



SWEEPSUPDATE

A MONTHLY UPDATE ON THE PROGRESS OF YOUR SWEEPSTAKES AIRPLANE



Airbags in the SR22

Automotive technology enters the cockpit **BY DAVE HIRSCHMAN**

The padded, snug-fitting shoulder straps in the front seats of the 2009 AOPA Let's Go Flying Sweepstakes SR22 feel much the same as any others—but they contain a hidden and potentially lifesaving technology. Airbags.

Just as airbags have vastly improved automotive safety in the last 15 years, the technology is moving into general aviation with some very encouraging early results. So far, manufacturer AmSafe claims 11 lives saved by airbags, and that number is likely to grow as the number of airbags in the GA fleet increases.

"Airbags are going to become as common in the GA fleet as they are in cars," says Bill Hagan, president of AmSafe's aviation division. "The extent to which airbags improve aviation safety is huge. Airbags can absolutely prevent death or serious injury in a broad variety of aviation accidents."

AmSafe doesn't quantify the speed or descent rates at which airbags can make aircraft accidents survivable. But Hagan said airbags have been shown to save lives and lessen the severity of injuries across a broad spectrum of takeoff and landing accidents, as well as forced landings in which pilots maintain control of their aircraft to the ground.



Airbag technology has made dramatic improvements in highway safety. Now the potentially lifesaving airbags are available to the GA fleet.

PHOTOGRAPHY BY CHRIS ROSE



Installing airbag seatbelts involved removing the front seats, putting a crash sensor on the floor (above), and modifying each seat with new hardware.

Roll servo upgrade

One perplexing characteristic of the Let's Go Flying SR22 was its occasional, but undeniable, tendency to "hunt" on the localizer. During ILS, localizer, or WAAS approaches, the airplane would bank left and right—and the oscillations got bigger, not smaller, all the way to decision height (or the missed approach point).

How big were the oscillations? Sometimes they were almost nonexistent. At other times, they reached 30 degrees of bank. AOPA Air Safety Foundation Chief Instructor J.J. Greenway summed up the situation succinctly by pointing out that "If this autopilot were an instrument student, it would fail its checkride."

Interestingly, the S-Tec System Fifty Five X performed beautifully in the cross-country phase of flight, and heading, nav, and GPS steering modes worked as advertised. It was only on approach in the nav mode that things got ugly. In fact, the autopilot's performance could be so unpredictable that I stopped flying coupled approaches in actual IMC and made it a point to hand fly the airplane for the last five miles to the runway.

When we brought up the problem with S-Tec, company officials said they'd heard it all before, and the problem went deeper than the autopilot. Cirrus owners have complained for years that their Fifty Five X-equipped airplanes wandered on final approach, and S-Tec examined many autopilots—all of which, the company said, were fine. The problem is the way the spring-cartridge controls in the flight control system in Cirrus aircraft interact with the autopilot system.

"You could take two airplanes off the Cirrus production line and their trim cartridges would behave much differently," said Rick Januszewski, regional sales manager for S-Tec owner Cobham. "We were getting lots of complaints from owners who said their autopilots just wouldn't fly right on instrument approaches."

S-Tec began offering its own solution two years ago in the form of a roll servo kit for Cirrus aircraft. By installing traditional roll servos, the autopilot can command the aircraft with greater precision and authority.

About 60 Cirrus owners have bought the roll servo kit, which carries a retail price of just under \$5,000 plus 15 to 20 shop hours for installation.

AOPA hired Lancaster Avionics in Lancaster, Pennsylvania, to upgrade the Let's Go Flying SR22, and the results have been remarkable. The weeklong installation has enabled the Let's Go Flying SR22 to fly ILS, localizer, and WAAS approaches steadily with no wandering other than wind correction. The vertical guidance was always spot on, but now it's matched by solid roll performance.

I'm confident enough in the new system to let the autopilot fly all the way down to minimums.

"Letting the autopilot fly the approaches allows pilots to monitor the situation, see the big picture, and think much farther ahead," Januszewski said. "These technologically advanced airplanes have tremendous capabilities such as flying coupled approaches. Roll servos in Cirrus aircraft allow pilots to get the most out of their aircraft's capabilities."

—DH

In one case, a student and instructor practicing night touch-and-go landings in an airbag-equipped Cessna 172 lost their bearings and flew into a heavily forested area at normal approach speed. Both walked away from the accident with minor injuries. Another event involved a botched go-around in a Cirrus SR22 in which the airplane cartwheeled and was destroyed—yet both occupants survived.

According to the AOPA Air Safety Foundation's *Nall Report*, light GA airplanes sustained 6,448 accidents in the decade ending in 2007 during takeoffs, landings, or go-arounds in which 842 people were killed and 731 seriously injured. Takeoff accidents accounted for 28 percent of the total but caused more than half of the casualties. Landing accidents were the most numerous (4,166 accidents during the period) but the least harmful with 131 deaths and 226 serious injuries.

AmSafe began installing airbag seatbelts in GA aircraft in 2001, and they

have become standard equipment in 80 percent of the new single-engine airplanes manufactured today. About 17,000 sets of airbag seatbelts have been installed on GA aircraft, and that figure includes a growing number of retrofits in the existing fleet through STCs. All new Cirrus aircraft have them, and AOPA wanted the Let's Go Flying SR22 (a G2/GTS model built in 2005) to carry them as well.

The retrofit installation in the Let's Go Flying SR22 was performed at Landmark Aviation in Frederick, Maryland, and came with a total retail price of about

\$5,000. The Cirrus retrofit required two days (24 shop hours) to complete and involved modifications to the airplane's composite floor and extensive work on both front seats. The installation also added about two pounds to the airplane's empty weight.

AmSafe officials say Cirrus retrofits are among the most labor-intensive airbag installations, and the safety equipment can be added to other aircraft in less time. Airbag kits typically sell for \$1,500 to \$1,750 per seat without installation. The amount of labor to install them varies from about eight

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Each AmSafe kit comes with specialized hardware such as a helium canister and inertia reel (above). The items that power the airbags are installed deep within the aircraft seats.

to 25 hours depending on the type of aircraft.

Lee Langston, an AmSafe field service technician based in Phoenix, Arizona, has installed seatbelt airbags in airplanes ranging from Cessna 172s to Airbus A380s, and he helped guide the installation in the Let’s Go Flying SR22.

After removing the front seats, technicians applied a composite patch to the floor on the passenger side of the aircraft. The reinforced flooring holds a mechanical crash sensor that tells the airbags when to fire. The sensor measures the severity and duration of the forces acting on the aircraft, and it only tells the airbags to deploy if there’s a for-

ward deceleration of nine Gs or more. Turbulence doesn’t register, and neither will a hard landing.

“There’s never been an inadvertent airbag deployment involving any of our aircraft systems,” Hagan said. “You’ve got to hit something solid to deploy the airbags.”

Hagan said seatbelt-mounted airbags are far superior to those in cars that deploy toward the occupants. There have been numerous injuries—particularly among small children and the elderly—caused by automobile airbags themselves. But since airbag seatbelts in airplanes deploy away from the occupants, they’re not a threat to young children or older people.

“It’s a huge advantage for the airbags to deploy away from the occupants,” Hagan said. “There’s no risk of injury from the airbags themselves, and they’re OK for a small child to wear as well as a 240-pound adult male.”

Airbag seatbelts require periodic maintenance. At each annual inspection, a technician performs a diagnostic check of the system that takes about two minutes to complete. Also, the battery pack that powers the crash sensor (and is separate from the aircraft electrical system) must be replaced every seven years, and the gas canisters that fill the airbags (with helium) have a 10-year life limit.

To date, aviation insurance companies have not yet offered premium reductions to the owners of airbag-equipped airframes, but AmSafe and AOPA are hopeful that the technology will prove so beneficial that owners will qualify for rate reductions. Those rate reductions could go a long way toward justifying the added cost of airbags for individual owners, and increase the use of airbags throughout the GA fleet.

Hagan said airbag seatbelts for GA are the first product AmSafe has ever attempted to sell directly to individual owners. All its other products are sold to vehicle or component manufacturers. So far, GA pilots have been slow to adopt the technology, but Hagan said that’s changing.

“When you present them with the information, it doesn’t take long for pilots and aircraft owners to see the advantages,” he said. “It’s not going to happen overnight—but airbags are going to make a major contribution to improving aviation safety.”

AOPA

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