

For Immediate Release

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## JVC Develops “Pulsating Sphere Speaker”

***Entire surface of 12-sided dodecahedral speaker emits sound, creating such a natural, ideal audio field that the listener is barely aware of the speaker***

JVC announces the development of a “Pulsating Sphere Speaker” with properties very close to the ideal sound source, and application for 17 related patents. Since JVC launched its first sphere speaker “GB-1” in 1967, it has worked toward such an ideal sound source for a natural, near perfect sound field.

This technology uses the entire surface of the Pulsating Sphere speaker as an emitter. With its 12-sided dodecahedral design, it has the ideal structure to create this size of multi-sided polyhedron sphere. For this reason, the compact ball-shaped speaker has the same frequency characteristics in every direction, faithfully reproducing the original sound source and sound field, so much so that the listener is barely aware of the speaker.

JVC will exhibit this technology at the JVC booth at the A&V Festa 2006 being held at Pacifico Yokohama from Thursday to Sunday September 21-24.



Prototype of “Pulsating Sphere Speaker”

### ***Main Feature***

#### **1. Natural, ideal sound-field reproduction from 12-sided ball-shaped compact speaker**

With a diameter of 10 cm, about 4”, the speaker is divided into twelve 5-sided sections. Excluding the bottom, each are driven dynamically by 11 drivers, realizing high-power for the speaker’s compact size. Sound coverage is uniform in every direction in range up to 10 kHz, varying by less than  $\pm 1$  dB (see Figure 1). This results in an unprecedented natural sound field.



## 2. Linked diaphragms permit entire speaker surface to act as emitter

The JVC developed linked diaphragm construction utilizes the entire surface of the speaker as an emitter, with eleven 5-sided segments linked only at their edges. This eliminates effects from a frame or cabinet, and results in a clear sound without distortion.

## 3. Wide, flat frequency range thanks to Weibull-curve diaphragm

The diaphragms have a “Weibull curve” shape optimized using computer analysis (see Figure 2). Plastic reinforced with stiffening fibers, flat frequency characteristics and low distortion result in a clear presence without hotspots. This also results in a wide frequency range.

## 4. Double neodymium magnets give high magnetic-flux density of one Tesla

With two high energy density neodymium magnets, the equal-diameter speakers produce a high magnetic-flux density of one tesla. Thus, thanks to the magnetically held and driven linked-together diaphragms, the speakers reproduce clear sound across a wide range.

## 5. Orthogonal double-suspension construction stably supports edge-linked diaphragms

The new two layer right-angled orthogonal suspension has good hardness but avoids fixed resonances, leading to highly accurate drives. Using this technology, JVC succeeded in driving the linked diaphragm precisely, as if it were breathing.

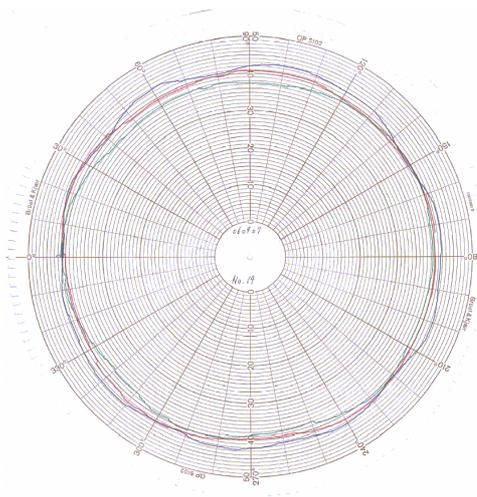


Figure 1. Flat directional performance at 5 kHz (red), 7 kHz (green), and 10 kHz (blue)

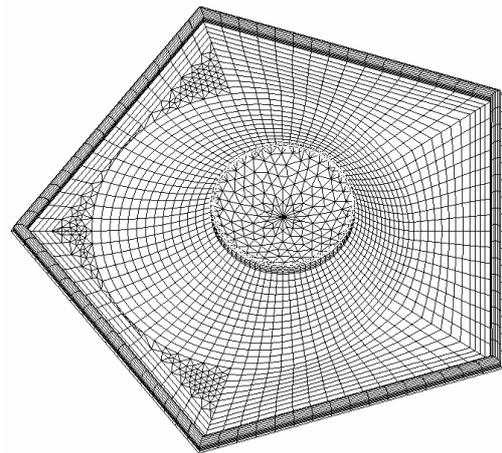


Figure 2. The Weibull-curve diaphragm

## ***Development Background***

JVC set out to create speakers that would act as near ideal sound-sources, producing sound fields with an unprecedented degree of naturalness. In January 2001, the company developed its “DD” series of long, thin speakers, offering wide directional coverage and sharp sound imaging. These were released both as standalone units and included in home-theater systems, and received enthusiastically by JVC product users.

JVC then tackled the challenge of omni-directional speakers that could even cover the vertical axis with no directional bias. The result is the new “pulsating sphere” speaker, a 12-sided ball that, while compact, produces an ideal wave surface and ideal frequency characteristics over a wide range for a natural sound field. Because this technology reproduces the same frequency characteristics in every direction, the speaker “disappears” acoustically, for faithful playback of the original sound source and sound field.

## **Technology analysis**

The “Pulsating sphere” is synonymous with an ideal sound source, a goal for sound engineers for over sixty years. Some reasons why the pulsating sphere is an ideal sound source include:

1. Uniform wave front projection in every direction,
2. No irregularity in acoustic impedance,
3. No diffraction from a cabinet,
4. No near-range sound-field problems caused by flat sound sources.

Because of these qualities, the speakers lack any of the sonic quirks of typical speakers, making it possible to design the signal paths in such a way that listeners feel as if speakers do not exist.

JVC designed the pulsating sphere speakers with a diameter of 10 cm for “near-ideal performance”. Together they exhibit less than  $\pm 1$  dB directional variation up to 10 kHz.

Each diaphragm is linked only to a dynamically driven voice coil, with an internally mounted driver circuit, resulting in sound waves with uniform amplitude and phase in every direction.

Each five-sided diaphragm is connected so the entire surface functions as an emitter. This construction results in clearer, undistorted sound because it renders unnecessary conventional cabinets and frames that could cause reflection and diffusion.

JVC used computer simulation to optimize the speaker’s design, resulting in diaphragms with uniquely flat frequency characteristics that remain stable up into high frequency range. Along with many other innovations in the areas of axial motion and input range, this led JVC to apply for 17 pulsating sphere technology related patents.

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