



Simulation nation

Alone in the King Air with one engine shut down, the harried pilot was preparing for an instrument approach to a fog-shrouded airport when the attitude indicator and directional gyro failed.

But instead of cursing Hawker Beechcraft, manufacturer of the twin-engine turboprop; the weather; or fate for his predicament, pilot Eric Schoneberger only had harsh words for his friend, Nashua Flight Simulator owner Steve Cunningham.

“Jeez, you’re really piling it on today!” he grumbled as the altimeter wound down below 700 feet agl. “Looks like we’re going all the way down to ILS minimums.”

Schoneberger, 54, a former Delta Air Lines and U.S. Navy pilot, followed the needles all the way to 200 feet and wrestled the airplane to the runway centerline while Cunningham, sitting a few feet away at a computer console, peeked into the elaborate flight simulator that he had turned into an IFR torture chamber. Cunningham had controlled the whole make-believe scenario, adding one emergency on top of another, to see how many of them Schoneberger, one of 14 contract flight instructors at Nashua Flight Simulator, could juggle.

Cunningham, a pilot, entrepreneur, and former fundraiser for the U.S. Aerobatic Team, says he founded the New Hampshire-based company to bring realistic, scenario-based flight simulator training to fellow general aviation pilots. Airlines and the military pioneered sophisticated flight simulators to improve the quality and lower the cost of flight training, and they have improved their technology and processes for more than two decades. Now, GA flight schools are beginning to adopt similar techniques tailored for GA pilots.

When avgas prices spiked in 2008 and the costs of flying real airplanes surged, flight schools with FAA-approved simulators say they saw the demand for simulation grow while their fleets of actual airplanes flew less. And flight-

Flight simulator training
for general aviation

By Dave Hirschman

training software designer Elite Simulation Solutions said high avgas prices—and a growing preference among flight schools for high-end simulators—helped to push the company’s sales to record levels last year.

“The surge in avgas prices was actually a blessing in disguise for us,” said Stephen Gatlin, Elite’s marketing director. “People began to evaluate the alternatives, and they saw how valuable simulator training could be.”

FAA regulations allow student pilots to log up to 2.5 hours of flight simulator time toward their private certificates, 20 hours for instrument training, and 50 hours for commercial certificates. Without fuel, mechanical wear and tear, or insurance costs, the hourly rate for flight simulators can amount to less than one-third that of an airplane rental. And proponents say the learning experience in flight simulators can be as good as—or better—than in real airplanes.

Instead of a noisy, stressful cockpit, flight simulator students learn in a quiet, darkened, climate-controlled room. When they make mistakes, instructors can hit the pause button and review errors on the spot instead of a post-flight debrief hours later. Then they can rewind and replay the scenario, allowing students to do failed tasks over while the information is still fresh in their minds.

Also, flight simulator students learning instrument procedures can fly many more approaches per hour. Instructors can simply

reposition the simulated aircraft with a few key strokes to avoid time-consuming repositioning or air traffic control delays.

Elite’s Gatlin said the company designed its IFR flight simulators for pilots that already know the mechanics of taking off and landing, so the control feel of maneuvering the simulator during those phases of flight can’t exactly duplicate the real thing.

But Jerry Williams, founder of Sonoran Wings (www.sonoran-wings.com), an Arizona flight school that uses simulators based on popular, graphics-rich Microsoft flight simulations, puts primary student pilots in simulators from the first day they show up for training. He also makes extensive use of simulators in a combined private/instrument flight training course his school offers.

“The most important feature on our flight simulators is the pause button,” Williams said. “The ability to stop and review something the moment it happens accelerates training and reinforces learning. We’re dramatically reducing the time, cost, and risk associated with traditional flight training. I’m convinced we’re producing far better pilots because we use simulators so extensively.”

So far, the GA flight schools that use simulators have emphasized them in IFR training and private pilot under-the-hood time. But Williams said the simulators can be valuable in every aspect of training, beginning with the pre-solo phase. And for private

A flight instructor at a computerized control station presents pilots with challenging and changing scenarios during simulator training sessions. By confronting complex, true-to-life emergencies in the simulator, pilots can gain critical experience without leaving the ground.





Glass-panel avionics such as the Garmin G1000 (left) have created new demand for flight simulation firms. Steve Cunningham (below) believes realistic, cost-effective training will improve GA flight safety.



and commercial training, which concentrates heavily on VFR maneuvering, Williams has students practice and perfect turns around a point, steep turns, and lazy eights in the simulator before performing the same maneuvers in an airplane. The simulators can be much more sensitive and harder to fly than real airplanes, he said, so once students can perform the maneuvers “in the box,” they usually find doing them in airplanes relatively simple.

“Students recognize early on that their performance goes up and their total costs go down when they make use of simulation,” Williams said. “They’re introduced to new maneuvers and concepts in the simulator, and they practice them there, so they know what they’re doing when they get to the airplane.”

Flight simulator owners say they are used to getting resistance from flight instructors who prefer building flight time in real airplanes. Instructors can’t log flight simulation as pilot-in-command experience, and that’s a limitation for those building qualifications for airline or corporate pilot positions that require large amounts of PIC time. But Williams said he’s seen instructors change their minds when they see how quickly their students progress in simulators—and they realize that the first thing a prospective employer is likely to do with them is put them in an airline flight simulator for an evaluation.

“It’s not easy for a 20-year-old to admit a 70-year-old is right about anything,” said Williams, who began using simulation when teaching firefighters in the 1960s. “But my instructors do great on their airline sim rides—and they all admit that their extensive flight simulator experience helps them when they get there.”

Flight simulator owners say the move toward glass panels in GA aircraft also has been good for business. It’s one thing to read Garmin’s G1000 manual, or take an online

tutorial on the company’s Web site (www.garmin.com). But programming a GNS530 or GNS430 in an actual cockpit environment, activating the flight plan, and changing it en route to their destination is a much richer educational experience. And it’s far less expensive to get that training in a flight simulator than in an airplane with the engine running.

The most sophisticated GA flight simulators also can replicate failures of glass panel components—something that’s usually off limits or difficult to reproduce in real aircraft. A few companies sell plastic strips that can cover or put a red X in a portion of a G1000 display, for example. But simulators can show what it looks like when the AHRS or air data computer malfunctions in flight.

Flight simulators for GA pilots range in price and sophistication from personal computer-based ATDs (aviation training devices) that typically sell for about \$7,000 to enclosed, fiberglass, multi-screen AATDs (advanced aviation training devices) that, in some cases, are more costly to buy than actual training airplanes. Cunningham’s top-of-the-line simulator, for example, cost about \$100,000 including the GNS530 and multiple “personalities” that replicate specific aircraft types. The simulator is wider (64 inches) than an actual King Air cockpit since there’s no need for sleek aerodynamics.

Cunningham’s firm specializes in instrument flight and recurrent training required by insurance companies for high-performance aircraft including the King Air, Beechcraft Baron, and Beechcraft Bonanza. Federal aviation regulations require all IFR pilots to perform at least six instrument approaches, holding, intercepting, and tracking every six months to maintain IFR currency.

Cunningham’s company offers a package that includes the required procedures as well as a challenging set of in-flight emergencies

that include vacuum pump failures (loss of attitude indicator and directional gyro), pitot ice (loss of airspeed indication), and clogged static ports (unreliable altimeter, airspeed, and vertical speed readings). All instrument pilots become familiar with those concepts when studying for IFR practical and knowledge tests, but few actually encounter them in the training environment.

“The simulator allows us to show pilots what those kinds of failures look like up close,” Cunningham said. “It’s very realistic, and it goes far beyond the academic. We guarantee that our students will learn about those situations and know how to deal with them before they face them in actual IMC.”

Cunningham said his company is using its Nashua center to prove concepts it seeks to expand at training centers elsewhere. His company doesn’t own any training aircraft—but that may change. In order to give complete IFR checkrides and instrument proficiency checks, the FAA requires that students demonstrate circle-to-land and unusual attitude recoveries in real airplanes. Cunningham plans to perform those maneuvers in the air and the rest of the required tasks in simulators.

“I’ve always had a passion for aviation, and I want to do something that makes a lasting contribution to aviation safety,” said Cunningham, an instrument-rated pilot who owns and flies a Piper Cherokee 180. “Realistic, cost-effective simulator training is the best way that I’ve seen to improve general aviation safety and help preserve the freedoms we enjoy as pilots.”

Dave Hirschman is a senior editor for AOPA Flight Training and AOPA Pilot magazines. He is an airline transport pilot and flight instructor who has specialized in tailwheel and aerobatic instruction since 1999.