

YAMAHA YH-1/2/3

Featherlight Natural Sound Stereo Headphones
Yamaha's Orthodynamic Design for Better Transients
Construction
Low Distortion, Wide Frequency Response
Bellini-Designed



Yamaha: Dedication to Musical Excellence

NOW LOWER DISTORTION AND WIDER FREQUENCY RESPONSE WITH YAMAHA'S EXCLUSIVE ORTHODYNAMIC HEADPHONE DESIGN

Today the world's largest manufacturer of musical instruments is also a leader in audio fidelity. For nearly a hundred years Yamaha craftsmen have been designing full, natural sound into our renowned pianos, organs, wind and string instruments—a rich musical tradition that makes us unique in the audio world. Part of the reason is our generations of musical sensitivity. But it's also due to our immense technological and production capabilities—built over decades of supplying fine musical instruments to the world.

The Basics

Audio performance depends upon a wide range of technologies. While Yamaha's computer-controlled circuit design and testing is second to none, our musical instrument experience has given us expertise in many other crucial fields. The Yamaha factories which produce LSIs and semiconductors for our electronic organs were also important in the development of the revolutionary Yamaha vertical FET and SIT used in our top-line B-2 power amplifier and C-2 stereo preamp. They are also responsible for our unique vapor deposition production of the world's only pure beryllium dome speaker diaphragms. After years of blending and forming the metals in our brass instruments, we were able to develop the special alloys used in our powerful speaker magnets. Piano frame diecast techniques are behind the ideal weight and acoustic properties of our turntable platters and speaker frames. And Yamaha piano soundboard research and cabinet woodcrafting is reflected in our resonance-free speaker enclosures and beautifully detailed components cabinetry.

In-House

Every crucial part of every Yamaha audio component is Yamaha made. That's how we set our own quality standards. And that's how we can afford to innovate every step of the way: When a part or material doesn't do justice to the music we simply develop one that does.

The Payoff

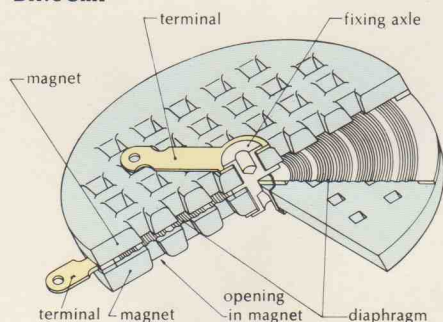
When you have musicians and audio engineers speaking the same language the result is full natural sound fidelity, plus innovative features which translate directly

into improved tonal quality or operating convenience. Yamaha's insistence on total music performance, not just isolated specs, is behind a revolutionary new approach to audio component design—one that makes the YH-1, YH-2 and YH-3 headphones remarkable achievements in high fidelity technology.

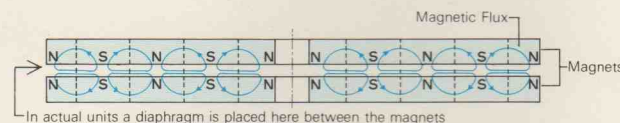
Three new ultra lightweight Orthodynamic stereo headphones from Yamaha—and a whole new approach to stereo listening pleasure. The reason is radical new Orthodynamic design, exclusive Yamaha technology, that provides lower distortion and wider frequency response. Plus extreme lightweight design, that includes a unique soft leather strap to distribute headphone weight over your whole head, and ear cups that require only slight pad pressure, leading to the kind of headphone comfort that heretofore has been as rare as superb headphone sound. Once again Yamaha puts it all together to give you private listening completely free from distortion or listening fatigue. And the kind of quality sound from the YH-1, YH-2 and YH-3 that will make you think you're listening to your own speaker systems. Read on to learn more about these attractive and enjoyable phones.

All About the Yamaha "Orthodynamic Design"

Most headphones use scaled-down loud-speaker type drivers. Yamaha uses a sandwich composed of two waffle-shaped Drive Unit



Conceptual Diagram of Orthodynamic Design



disc magnets, with a combination voice coil/diaphragm between them. The magnetic flux acts on the coil, activating the diaphragm. The magnets are sintered ferrite discs, with openings to permit the sound to pass. Note in the illustration (below) that each section between the magnet openings has alternate polarity. But the polarities are aligned above and below the diaphragm to provide perfectly balanced drive.

Magnetic Flux

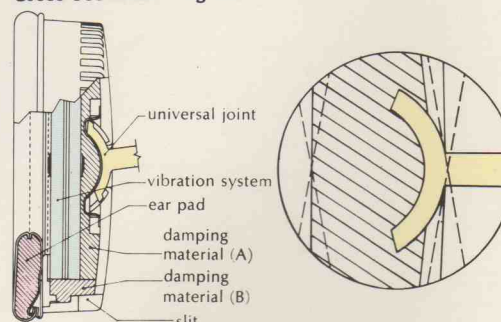
Here's how the magnetic flux is formed and acts on the coil. There's a pair of magnetic discs—actually a set of coaxially arranged, distinct magnets with each polarized in opposite to the next—which sandwich the voice coil/diaphragm. This combination contains the aluminum coil turns inside, divided into five* spirals, with each spiral wound in the opposite direction from its neighbors. (*Four on the YH-2/3.) In this arrangement, since Fleming's law prevails, the entire voice coil/diaphragm surface "breathes" back and forth—or vertically—in phase. The openings in the magnet discs allow unimpeded diaphragm movement and sound dispersion.

Diaphragm

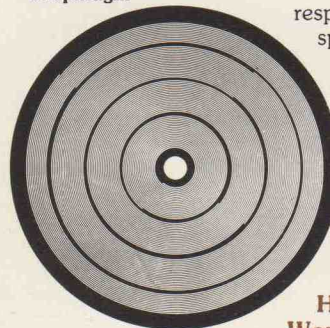
The diaphragm is a thin (12μm), lightweight polyester film, corrugated for optimum compliance in the direction of motion. It is fixed both at the edge and at the center.

The headphone body is a semi-enclosure: slits at the back permit the air flow required

Cross-Sectional Diagram



Diaphragm



for superb bass response, but two special damping materials, felt and urethane foam, give an optimum acoustic load to the diaphragm for natural response.

How It All Works

The small-mass, highly compliant diaphragm, vibrating over its entire surface at once, assures the clear treble tones of a condenser headphone, and at the same time the crisp, clean basses of dynamic types. Bass richness is improved by the spiral windings and corrugated construction (making every part of the diaphragm surface respond in phase). Damping is excellent. Center plus edge mounting cuts unwanted bass vibrations even further, and assures better overall balance between bass and treble ranges. Since the diaphragm and voice coil are a single unit, the transmission loss and distortion problems present in conventional headphones are eliminated. This construction also means the voice coil is virtually blowout-proof; it can safely and easily provide full dynamic response at any listening level. To your ears it adds up to thrilling tonal beauty throughout the entire audible spectrum.

A Very Satisfying Performance

At whatever level it's asked to reproduce, the YH-1 or 2 or 3 performs with low-distortion fidelity over a wide frequency range.

Each phone features a flat response across the entire audio range of 20 to 20,000 Hz; extreme frequencies roll off naturally

with frequencies in between reproduced without discrimination. Each phone also features a very low-distortion performance across a wide power range. At 90dB sound pressure level—the level which you'll find not too high or too low—you suffer only 0.3% distortion. At the higher, ear-splitting level of 120dB SPL, distortion is still less than 3%. Thus even when you drive your phones at an extremely high level over long hours, your ears won't suffer listener fatigue. Each phone also has a very high output SPL or Sound Pressure Level: 94dB/mW for the YH-1 and 93dB/mW for the YH-2/3. This means even when the phone output on your amplifier has a low output, you still enjoy reproduction at comfortable levels.

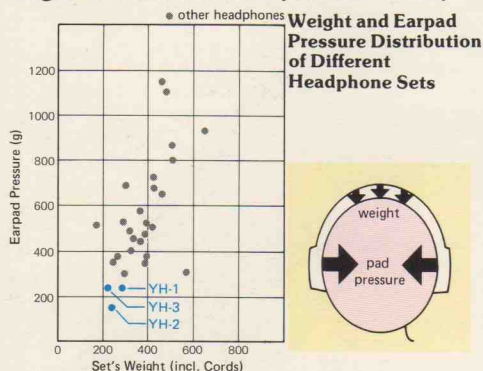
YH-1



There are two electrical properties that make these Yamaha phones higher performing. One is that each works as a purely resistive load on your amplifier, since it has virtually no impedance change across the 20 to 20,000 Hz audio frequency range. Two, the phones have no appreciable inductance. Thus reproduction is well damped with no significant drop in high frequency response.

Superb Lightweight Comfort

The Yamaha YH-1, 2 and 3 weigh less than other types, and this fact means fatigue-free comfort while you listen to any



of them. Another reason why these phones are certainly the most comfortable you'll ever wear is the use of a soft leather strap (for the YH-1 and YH-2) that not only keeps the spring band from pressing against your head, but also distributes the weight evenly.

The ear cups are the "supra-aural" type, with the pad above the ear lobe. This design lets the cup ride on your ear, instead of flattening it against your head. The semi open headphone structure is another source of long-term enjoyment: it has sufficient damping to reduce external distractions, but not to cut you off from conversation or cause any sense of isolation. The earpad itself is of a specially designed form, requiring only minimal pressure for its snug fit. This more fully eliminates extraneous noises, for clearer musical response. It also means no discomfort or fatigue, even after long hours of private listening.

The Differences

The YH-1 has a larger diaphragm and magnet than the YH-2 and YH-3. It is also



slightly more efficient, giving more volume for the same input, a bit more sensitive, and has a few more voice coil windings. You will also find it to be the heaviest of the three headphones. The YH-3 is the lightest of the three headphones, as well as the least expensive.

SPECIFICATIONS

	YH-1	YH-2	YH-3
Type	Orthodynamic	Orthodynamic	Orthodynamic
Impedance	150 ohms	150 ohms	150 ohms
Diaphragm	Diam. 55 mm ϕ	46 mm ϕ	46 mm ϕ
	Film 12 μ Polyester	12 μ Polyester	12 μ Polyester
Magnet	Material Sintered Ferrite	Sintered Ferrite	Sintered Ferrite
	Diam. 55 mm ϕ	46 mm ϕ	46 mm ϕ
Magnetic Flux	1200 gauss	950 gauss	950 gauss
Frequency Response	20-20000 Hz	20-20000 Hz	20-20000 Hz
Output SPL (dB/mW)	94	93	93
Output SPL (dB/V)	102	101	101
Rated Input (W)	3	3	1
Maximum Input (W)	10	10	3
Harmonic Distortion at 90 dB SPL	Less than -50 dB (0.3%)	Less than -50 dB (0.3%)	Less than -50 dB (0.3%)
at 120 dB SPL	Less than -30 dB (3%)	Less than -30 dB (3%)	Less than -30 dB (3%)
Pad Type	Supra-aural	Supra-aural	Supra-aural
Pad Pressure (at 140 mm spread)	250 g (8.8 oz.)	150 g (5.3 oz.)	250 g (8.8 oz.)
Cord (stereo plug incl.)	2.4 m (8 ft.) straight	2.4 m (8 ft.) straight	2.4 m (8 ft.) straight
Color	Black	Black, Red-Brown	Black
Weight without Cord	250 g (8.8 oz.)	190 g (6.7 oz.)	170 g (6 oz.)
with Cord	290 g (10.2 oz.)	230 g (8.1 oz.)	210 g (7.4 oz.)

Specifications subject to change without notice.

For details please contact:

SINCE 1887



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