View From Above

Sigma Tek's popular-priced HSI brings sophisticated navigation to the little plane

By Keith Connes

Until recently, the HSI (horizontal situation indicator) has been considered a posh instrument normally found in the panels of corporate twins and sophisticated singles. However, a company called Sigma-Tek has helped popularize the HSI with a new design offering a good combination of reliability and relative economy.

According to Sigma-Tek's Marketing Vice President Bill Carlon, the HSI is finding its way into panels of Skyhawks and even Cherokee 140s, and at this writing, orders have outpaced production by five months.

How the HSI Works

The HSI combines the functions of two instruments—the VOR/LOC/GS course deviation indicator and the directional gyro—into one. This reduces your instrument scan and provides a clearer picture of your plane's position relative to a navigational fix, such as a VOR, ILS or waypoint. And since one instrument has taken the place of two, you now have a conveniently-located vacant hole for a Stormscope, etc.

Working in the same way as a DG, the HSI's compass card rotates with the plane's change of heading. Moreover, the course pointer and course deviation bar (equivalent to the needle of the conventional CDI) also rotate. An airplane symbol, representing a view of your plane as seen from above, remains fixed in the center of the instrument. This enables you to visualize the plane's relationship to the nav fix. A moveable bug provides heading reference for an autopilot, or simply acts as a reminder of the desired heading if the plane is flown manually.

When intercepting a radial or localizer, one commonly used technique is to continually adjust the aircraft's heading in a manner that keeps the top of the course deviation bar touching the lubber line. This gives a smooth interception without overshoot.

The HSI makes it as easy to keep the localizer nailed on a back course as it is on the front course. Simply remember that the course arrow should always be set on the *front course inbound localizer course*. In effect, you are turning the display upside down—which you can't do with a standard CDI—and therefore you will not have the confusion of reverse sensing. So even on a back course approach, fly toward the deviation bar when on the localizer—just as long as you've set the pointer to the front course.

An HSI also helps take some of the curse out of holding patterns, where a good sense of orientation is important.

Starting at $2,473, Sigma Tek's HSI takes the place of two instruments, leaving room in your panel for that other black box you've had your eye on.

As with a CDI, there is a deviation scale, with full-scale deflection of 10 degrees right or left when tuned to a VOR and 2½ degrees when tuned to a localizer. Also, most Lorans interface with a CDI or HSI to provide left-right steering information to the active waypoint. Glideslope deviation information is shown by means of an arrow or bar on one or both sides of the instrument.

Some HSIs are slaved and others are non-slaved. The slaved HSI is coupled to a remote-mounted magnetic flux detector that constantly updates the instrument's reference to magnetic north and keeps the rotating card in alignment by means of servos. The non-slaved HSI does not have this magnetic reference. Like a DG, it must be set to the plane's compass, and should be monitored regularly for precession during flight and reset as necessary.

Incidentally, you may have seen an HSI under an alias. King calls its display units a PNI (pictorial navigation indicator), while Century uses the desig-

ployee relations director for ERA Helicopter for less than a year, but he's already made his first recruiting trip to Spartan. "Spartan has a good reputation at ERA," explains Hightower. "The students are technically sound, very work oriented, quite serious. Our maintenance department prefers someone who took a full-fledged program like Spartan's."

Bullfrog Aviation of Owensboro, Ky., hired Gary Minnick about one month before graduation. "It's the only instrument shop in Kentucky," says Minnick proudly. And rightly so, since he built the shop from the ground up.

"The placement department at Spartan is quite special," said Minnick, "I had two other offers, but I accepted Bullfrog's because of the challenge. It's the biggest FBO within 150 miles and needed an instrument shop. I was involved in everything, even the plumbing."

According to Don Logan, supervisor of avionics shops for Pan American World Airways, Spartan and Pan Am "go way back." Pan American was founded in 1927 and Spartan in 1928. "We've been hiring Spartan students since the school started," Logan continued.

Rockwell International regularly hires Spartan graduates for several of its locations, including the facility in Tulsa, Okla.

"Back in the 757 days," said David Potts of Rockwell's personnel department, "we used a number of Spartan students. Spartan's always been a valuable employment source for Rockwell. I've always had an excellent relationship with Spartan's placement office. I've been able to call and say I need 10 of these or 50 of those and they always come through."

If anyone is more enthusiastic about Spartan graduates than the Spartan staff, it's Pete Clarke, director of support shops for U.S. Air in Pittsburgh. "The people Spartan has placed here are fantastic. They have a good attitude, are well trained; I just can't say enough about them. We assign Spartan grads to our most difficult products, ADCs and gyros, immediately. Ted Roberts, our instrument shop foreman, is a Spartan graduate, and in that shop alone, we have Doug Keane, Chris Hollister, Rolf Peter and Ernie Fretz, all from Spartan."

"Naturally, our placement rates fluctuate," said Qaiser Khan, director of placement at Spartan, "but even in the early '80s when aviation as a whole was in bad shape, we still placed four ou of five graduates within a few months of graduation, and in their chosen field. Now, with everything looking up, we're doing even better."

"Salaries vary," said Sheryl Grigsby, Khan's assistant, "but our average A&P graduate will make $8 to $9 an hour his or her first month on the job. Avionics and instrument graduates will be slightly higher, about $8 to $11. And remember, these are entry level positions. Of course, we do have some exceptional graduates who do much better than that."

Spartan's dedication to training for industry is apparent throughout the school. When the helicopter maintenance field was glutted with Vietnam era veterans, Spartan dropped the program. Now, as the demand for helicopter techs rises, the course has been reinstated. Changes in the quality control program, intense training for the FCC General License, the combining of airframe and avionics training, the obtaining of an FAA repair station certificate for instruments, all represent steps taken to ensure that the Spartan graduate has a skill the industry needs. *P&P*

tion NSD (navigational situation display). They all do the same kind of job.

For more details on the use of this instrument, see the "HSI/Flight Director Primer" in the June 1984 issue of *PLANE & PILOT*.

Sigma-Tek's HSI

Sigma-Tek was formed in 1983 by four former executives of Edo Corporation to purchase the assets of Edo's instrument division. Edo had been developing a new-concept HSI since 1978, and Sigma-Tek completed the development.

Model IU445 is an air-driven, nonslaved HSI whose design eliminates a lot of the parts that are found on a conventional HSI. According to Sigma-Tek President Bob Castleberry, the standard HSI contains a large 30-cycle resolver, a device that is needed to communicate the pilot's selected radial to the nav converter. The IU445 does the job with a patented system using two smaller 400-cycle resolvers. This and other design improvements permits the elimination of servo transducers, servo amplifiers, servo motors, belts, pulleys, brushes and slip rings—which, in turn, says Castleberry, greatly improves reliability.

What's more, the wheel (gyro) has twice the angular momentum of a standard gyro and therefore a greater resistance to drift, or precession.

I had one of the first of the Sigma-Tek