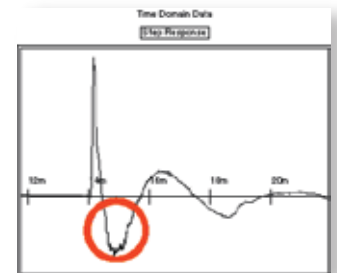


Fig.3 Step Response of Fig.1.

The Phase Lag in Low Frequency Is Causing Distortion of Waveform.

Signal Compensation by FPIC

Fig.4 Compensation by FPIC

With conventional low-cut networks, the phase lag toward cross over is unavoidable. On the other hand, FPIC can advance the phase angle toward the low-cut frequency. FPIC can compensate both frequency and phase characteristics, simultaneously and independently. By advancing the phase from 2kHz to the low-cut cross over point, the natural phase lag of the horn speaker can be precisely compensated for.

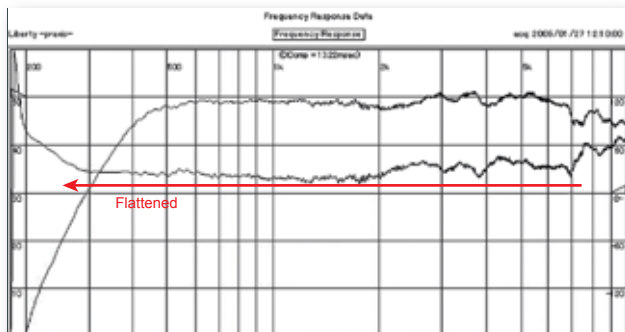
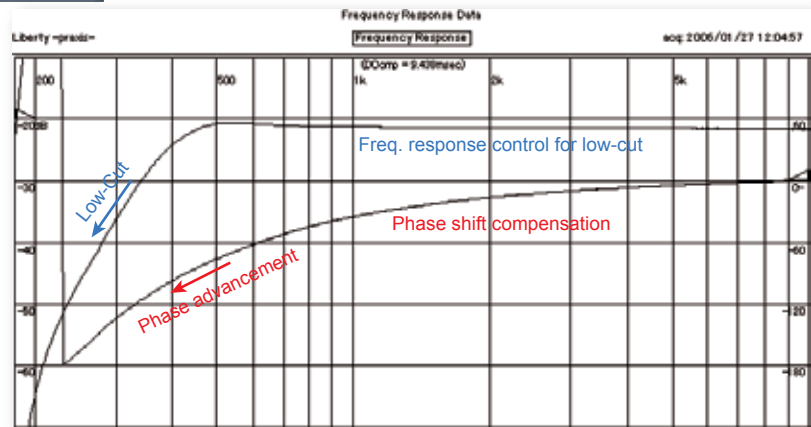


Fig.5 Horn Performance with Fig.4 Compensation

The frequency response and phase characteristics are both improved simultaneously. Phase curve becomes flat toward 250Hz as specified.

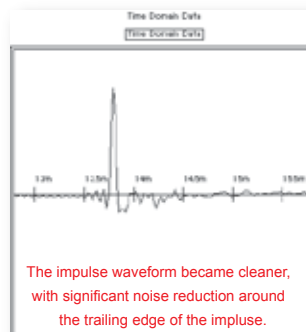


Fig.6 Impulse Response of Fig. 5

The impulse waveform became cleaner, with significant noise reduction around the trailing edge of the impulse.

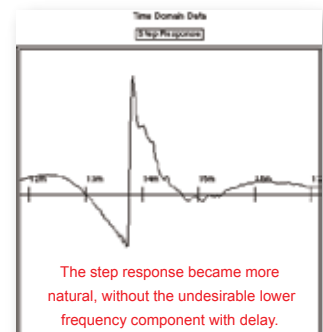


Fig.7 Step Response of Fig. 5

The step response became more natural, without the undesirable lower frequency component with delay.

By flattening both frequency and phase curves all through the musical bandwidth, the transient performance is drastically improved, resulting in the cleanest sound wave form without any blur.

Total Performance with Woofer and Tweeter

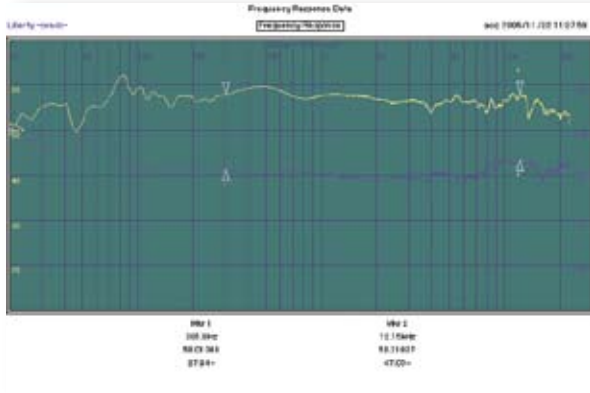


Fig. 8 Total Performance with Woofer and Tweeter

From 250Hz to 15kHz, the phase curve is almost flat over the entire range.

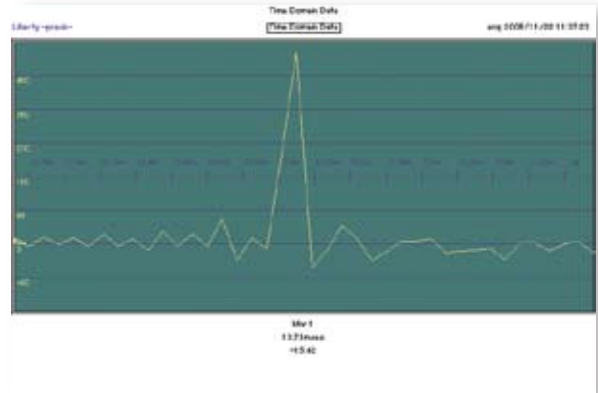
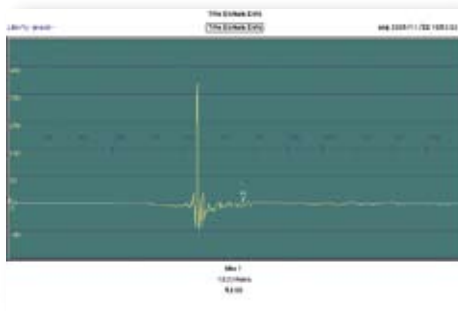
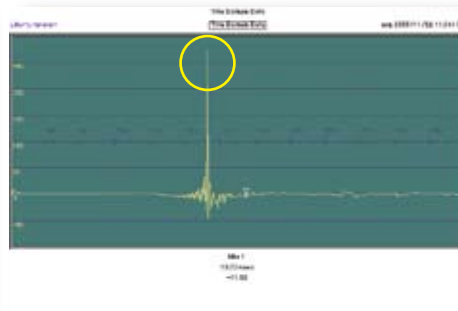


Fig. 9 Impulse Response of Fig. 8

The Impulse response became very sharp. Within the very short period of 0.05ms, most of the musical elements are contained.



(Without tweeter)



(Phase-aligned tweeter is added.)

Fig. 9.1

Sharp Impulse Response

The sharp impulse response is realized by adding a tweeter, **ONLY IF** its phase is adjusted appropriately using FPIC. If the phase is not adjusted, the tweeter adds just noise.

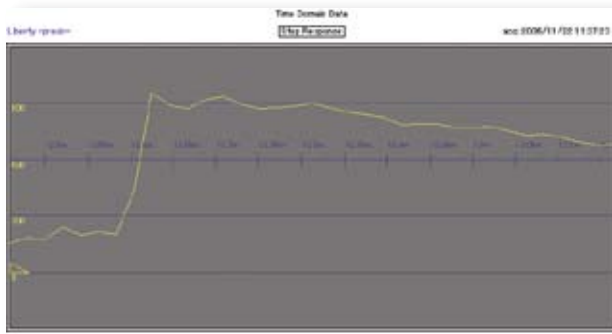


Fig. 10 Step Response of Fig. 8

The leading edge of the step rises sharply, and then diminishes smoothly resulting in a close-to-ideal triangular waveform. This is possible only by keeping the phase lag constant throughout the audio bandwidth.

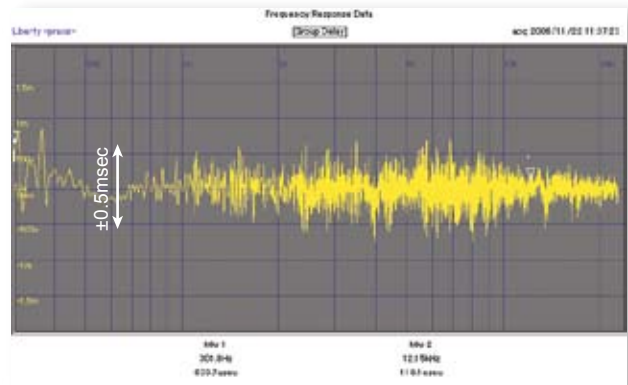


Fig. 11 Group Delay

From 250Hz through 20KHz, it is within the time delay of 0.5msec. This means that FPIC phase control is working properly throughout the range.

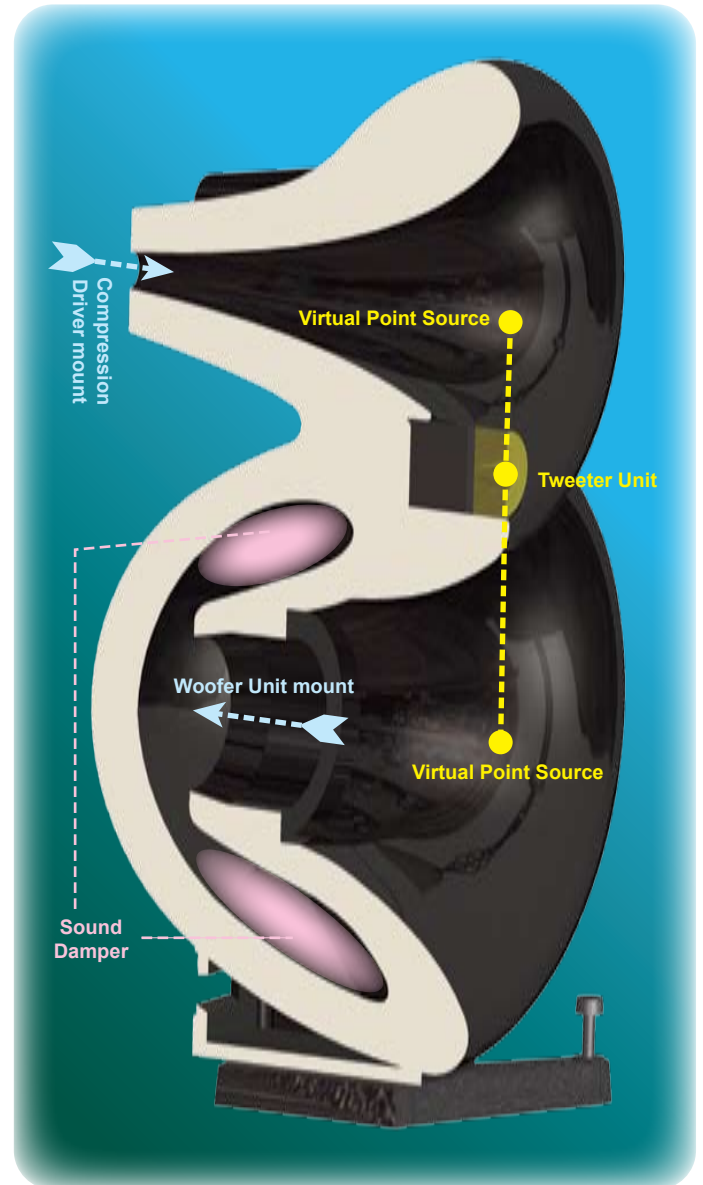
HANIWA Speaker Enclosure

The unique appearance of HANIWA speakers is derived from the fundamental concept that the cabinet should express audio theory naturally, based on spherical shapes. This differs substantially from traditional cabinets which are restricted by conventional manufacturing methods.

The principle behind the radical cabinet design is that the speaker enclosure should never vibrate – if it does, the enclosure itself becomes a sound source and adversely affects the clean, accurate, and vivid reproduction of music. That's why the HANIWA speaker cabinet is a laminated enclosure strong enough to suppress any vibration; the interior structure is designed to avoid resonance and reflection, minimizing bass sound leakage through the cone of the woofer unit, which also features a bass horn with an active crossover to a mid-range horn for a full, well-balanced mid-range sound. The cabinet is designed to minimize the distance between high, mid-range, and bass sound sources so that the three output signals are closely aligned for a sharp, horizontal sound position definition.

HANIWA speakers are unique in that they are:

- Completely enclosed
- Made entirely of curved surfaces
- Based on the precise Tractrix curve horn shape
- Designed and manufactured by a full 3D CAD/CAM system with no shape restriction



How HANIWA Speaker Cabinets Are Made

HANIWA speaker cabinets are the result of tossing convention out the window and focusing on the basics of audio physics theory. By avoiding traditional thinking, Dr. Kubo was able to arrive at an optimal cabinet shape and construction –made possible only by Kubotek's own proprietary 3D CAD/CAM design and manufacturing technology.



1 MDF or laminated plywood is cut by our own RPT2000 3D NC system and then laminated with special, moisture-resistant glue.



2 The laminated block is pressed with a 30-ton press at room temperature for three days to firmly fix the lamination.



3 The RPT2000 is then used to shape the complex cabinet using a precise, computer-controlled cutting tool.

The HANIWA Cybernetic Audio System provides the most accurate, realistic listening experience available today.

Standard Color Options (three weeks for delivery)



SP1W33 (Spherical Horn) 3 WAY System

Suggested Retail Price \$60,000 per pair

- Unit Configuration

Low Range	13' Kapton (Reinforced Kevlar) Cone Woofer
Middle Range	3' Compression Driver
High Range	480g Al-Ni-Co Magnet Pure Magnesium Ring Tweeter
- Recommended Cross Over = 300Hz / 12KHz

- Dimension : 1,450 x 960 x 750 mm (HWD)

Photo shows Black Cashew option with Piano Black Finish.



SP1W25 (Spherical Horn) 3 WAY System

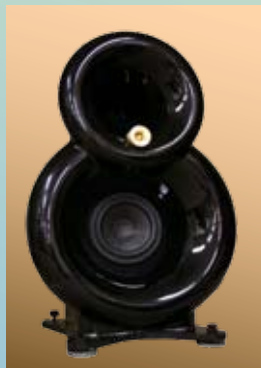
Suggested Retail Price \$40,000 per pair

- Unit Configuration

Low Range	10' Kapton (Reinforced Kevlar) Cone Woofer
Middle Range	3' Compression Driver
High Range	480g Al-Ni-Co Magnet Pure Magnesium Ring Tweeter
- Recommended Cross Over = 350Hz / 13KHz

- Dimension : 1,300 x 800 x 600 mm (HWD)

Photo shows Black Cashew option with Piano Black Finish.



SP1W20 (Spherical Horn) 3 WAY System

Suggested Retail Price \$30,000 per pair

- Unit Configuration

Low Range	8' Carbon Fiber Mixed Cone Woofer
Middle Range	3' Compression Driver
High Range	Al-Ni-Co Magnet Ring Tweeter
- Recommended Cross Over = 400Hz / 14KHz

- Dimension : 1,100 x 730 x 510 mm (HWD)

Photo shows Black Cashew option with Piano Black Finish.

HANIWA FPIC-100 Sound Signal Controller

Suggested Retail Price \$3,500



Horn speakers are appreciated by high-end audiophiles for their unparalleled transient characteristics. However, horn speakers are also known for creating a distracting phase shift which cannot be corrected by conventional divider circuits.

KUBOTEK met the challenge by developing the FPIC-100 Sound Signal Controller, based on digital signal processing technology. Unlike conventional filter circuitry which simply adjusts frequency characteristics, our Frequency and Phase Independent Control (FPIC) technology controls phase characteristics independent of frequency characteristics. As a result, our FPIC technology can drive horn speakers with astonishing efficiency and accuracy throughout the entire speaker bandwidth, resulting in the most vivid, authentic music reproduction and listening experience available in a high-end audio system.

Please contact us for further information.

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CREATION ENGINEERING COMPANY

KUBOTEK

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