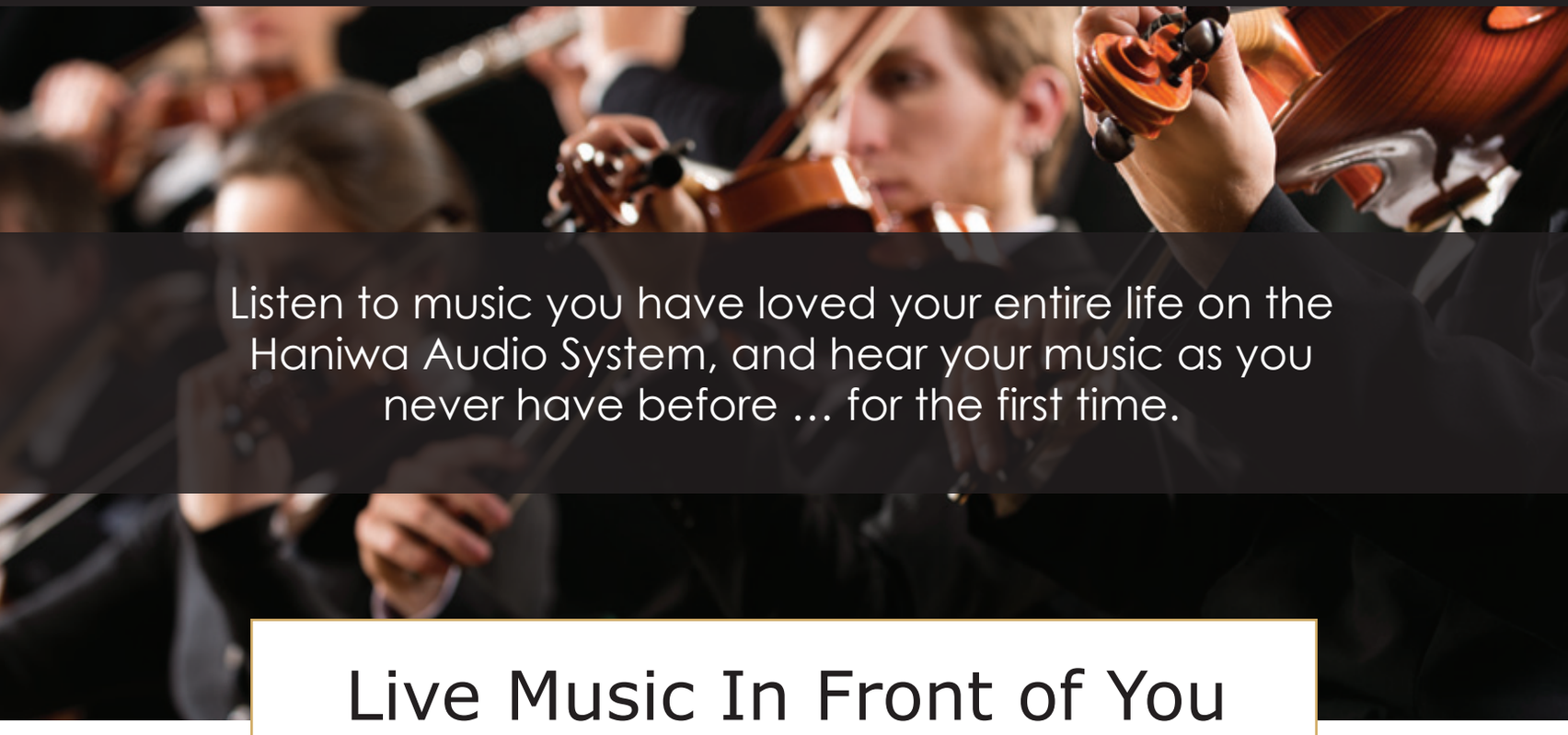
Haniwa

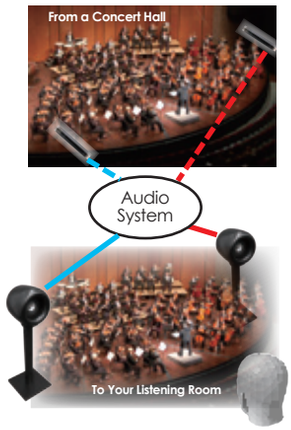


Listen to music you have loved your entire life on the Haniwa Audio System, and hear your music as you never have before … for the first time.

Live Music In Front of You

Haniwa will transport you back to the actual performance where you can touch and feel each musical instrument, precisely located on stage, played by genius musicians of all eras.

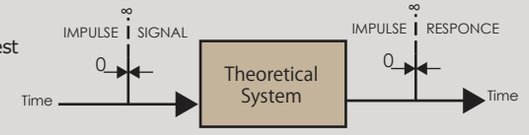
At Haniwa we believe that the definition of the perfect audio system is one that exactly and faithfully reproduces music. No coloration, no added bass no softening of the sound. Music should have all the energy, smoothness and creativity of the original performance … no exceptions. Music should mimic the original artists performance itself in real time. ***In order to reproduce music accurately, the waveform must be reproduced accurately.***



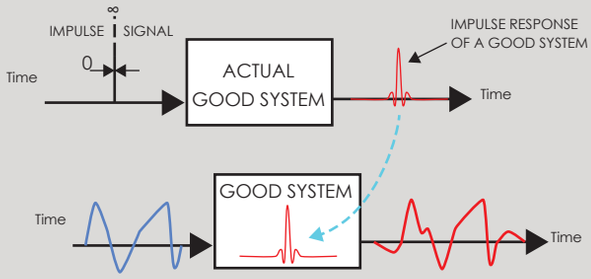
How do we know if the recorded waveform is accurately reproduced by an audio system?

- When analyzing the waveform, the time-domain data (the music signal along time) is used. In the time domain, Impulse Response theory is used for checking the waveform preservation and accuracy.
- Impulse response testing uses a signal containing the frequency entire bandwidth from the lowest to the highest, with an almost zero duration, and a near infinite peak. This idealized signal is called an ***Impulse signal***.
- If a system receives the signal and outputs the signal without change at the speakers, the system can accurately reproduce any waveform and the ***Impulse response*** is equal to 1.

Theoretical Prefect System with "IMPULSE RESPONSE = 1"

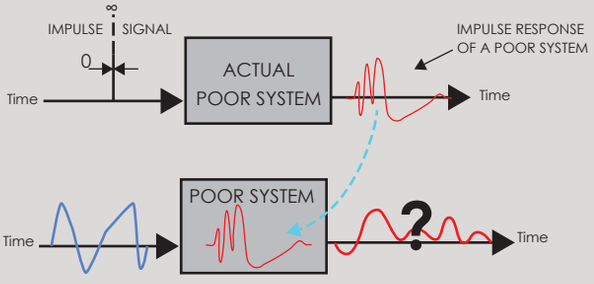


Actual Good System with IMPULSE RESPONSE close to1



Good System with IMPULSE RESPONSE close to 1
the Output waveform is close to the input.

Actual Poor System with IMPULSE RESPONSE far from 1

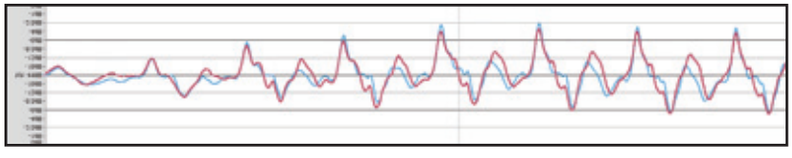


Poor System with IMPULSE RESPONSE far from 1
the Output waveform is distorted and confused.

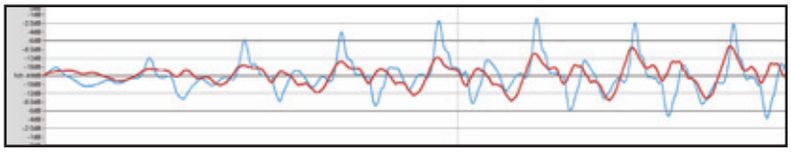
The development goal of Haniwa is always to make its Impulse Response as close to 1 as possible.

Do we know the actual Waveform of the Output Sound from the speaker system?

Comparison of the audio sound waveform against the input waveform is rarely publicized. On the right is an example; the blue curve is the input signal taken from Art Pepper's famous saxophone performance, and the red curve is its sound played back by the Haniwa system. The output waveform is accurately tracking the original music signal, without missing the saxophone's characteristic sharp shape, peak position and its height.



In contrast, the following is an example actually measured in the same way with a popular and very expensive multi-driver speaker system. It is easily recognized that the polarity is not preserved, and peaks are much lower. With this deteriorated waveform, the reality of the input sound is not preserved, and the timing of rising edge signals are vague resulting in a blurred spatial presence. Due to these factors, this playback speaker system is not accurately reproducing the original music, which is the sole purpose of an audio system!



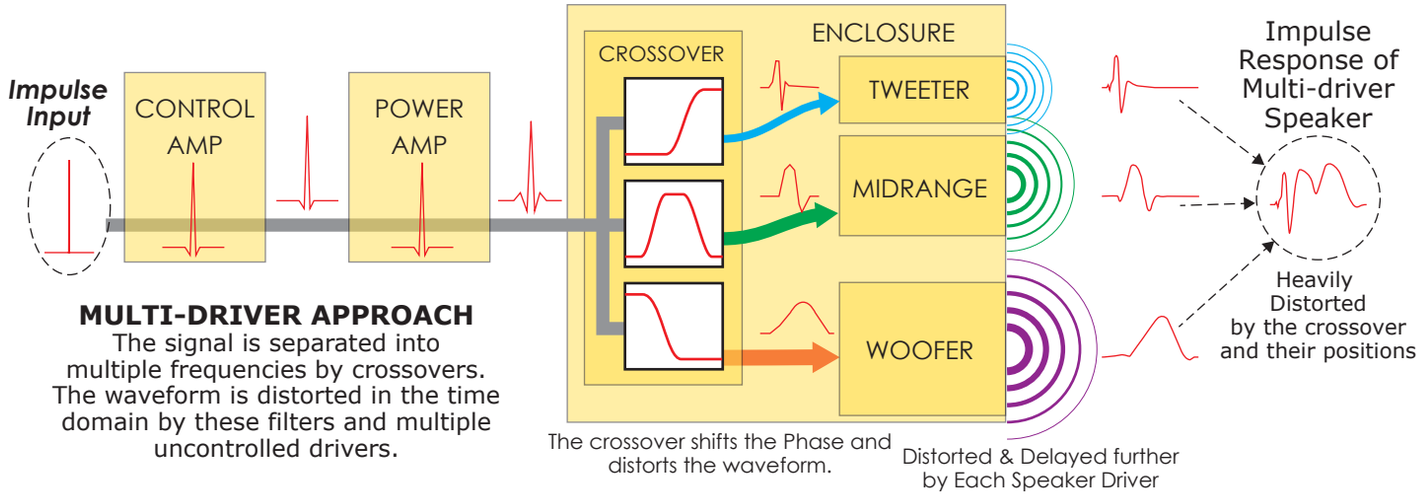
Precise Digital/Analog Waveform Control Technology
Conventional vs Haniwa Approach

Most audiophiles feel that audio technology has matured, and that no major improvements are in store. When digital audio technology was announced, it was supposed to open the door for better sound, when in actuality, fidelity of music through this media did not dramatically improve.

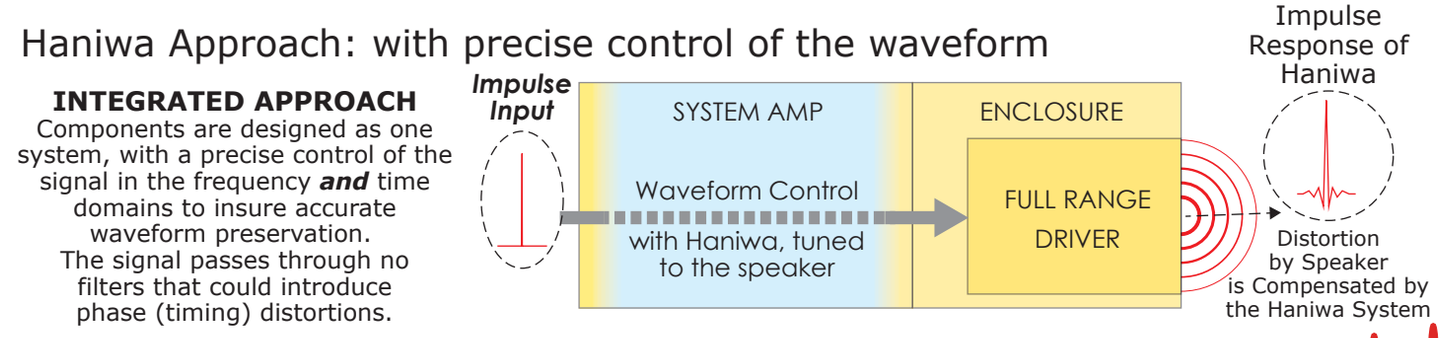
It is well known that a musical waveform consists of frequencies over time. Conventional audio equipment is designed based on analog physics with the sole objective of producing a flat Frequency amplitude curve (Frequency Curve). Some audiophiles point out the fatal error in this conventional theory, which states **"If the Frequency curve is flat, the system will transfer the waveform into music with the highest fidelity".** The flaw in this approach comes from neglecting the important role of the Phase Shift Curve (Phase Curve) in the frequency domain, which can indicate if the output waveform is equal to the input waveform. The phase shift curve conveys the accuracy of timing. The reason that this curve is often not considered is due to the fact it is almost impossible to control with conventional analog physics because it requires the control of time. In the physical world, time is not controllable, and it flows from the past to the future continuously without stopping. The reliance solely on the Frequency Curve in the Frequency Domain for evaluating an audio system typically requires a solution employing multiple speaker drivers to cover the full audio bandwidth. Each driver is designed to reproduce sound a in narrow bandwidth where a circuit can control the Frequency Curve in high, mid and low sound bands. Speakers separate the input signal into three bands by using analog filters, consisting of Resistor (R), Capacitor (C) and Inductor (L) Networks. This mechanism is called a crossover. If one is only concerned with reproducing a flat Frequency Curve, using crossovers is a reasonable solution, but the behavior of the Phase Curve in each bandwidth is totally neglected. So, the specifications of multi-driver speakers look fine if only the Frequency Curve is considered, but their sound is not necessarily natural and accurate. If the waveform is observed, it can be instantly understood why the sound is not an accurate reproduction of the input. Noise and timing errors (phase shift) are continually introduced by the crossovers, and eventually by the speaker itself.

The Haniwa approach is much simpler. It was developed to make the entire system's impulse response as close to the impulse signal as possible while having the narrowest possible width with the highest possible peak. The speaker itself is simple, with only one full-range speaker driver connected to the power amplifier leveraging both analog and digital technologies. The resulting Haniwa system produces an ideal impulse response from the impulse signal, indicating that the input waveform is well preserved.

Conventional Approach: with no control of the waveform



Haniwa Approach: with precise control of the waveform



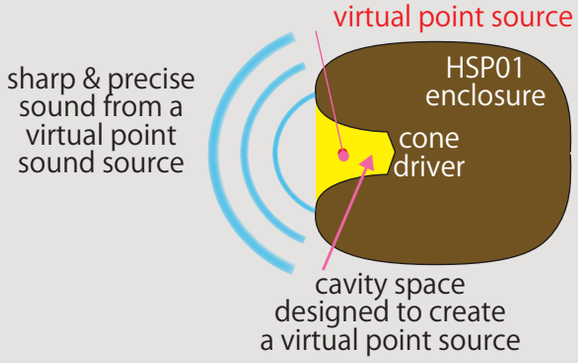
HSP01 Single Driver Speaker System

HSP01 is a single driver, full range speaker that uses a specially designed small, solid magnesium alloy speaker driver. It was developed based upon Haniwa's theory of waveform preservation, sound and speaker output. A single driver speaker system has significant advantages over multiple driver systems, especially the precise delivery of 3D sound due to its clear focus point. Haniwa's speaker uniquely employs a tightly sealed cabinet with elastic damping to provide powerful bass, driven by the Haniwa HDSA01 integrated control amplifier. The small magnesium cone is almost free from divided vibration and shows ultra-smooth phase-shift characteristics from low to super high frequencies. In addition, the enclosure is rock-solid and perfectly air-tight, thus avoiding any resonance and vibration of the enclosure itself. Its shape is designed to focus a virtual "point-source" of music for the best 3D presentation of instruments in a sound stage.

"The phase control employed by HDSA01 extends beyond 40KHz which means the spatial resolution of the sound source is less than 1mm. So, whether playing a record or a 24bit 192Khz file, Haniwa provides an incredibly clear focused sound. "

The HSP01 speaker radiates sound from its 3" full range cone driver which is small, but not a point. However, by adding a specially designed cavity space in front of the cone, the music emanating from the speaker appears to come from a virtual point source near the mouth of the speaker. It accurately reproduces the 3D spatial information of the original performance and maintains precise phase control when used with the matching HDSA01 integrated amplifier.

HSP01 has a Virtual Point Source, for a Sharp Focus of Sound.



Full sound bandwidth comes from one full-range driver with a Virtual Point Source. The sharp focus of right and left speakers, deliver crystal clear 3D audio.

HDSA01 Integrated Amplifier

The HDSA01 Integrated Amplifier controls all input and output switching and converts all signals from LP's, CD's or computer audio into the internal standard 192kHz/24bit format. It is tuned and matched to compensate for the HSP01 speaker's natural response and to precisely preserve the waveform of the input signal.

This is done in the time domain using Haniwa's proprietary simultaneous frequency and phase control with the Digital Signal Processor inside the HDSA01 Integrated Amplifier.

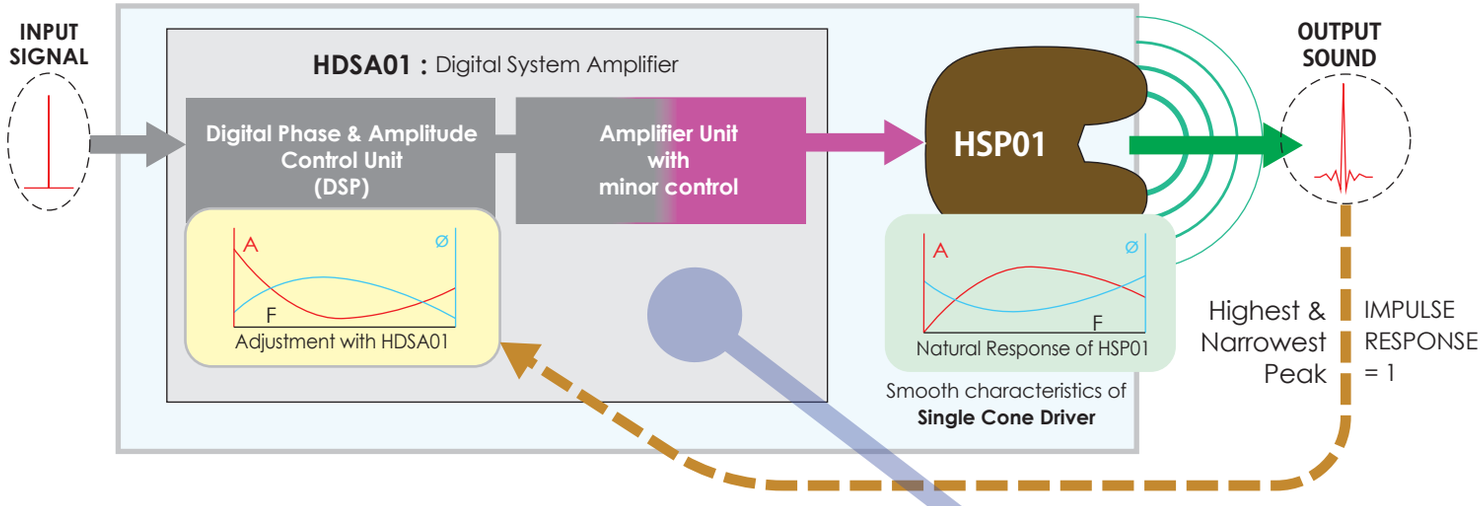
The amplifier section of HDSA01 also is tuned to drive the HSP01 speaker pair. It includes a bass-enhancement function with proper phase correction combined with compact, high speed speaker driving technology. The amplifier is designed to minimize the influence of HSP01's load on the system. Truly, every aspect of the signal path has been optimized and tuned as a complete system to accurately and precisely play back your music precisely as the artist intended.

Digital System Amplifier
HDSA01

(Matched with HSP01)

Performance Optimization Of The Audio System

True optimization of the systems impulse response is possible only by controlling the system as a whole



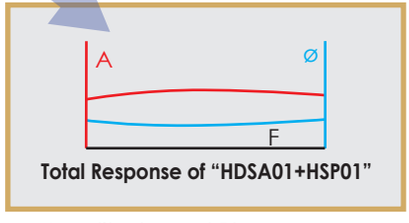
The Process of Optimization Used to Design Haniwa

1. We selected a single cone full range driver so that the speaker itself has smooth natural characteristics without dips and spikes, which makes it easier to adjust the waveform in the DSP.

2. An impulse signal is sent into the system, the output is observed, and the DSP parameters are adjusted so that the output sound becomes a higher and more narrow response.

3. The process above is repeated to make the output pulsive sound as High and narrow as possible to realize Haniwa REAL 3D AUDIO

Final Result of Optimization



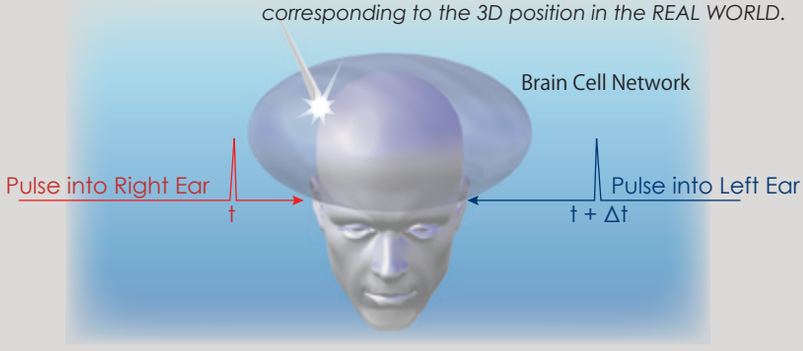
Amplitude and Phase curves
are both adjusted to be flat.

How do we sense sound?

Arguably, the human organ that "hears" sound is the brain. The eardrum is the sensor, but the brain processes the precise timing and frequencies of natural sound and interprets complexities of the signal. The ability to sense precise sound direction was critical for our survival as humans and is still buried deep in our DNA. Indeed, our senses are even heightened in the evening because our distant ancestors needed to sense approaching danger and its direction over the crackling of a fire. The evening is still the best time of day to listen to music because of our heightened senses.

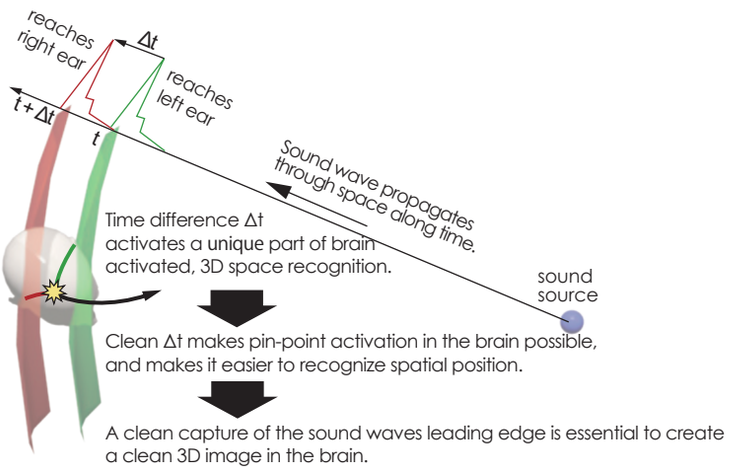
If we consider an upright acoustic bass being played in the rhythm section of a Jazz band, we certainly hear the deep bass note frequencies. But we also hear the sharp high frequency "pluck" and sliding of the musicians' fingers on the fingerboard. We also "hear" the energy and passion of the artist. The precise timing of these sounds is critical for the instrument to sound like a real acoustic bass to duplicate the performance exactly as it existed. When drums, piano and saxophone are added, our brain processes the beautiful complexities of music with multiple sound sources coming from multiple musicians simultaneously recreating the "space" of the performance.

In the brain network, sharp high peaks appear at the position corresponding to the 3D position in the REAL WORLD.



How does Haniwa realize 3D Audio?

Make the output equal the input. This is the simple driving philosophy of Haniwa. The music output at the speaker should be the same as the input from the recorded media, whether from a CD player, turntable or streaming file. Making the output equal to the input is impossible to achieve using a typical component analog system and very difficult to achieve even with digital systems. Haniwa has spent decades developing a music reproduction system that achieves this goal with precise timing, phase and frequency control that is Haniwa 3D Audio. We call it "3D audio" because Haniwa recreates a precise 3D soundstage in your listening room so you can get as close as possible to the original performance.



When reproducing recorded music, precise control of the tiny sound gaps that occur in each ear which deliver a 3D sound stage is critical to replicate the artists performance. We do this by taking an integrated systems approach and leveraging advanced digital technology. All of Haniwa' s processing is done at 24bit/192Khz since the human brain can resolve time differences of 5μs which is equivalent to 200kHz. We control the frequency and phase curves to deliver optimal performance as demonstrated by ideal impulse and step response. The systems based technology behind Haniwa 3D Audio is completely different from any other audio systems on the market. You can hear the difference with only one note from a piano reproduced on Haniwa.

Haniwa REAL 3D AUDIO

Conventional vs Haniwa Audio : Actual Data

In addition to using single driver speakers to deliver a focused image, we have developed proprietary Digital Signal Processor based technology that precisely controls and adjusts the audio signal in real time to achieve optimum characteristics of the system at the speaker output (Impulse Response and Step Response). Optimum Impulse Response is a pulse with high peak over the shortest time interval. Haniwa has a "near perfect" impulse response which is close to 1. This means that the output pulse from the speaker is almost identical to the input pulse of the signal. Optimum step response should look like a step, with a sharp vertical rise in the signal and then a flat trailing signal. Haniwa has an ideal step response as well. The capability of an audio system to reproduce audible sound with the proper phase and amplitude for all frequencies is captured in these curves. By controlling these curves, Haniwa delivers the sharpness of a sounds leading edge that generate distinct pulse recognition in the brain. It is worth noting that most high-end speakers have poor impulse and step response, even speakers that cost more than 10x the price of Haniwa (see figure 1)

TOOLS USED FOR THE EVALUATION OF SOUND

IMPULSE RESPONSE = 1: Means the waveform is preserved. Pulse sharpness is the sharpness of a transient sound.

STEP RESPONSE : Is derived (post-processed) from the impulse response. Its rising edge shows transient sharpness. The Step response trailing shows the transient impact power of the system. If it is not smoothly sustained, the sound loses its concentrated impact.

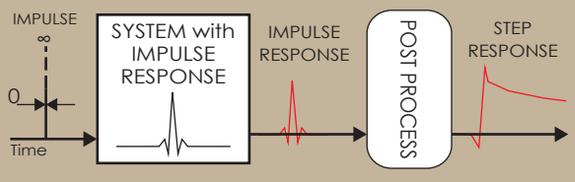
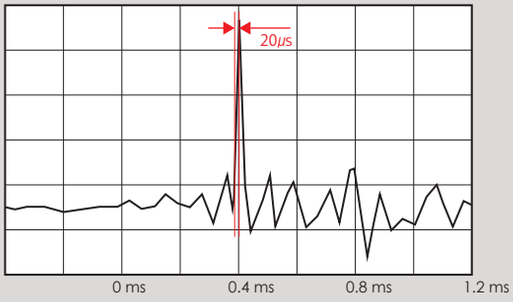


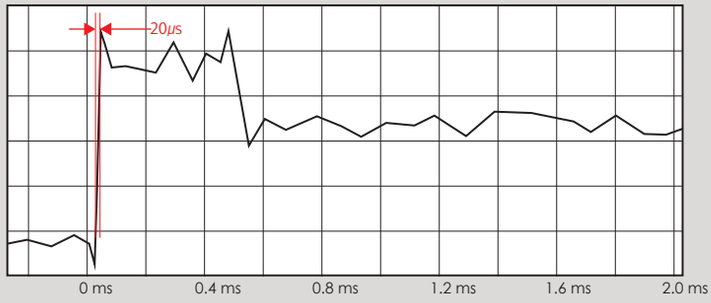
Figure 1

What Haniwa has achieved.

Impulse and step response of the latest Haniwa Integrated System



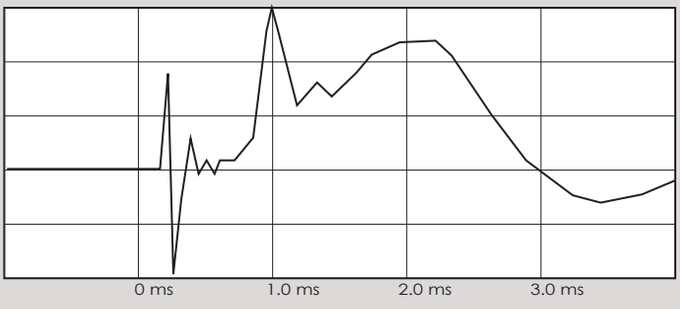
Impulse Response of Haniwa "HDSA01+HSP01" has only one sharp peak rising and falling in a single clock cycle.



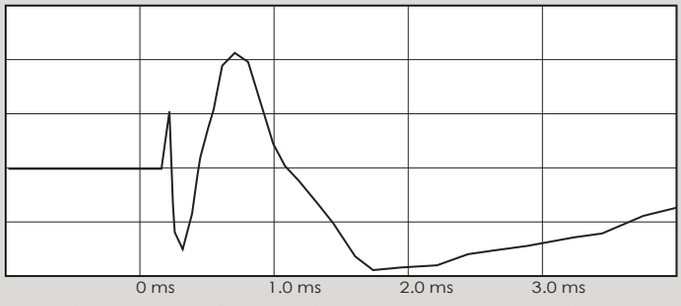
Step Response derived from the impulse response on the left. It has only one steep rising edge and a sustained trailing curve assuring excellent reproduction of the original waveform.

What Is the reality of typical High End Speakers in the market ?

Examples of the Step Response of two expensive High End 3-Way Speakers in the market.



Step Response of a 3-way speaker has two separate and time shifted peaks from the tweeter and horn drivers, and a slow bump from the woofer, suggesting a confused waveform.



Step response of another 3-way speaker, which has three separate bumps, but the bump from woofer is reversed.

Fully Integrated REAL 3D Audio System

The Haniwa system is designed to reproduce music with the highest fidelity of the original performance. It consists of a pair of small resonance-free, full range speakers and an Integrated System Amplifier uniquely tuned to drive those speakers.

The HDSA01 Integrated Amplifier processes input signals at 192kHz/24bit format, and drives the HSP01 full-range speakers, after applying precise adjustments of a flat frequency response combined with almost zero phase-shift.

Precise and faithful reproduction of music is the sole purpose of an audio system. It is achieved uniquely by Haniwa where the input waveform exactly matches the physical output sound. At Haniwa we believe that the definition of the perfect audio system is one that exactly and faithfully reproduces your music.

SPECIFICATIONS

HSP01 Full Range Speaker

Full Range Driver	3-inch Magnesium Alloy Cone
Bandwidth	25Hz - 30kHz
Dimension (WHD)	270 x 295 x 250 mm
Weight	8.0 Kg

HDSA01 Digital System Amplifier

Input	**Analog**	RCA : 2ch (stereo)
	Digital	Optical : 2ch / Coax : 2ch / AES : 1ch
Output	**Analog**	RCA : 1ch (stereo) through
		Power : 100W (at 6 ohm)
USB Port		Bi-directional USB 2.0
FPDC Unit		Amplitude & Phase Curves are tuned simultaneously.
Dimension (WHD)		316 x 95 x 370mm
Weight		5.2 kg

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