

# Phoenix Gold Cyclone

T E S T R E P O R T

## 12-INCH ROTARY SUBWOOFER

BY TOM NOUSAINE

SO I'M SCHLEPPING MY first cup of Irish Cream coffee out of the local White Hen Pantry (suburban Chicago's version of a 7-11) when this guy looks up from his morning cappuccino and inquires about the odd-looking "washing machine" nestled in the rear hatch of my Corvette. The device in question is a large aluminum-clad test box with the business end of a brand new Phoenix Gold Cyclone 12-inch rotary subwoofer staring out of the glass hatch. I had to admit that, as we gazed into the throat of the woofer, the curved ABS helix did indeed remind me of the agitator in a Maytag washer.

In fact, the Cyclone is a radically new speaker design based on a technology originally developed by Intersonics, now called Quantum Sound, of Northbrook, Illinois. That system was an extension of a series of professional belt-drive subwoofers which, in turn, were first designed to summon elephants from the back of jungle trucks (I'm serious).

So out of the ashes of Intersonics and elephant-calling technology comes Phoenix Gold's Cyclone. And no, it's not another *Twister* summer-movie tie-in; the Cyclone has been in the works for more than 4 years, and it's certainly been worth the wait. This woofer is truly striking in appearance and fantastically novel in design.

On to the tech stuff: To reproduce sound, a typical speaker uses a moving voice coil suspended inside

a permanent magnet that pushes a cone back and forth. A surround and spider keep the cone centered. The surround (along with the enclosure baffle) also physically isolates the front and back sound waves, thus avoiding cancellation at low frequencies. I like to think of this traditional speaker design as a clever acoustic slingshot.

On the other hand, the Cyclone uses a moving magnet with a fixed voice coil that drives a shaft with fixed "vanes." Think of it as the agitator of a washing machine being driven by a fixed rotary motor. If that analogy doesn't work for you, try this one: imagine the back-and-forth rotary motion of an index card taped to the head of a pencil as you rotate the pencil back and forth with your palms. Now, concentrate the energy by spinning the index card in a round Quaker Oatmeal

carton with both the top and bottom removed. . . . you get the idea.

To model this basic machine into a speaker, we place an enclosure on one side of the Oatmeal box to keep the open end from acoustically canceling the output at the other end. We also have to find some way to keep the air from squirting back and forth through the center of the carton. The surround and dust cap perform this function in a regular speaker. In the Cyclone, a curved helix fills the hole in the cylinder.

Phoenix Gold packages this basic topology—a rotary AC motor driving vanes on a shaft—with high-tech materials like a see-through sheet-molded compound

(SMC) housing, light polystyrene carbon fiber vanes, and the ABS helix. The motor is attached to the bottom of one end of the housing, which enters the enclosure through a standard 12-inch woofer cutout. A pair of gold-plated dual banana jacks stab into the motor structure from the extreme bottom of the entire structure. Of course, this makes for a very large driver that requires 12.8 inches of rear clearance and occupies 0.5 cubic feet of space.

Why go to all the trouble? According to Phoenix Gold, the Cyclone offers extremely high displacement, which enables high output (SPL) with low distortion. Also according to Phoenix, the Cyclone has the same piston area but four times the linear displacement of a traditional 12-inch woofer.

Specifications include an impedance of 3 ohms, sensitivity of 90 dB (1 watt/1 meter), 300 watts of contin-



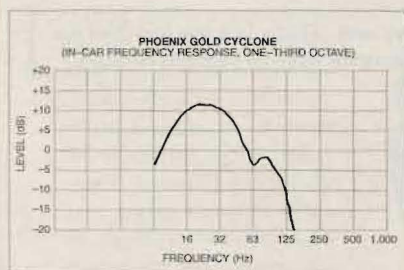
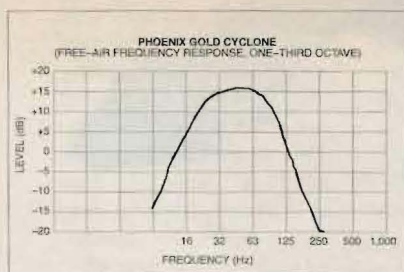


uous power handling, and less than 3-percent distortion from 20 to 80 Hz at "full power." Price: \$799. Phoenix Gold, Dept. CSR, 9300 N. Decatur, Portland, OR 97203.

### BY THE NUMBERS

Although Phoenix says the Cyclone can be modeled as a plain ol' subwoofer, the company hasn't released any Thiele-Small parameters for it. Instead, Phoenix simply recommends that the Cyclone be dropped into a 3-cubic-foot sealed enclosure, which is supposed to produce a very reasonable system Q of 0.82.

Using a MLSSA analyzer with a 5-volt drive level as recommended by Phoenix, I measured a free-air resonance (Fs) of 31.5 Hz, Qms of 2.75, Qes of 6.38, and Qts of 1.92, all of which are a bit unusual. I'm not going to comment much on these numbers except to say that it's not too surprising that Phoenix hadn't yet issued Thiele-Small parameters at our deadline. Suffice it to say that the Cyclone uses a radically different operating topology and the numbers need to be interpreted with care. More run-of-the-mill numbers included a Vas of 11.3 cubic feet, system sensitivity of 84 dB SPL (1 watt/1 meter), Re of 3.12 ohms, and minimum impedance in the recommended enclosure of 2.68 ohms at 73 Hz.



Installed in the recommended enclosure and measured in the lab, the system was 3 dB down at 27.6 Hz and the response curve was a smooth 27.6 to 100

Hz  $\pm 2.6$  dB. Installed in the rear hatch of my trusty '95 Corvette LT-1, with the required 80 Hz 18-dB-per-octave crossover kicked in, the system was -3 dB at 12.5 Hz and  $\pm 3.2$  dB from 12.5 to 46 Hz.

### THE INSTALL

Although it features a radical design, the Cyclone installs like any typical old

**The Cyclone delivered the best in-car low-distortion output I have ever recorded!**

woofer. As noted, I dropped the Cyclone into my 5-cubic-foot sealed test enclosure, adding some styrofoam to simulate Phoenix's recommended 3-cubic-foot enclosure size, and screwed it in place. (Remember, you'll need a full 12.8 inches of rear clearance to let the Cyclone do its thing.) A nice little integral gasket provides a tight woofer-to-box seal. All that was left to do was set the enclosure into the back hatch of my Vette and I was ready to rock. [To check out the Cyclone in a full-blown competition-hungry install, see "Coupe de Grâce," a look at Kennedy Hi-Fi's outrageous '51 Mercury Coupe, page 34.]

### ON THE ROAD

In-car dynamics and output were seriously impressive. At a 10-percent distortion limit, the Cyclone delivered 113.2 dB at 12.5 Hz, 120.5 dB at 20 Hz, and 122.5 at 31.5 Hz when driven with a 400-watt amplifier. This is the best in-car low-distortion output I've ever recorded! (Harking back to its origins, the Cyclone might just be able to do some elephant calling out on the Serengeti.) Driving the Cyclone just shy of audible distress produced 124.4 dB with the 20-Hz sine-wave tones from my *Bass Erotica* test CD.

On the other hand, these figures represent the absolute outer limits of the Cyclone's performance. When this woofer gives up the ghost, it does so with all the

grace of Dennis Rodman in full tantrum. Mechanical noise is caused by air leaking past the vane-tips up the inside of the housing and clattering at the woofer's excursion limits. The main manifestation of this distortion is a low-level "whooshing" that you won't hear unless you stick your head down near the woofer itself. Phoenix says that the better tolerances of full-production versions (my test sample was an early production model) will reduce but not completely eliminate the suspension noise at lower levels.

Sonically, the suspension noise is a relatively minor problem; most autosound enthusiasts consider it a normal part of the car-fi listening experience and they're willing to trade a little noise for ever-higher output.

Mechanical noise aside, the Cyclone's sound quality was supremely clean (I have to say that I'm really beginning to fall in love with low-distortion subwoofers). Classical, rock, easy-listening, pop, and jazz all produced plenty of taut and tight low-end. Organ fundamentals were rendered with effortless clarity and thunderclaps from my effects disc had me diving for cover.

Imaging was similarly fantastic. Because the Cyclone basically has no significant distortion even at subsonic frequencies, the image always remained tightly placed up front. Acoustic bass on Oscar Peterson's *We Get Requests* was firmly locked on target at the right front of the car; as long as your main speakers can recreate 80-Hz tones with authority, you're in for a wild ride.

PHOENIX GOLD'S CYCLONE IS A FUNKY and unique subwoofer with performance and design chops to burn. It'll reproduce plenty of energy below 20 Hz with less than 10-percent distortion and it sounds fantastic. Though I was mildly troubled by the Cyclone's tendency to create mechanical noise when pushed to its limit, its overall performance benefits far outweigh its negatives. It certainly isn't a space-saver, of course. And it ain't cheap, either (most groundbreaking products aren't). But Phoenix doesn't plan on selling the Cyclone to the masses. Car-fi fanatics and sound-off competitors who are looking to score some points for uniqueness should take a good, long look at this sub. It's a fine piece of engineering. ■

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