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NTSB: GA airbags, shoulder harnesses save lives

By Paul Lowe

After a study of the effectiveness of airbags and restraints, the NTSB has concluded that airbags in general aviation would save lives and urged the FAA—as a first step—to require retrofits of shoulder harnesses on GA airplanes that are not currently equipped with such restraints, among other recommendations. The recommendation stems from a safety study to examine the effectiveness of airbags in mitigating occupant injury in an otherwise survivable GA accident, to identify any unintended consequences of airbag deployments and to help investigators analyze airbag systems in future investigations.

"Although airbags have been mandated in automobiles for more than a decade, the aviation industry has no such requirement for small aircraft," said NTSB chairman Deborah Hersman. "The good news is that more than 30 [aircraft] manufacturers have stepped up to the plate and offer airbags as standard or optional equipment."

The study, which was adopted in January by the five-member Safety Board, found that GA airplanes equipped with airbags provide additional protection to occupants in accidents involving survivable forward impacts.

In the study of 88 accidents involving airbag-equipped airplanes that occurred between 2006 and 2009, no instances were found where an airbag caused harm in properly restrained occupants. In addition, the study found 10 survivable accidents in which the crash forces were severe enough to cause injury and/or to deploy the airbag.

A Little-known Safety Option

During the meeting to adopt the airbag study, one of the more surprising revelations was the fact that GA pilots and operators are unaware that airbags are available for many of the most popular makes of GA aircraft.

"I encourage the general aviation aircraft manufacturers to offer airbags as standard equipment, and aircraft owners to use the power of the purse and push for even greater availability of these injury-preventing devices," Hersman said. "Because airbag restraint systems employ attachment points that are similar to restraint systems without airbags, very few design changes are needed to install them."

Airbags were certified for pilot and copilot seats on GA aircraft in 2003, and as of last August, they have been installed in nearly 18,000 seats in more than 7,000 GA aircraft.

Unlike automotive airbags that typically deploy from the steering wheel, instrument panel or above the window, airbags in GA aircraft are installed in the lap belt or shoulder harness portions of the restraint system and are designed to deploy outward from the pilot or occupant.

Sled tests conducted under controlled conditions have suggested that aviation airbags may increase survivability and reduce injury in actual aviation accidents. But no systematic evaluations have been conducted to evaluate their efficacy in the variables that accompany real accidents.

While acknowledging that \$3,000 for a two-seat retrofit might not be cheap, Hersman maintained that, relative to the safety benefit and the cost of a new airplane, it is a good investment. Both Cessna and Cirrus were early adopters of airbags manufactured by Phoenix-based [AmSafe](#), currently the only source for general aviation aircraft. A Cirrus SR-20/22 interior was used in the sled tests.

The Board acknowledged that many pilots and owners are largely unaware of the availability of aviation airbags. Board member Earl Weener, a private pilot, noted there are no business aircraft on the list of aircraft for which Amsafe makes retrofittable airbags. Board member Robert Sumwalt, a former corporate and airline pilot, told of a company that is refurbishing a King Air and was not aware that airbags are available for retrofit. "In this particular case, it was an organization that would spend the money to do the right thing if it had known [airbags are] available," he said. "So we've got to get the word out to the flight departments, to the interior shops and the people who are providing the refurbishments to help them understand that these are options."

According to Joseph Kolly, director of the NTSB's office of research and engineering, board members and the agency's staff are going to be engaged in advocacy efforts for installation of airbags and shoulder harnesses.

"We intend to provide information to the various organizations that promote GA safety on the summary information of this study," he said, "to get the word out before the effectiveness of any of our recommendations really gets a chance to gain hold."

The study also noted that there were no negative consequences as a result of airbag deployments. For example, there were no cases in which airbags were expected to deploy but did not. Nor

were there any cases that involved airbags deploying under unexpected circumstances, hindering egress, fueling post-crash fires or interfering with rescue attempts.

However, the Board did note certain airbag-specific issues. In some aircraft types, the seatbelts in the left and right seats can become reversed, which could result in the wrong airbag being activated if only one of the seats is occupied.

There were also concerns about optimal airbag protection for occupants whose body mass index (BMI) classifies them as either overweight or obese (BMI of 25 or higher). The NTSB questions whether the airbag-equipped restraints were designed and tested with the high-BMI population in mind.

Shoulder Harness Benefits

The study also affirmed that correctly installed shoulder harness/lap belt combinations provide "significantly greater protection" in GA accidents than that offered by a lap belt alone.

Based on an analysis of more than 37,000 GA accidents between 1983 and 2008, the Board concluded that the risk of fatal or serious injury was 50 percent higher when an occupant was restrained only by a lap belt compared with the combination of lap belt and shoulder harness.

"Shoulder harnesses save lives," Hersman said. "It's up to the FAA to ensure that all GA airplanes are retrofitted to include them."