

Sporty's New Gyro Bests RC Allen

An electric back-up gyro for under two grand? You gotta be kidding. Not really. Sporty's AIM-based gyro is a terrific performer at a bargain price.

radio, including headset adapter, antenna coupler, spare battery case and a NiCad rechargeable battery pack and charger system. There's also a ship's power accessory for 12-, 24- and 28-volt options.

The SP-200's form factor has top-mounted squelch and power/volume controls, a flip-flop memory button and standard BNC antenna connector. External mic and phone connectors are on the top and are not weather protected, as with the ICOMs. The SP-200 is the only radio we tested that doesn't have keyboard beep, except for illegal keys. This is a bit of a nuisance if you're used to a beep or tactile feedback but it's offset by the slightly larger keyboard, which reduces fat-finger mistakes. The SP-200 tunes up to 142.975 MHz in 8.33 KHz steps.

Sporty's was the best of the group in VOR performance, hands down. In a pinch, you could actually navigate with it. Further, it's the only portable radio that displays a LOC signal, something that might come in handy some day. The VOR mode automatically sets a course TO the VOR as soon as the VOR signal is decoded, although the initial course is sometimes inaccurate. When this happens, change frequency momentarily to force a retrain.

During comm band scan, nine birdies were detected at an aggressive squelch setting. Turning up the squelch eliminated them. The birdies don't seem as strong as the birdie on the VXA-700. Squelch level is controlled by a real knob, not keys or sliders. Frequency display and CDI are easy to read in the handheld position—antenna pointing slightly away from you and the display is optimized for this angle of view. Contrast is poor when viewed from above, as would be the case if the radio were attached to the panel. Overall, for the price, the Sporty's SP-200 offers a lot of value and plenty of add-on accessories.

Vertex Radios

Among amateur radio enthusiasts, Yaesu is a well-known Japanese brand and Vertex Standard is the new name for that line. Building on its experience with portables for

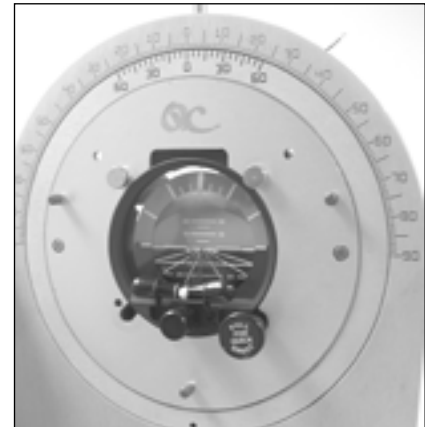
As general aviation marches bravely forward into the dawn of the electronic flight display revolution, you'd think the days of the iron gyro would be numbered. Who in their right mind would design and build a new one? Answer: the world's most well-known pilot boutique, Sporty's Pilot Shop, along with an equally well-known instrument maker, Castleberry Instruments of Austin, Texas.

Have these guys come adrift or is there really a market for such a thing? As with all things in aviation, there's a market for everything if the price is right and on this new instrument, the price is definitely

right, a bargain-basement \$1595 for a fully lighted, well-designed electric attitude gyro suitable for back-up in airplanes with vacuum systems.

We know a thing or two about the economics of instruments and avionics and like a few of our readers, one question occurs to us: At that price, can this product possibly survive and make enough profit to sustain itself? Sporty's CEO Hal

Dave Vorsas, below, at Triumph Instruments and Avionics (formerly JDC) prepares the Sporty's gyro for a wring-out on the gyro table. The gyro did well in a series of basic tests.



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Shevers, whose determination to offer an affordable back-up gyro is embodied in this product, insists that this new gyro will flourish. (It better; he's pre-paid for 1000 of the gyros, which explains in part why the price is so cheap.)

When the gyro was announced a few months ago, our e-mail inbox lit up with requests to obtain one for testing. Accordingly, Sporty's sent us one last August and we promptly marched off to our favorite instrument shop to crack it open and wring it out on the gyro table. The executive summary is thus: Despite its low price, this isn't a cheap gyro and if you want a back-up electric AI, grab one of these before the bean counters at Sporty's snap back to their senses and add about a grand to the price.

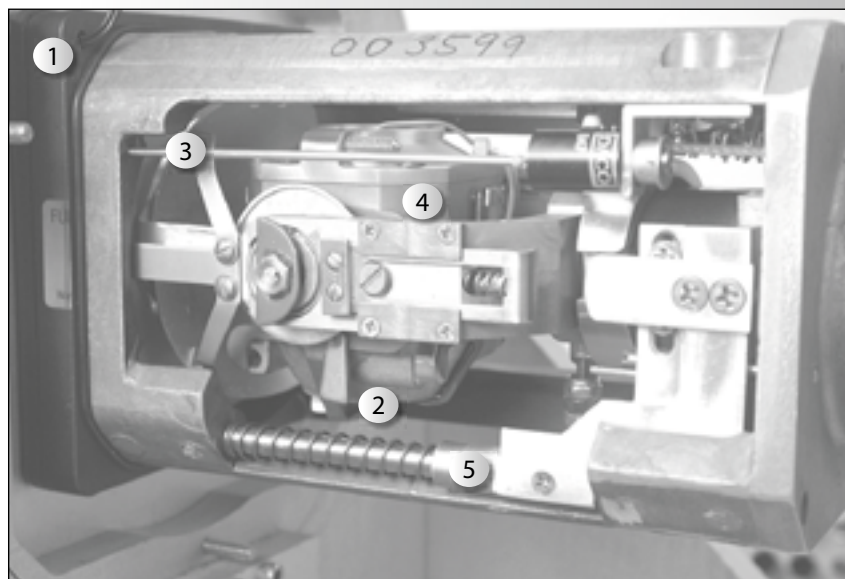
Long Battle

We've stood on the sidelines for the past 15 years watching Hal Shevers wage what might best be called the War of the Gyros. Beginning about 1991, Shevers petitioned the FAA to amend the language in FAR 91.205 to allow a second attitude gyro to be installed in place of the required gyroscopic rate-of-turn indicator, either a turn-and-bank or a turn coordinator.

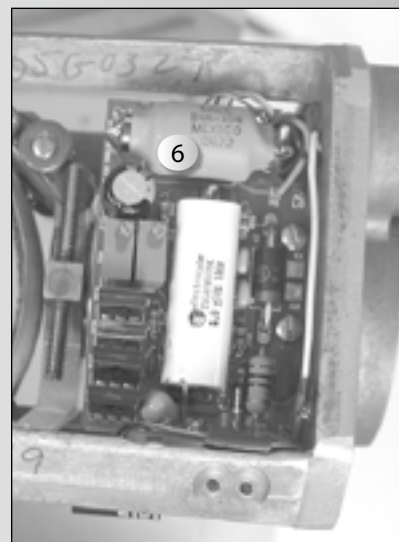
Ever true to its culture, the FAA dragged its feet, dodged and demurred on changing the regulation but it finally caved in to Shevers' simple request—after a fashion—by issuing Advisory Circular AC-91-75 in 2003. The AC says that in airplanes under 12,500 pounds, an electrically powered (or vacuum powered) AI can replace a turn indicator. In the case of the vacuum-powered replacement, however, a second independent vacuum system must be installed, an eventuality so unlikely that an electric replacement remains the only practical option, at least in this context.

Having cracked the lid on a Pandora's box of sorts, Shevers realized the market didn't have an economical iron gyro suitable for replacing a turn instrument. Lately, Mid-Continent Instrument has introduced the 4300 series electric AI which we find to be a superb instrument. It's also \$3000 in its cheapest iteration. The L-3 AIM electric gyro is higher

Inside Sporty's Gyro



- 1 Internal lighting inside bezel; can be wired to panel dimmer.
- 2 Pendulous vanes pivot on bearings, not simple metal pins.
- 3 Failure flag mechanism also senses proper rotor speed.
- 4 Rotor appeared smooth and vibration free.
- 5 Well-designed, robust manual erection mechanism.
- 6 Electronics package appears well made, although it crowds roll caging ring slightly.







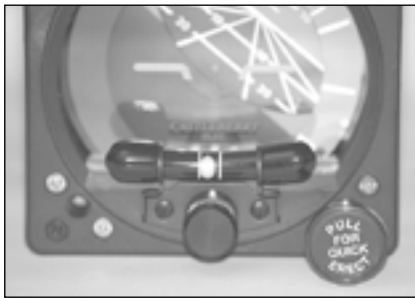
on the food chain, at \$4999 and up. Kelly Manufacturing is still selling the bottom-end RC Allen R26A for about \$2800, but we've been reluctant to recommend it because of complaints about poor durability.

Shevers' idea was to find an instrument house willing to build—in volume—a competent gyro for about \$1000 and he approached several manufacturers with just that proposal. "They laughed at me," Shevers told us, "they said it just couldn't be done."

Then, during a chance encounter with executives from the newly reconstituted Castleberry Instruments and Avionics, Shevers told us he made the pitch one last time. Castle-

CHECKLIST

-  At \$1599, this is the least expensive electric attitude indicator available.
-  Design is based on—but isn't identical to—the AIM 300-14, a proven product.
-  Components are of high quality and the mechanism is smooth and balanced.
-  The instrument needs to be shipped in a bigger box with more generous padding.



Sporty's gyro is a more complex but higher quality instrument than the old RC Allen design, top photo, lower. To legally replace a turn instrument, the new gyro has a ball inclinometer, lower photo.

berry said it couldn't meet the \$1000 price point, but how about \$1400? Shevers agreed and added \$200 on top for the final price. The only catch: Shevers would have to order 1000 instruments up front in order for Castleberry to realize the economy of scale necessary to beat the price back. Instrument manufacturers are accustomed to Ferrari-like production volumes; a dozen gyros is a huge order. Overnight, Castleberry morphed into the Ford Motor Company of electric gyros, hence the bargain price.

The AIM Gyro

Long-time owners and pilots recall what used to be known as the AIM gyro, or technically the AIM 300-

14, originally designed by a company called Aviation Instrument Manufacturing. The 300-14 has been through various iterations and companies and has been available in both vacuum and electric versions. The AIM 1100 electric gyro still built by L-3 is a relative of the original AIM, L-3 having bought the line from Goodrich. The new Sporty's gyro—officially the 300-14E(L)—is also related to the original product but to avoid infringement, Castleberry's Ron Gibson told us the design was carefully reviewed by L-3, who was reportedly satisfied that it's a different enough instrument to have raise no infringement beefs.

Our independent evaluation of the gyro by Dave Vorsas at Triumph Instruments and Avionics in Fort Lauderdale, Florida (formerly JDC, see *Aviation Consumer*, January 2005) confirms that the Sporty's gyro is not just different than what most of us know as the "old AIM," but also improved. More on that later.

Gibson told us Castleberry has ruggedized the gyro's mechanical and electronic guts and added a controller that minimizes power consumption. Theoretically, this makes the gyro run cooler and should improve service life. The instrument also has an improved gyro motor, although the basic configuration of the instrument is similar to vacuum-powered AIs. It's available in 14- or 28-volt models and both are shipped with internal lighting as standard equipment. The lighting requires a separate lead and can be dimmed through the panel circuit. The gyro has a two-year, 100 percent warranty through Castleberry.

Wringing It Out

Triumph's Vorsas had one immediate complaint when we showed up with the gyro. The shipping box, he said, was too small. Most companies ship gyros in double boxes, both foam lined, to prevent shipping damage, which is a common warranty complaint. In fact, Vorsas wouldn't let us leave with the original box but insisted on repacking it in a double box. Shevers told us about 77 gyros have

been shipped in the small boxes with no damage. But we're skeptical. For an extra few bucks—let the customer pay for it—we think the instruments should be double boxed, just as Castleberry ships them.

After an inspection for balance, bearing tightness and general construction—all of which Vorsas said were exceptional—the gyro was mounted on a test table and spun up. One nice touch was immediately obvious: The flag doesn't pull until the gyro is up to speed so its circuitry is equipped with a speed sensor. Very nice. It took about 30 seconds to spin up. Vorsas found the rotor balanced, with no hint of vibration.

Some fine points he noted: The pendulous vanes, which control air jets used for self-erection, pivot on bearings, not pins through holes, as gyros made to a lower standard tend to have. The vane stops have ceramic sleeves rather than shrink tubing and this minimizes sticking, another nice touch. Vorsas noted that the rotor bearing pre-load can be adjusted while in an older RC Allen gyro he showed us, the bearings were epoxied in place, something that makes them all but unreparable.

After running the gyro up to speed, Vorsas had the table simulate a series of rolling dives and climbs to test the gyro's tendency to precess. None was noted. When precession was forced by disturbing the gyro by hand, it recovered at about 2.5 degrees per second, also a good performance point. When powered down, the gyro tumbled as it spun down, indicating a slight misbalance in the rotor mechanism, something Vorsas told us wasn't much of a shortcoming. Repair shops generally try to balance gyros so the rotor won't tumble on spin-down. Some do, some don't.

Vorsas pointed to limited clearance between the bottom of the circuit board and the manual caging ring as potential long-term failure point if the board should warp or sag. But Castleberry's Gibson told us that temperature testing of the gyro revealed no interference between the board and ring. Only long-term service will reveal if this is a weak spot. We don't think it's a deal breaker by any means. Vorsas' overall view of the gyro is that it's a lot of instru-

ment for the money. "We know the guys who built this and they're good. This is not a gyro made with cost cutting as a goal," he said.

Conclusion

This doesn't happen often but this product is more than \$1000 cheaper than its closest competition—the RC Allen R26A—and, in our view, it's a better gyro. That begs the question, it is too cheap? We've seen more than one aviation product dry up and blow away because the maker simply didn't build in enough profit for long-term service and warranty work. Suppose, for example, 500 of these have to be recalled for some unknown flaw.

Will a \$200 margin per unit support that? Shevers insists Sporty's and Castleberry will stand behind the gyro and if the factory can't handle the service volume, it will release the documentation necessary for shops like Triumph to fix it. (Currently, that documentation has not been circulated, so factory service and repair is the only option.)

We're reticent to slather too moistly over new products until they've proven themselves through long-term service. Recall the dual-chamber vacuum pump fiasco of a year ago, in which the company simply folded up in the face of premature failures, leaving buyers holding the bag. Although the 300-14E(L) is a new product, the design is based on a proven gyro built by a company with a track record. (Besides, we know where Mr. Shevers lives.)

We can't think of any reason not to recommend this gyro for owners who need affordable back-up for vacuum instruments. Our review of it suggests it's exactly what Hal Shevers says it is: A high-quality gyro selling for the lowest possible cost. We would happily pay another \$30 for a bigger box with more foam padding, just as additional protection against shipping damage to the instrument's delicate bearings.

CONTACTS...

Sporty's Pilot Shop
800-776-7897
www.sportys.com

Why Not the Electronic Solution?

Panel envy is an ugly thing. While new airplanes are tarted up with color PFDs, the freckle-necked masses must make do with aging iron gyros backed up by more aging iron gyros. Or must we?

During the past five years, quite a cottage industry has sprung up making inexpensive, portable ADHRS boxes that display an impressive attitude gyro on a color PDA or tablet computer. In its 196/296/396 series, Garmin has astonished buyers by including a flight instrument page driven purely by GPS that's accurate and fast enough to display heading, speed, bank and altitude data.

Although few have come right out and said these devices are suitable for backing up a mechanical gyro, many are actually doing just that. Shortly after the GPSmap 196 appeared, we conducted a series of tests in which an extensively hooded pilot—he had a blanket over his head—was able to fly approaches successfully to a runway, using only the 196 as reference. These experiments suggested to us that the only reason these electronic gadgets aren't more widely used to back-up vacuum systems is probably due to a misplaced bias in favor of iron gyros. After all, the Garmin GPSs aren't certified and neither are the ADHRS boxes from companies such as PCFlightSystems, Blue Mountain Avionics, Control Vision, Icarus Instruments and others. We've tried these systems and found that their performance is terrific.

But has anyone actually used them in the heat of vacuum-failure battle? We posed this question to readers of our online sister publication, www.avweb.com.

"I lost all electrical power on an instrument climbout in a Cessna 210 and switched to the instrument

panel page of a Garmin 296, yoke mounted. It worked perfectly," wrote one reader.

Wrote Harold Berk: "I had occasion to use a solid state back-up attitude gyro connected to an iPAQ 3650 while IMC and initiating an approach to Half Moon Bay, California. On losing all vacuum pressure, I diverted to San Jose and landed without incident. No emergency was declared." Berk told us the PDA-based EFIS was "more than sufficient for safe operation" and that he used partial panel to confirm that the PDA was providing correct information.

Fred Allsup used a GPSmap 196, pictured below left, and has upgraded to a 296. "I have used the 296 under the hood and it does work as a back-up. I have not used it in IMC." Allsup told us location of the GPS is critical. "You can see my installation lends itself to be part of the scan."

By far, the most impressive all-electronic panel we've seen belongs to the RV-6 built by Ricardo Salinas of Miami, below right. "I have a Dynon 10A and a Garmin 296 as my sole flying instruments," he wrote. "Both have worked flawlessly and both have internal and independent battery back-up systems. I have totally removed the vacuum system."

Our impression from this informal survey is that non-certified electronic-based attitude systems are gaining favor among owners as a back-up solution. A couple of readers who have evolved several iterations of these systems say they've become more reliable.

So, to answer our headline question asking why not use an electronic solution? We can't think of a good reason, other than cultural inertia. Somehow, an FAA-certified iron gyro just seems more reliable when, in fact, it's probably not.

