



NTSB National Transportation Safety Board

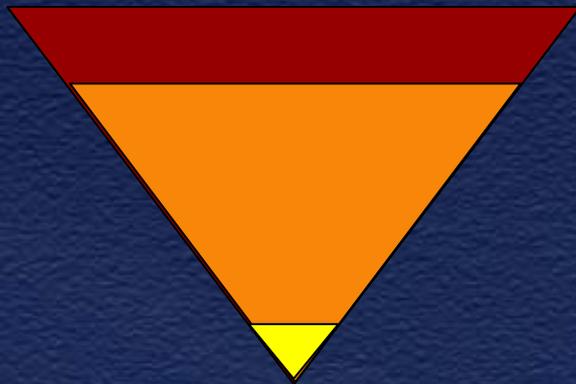
Office of Research and Engineering

Results and Discussion

Jana Price, Ph.D.

Notifications and Study Cases

- Data collection: 8/06 – 7/09



138 Events in the US
117 Survivable
10 Study Cases

- No unexpected deployments

Accidents

City, State	Make/Model	Airplane Damage	Airbag Deployed	Principal Direction of Force
Boyceville, WI	Cirrus SR22	Substantial	Yes	Longitudinal-Forward
Owyhee, OR	Aviat A-1B	Substantial	No	Vertical-Upward
Indianapolis, IN	Cirrus SR22	Destroyed	Yes	Vertical-Downward
Athens, TX	Cessna T182T	Substantial	No	Vertical-Upward
Fullerton, CA	Cessna 172S	Substantial	Yes	Longitudinal-Forward
Groton, CT	Cessna 172S	Substantial	Yes	Longitudinal-Forward
Green Cove Springs, FL	Cirrus SR20	Substantial	Yes	Longitudinal-Forward
Steamboat Springs, CO	Cirrus SR22	Substantial	Yes	Longitudinal-Forward
Stigler, OK	Cessna 182T	Substantial	No	Vertical-Downward
Boyd, TX	Cessna 172S	Substantial	Yes	Longitudinal-Forward

Occupant Demographics

- 10 accidents, 25 occupants
- 18 males, 7 females
- Age: 13 to 72
- Height: 4' 11" to 6' 9"
- Weight: 97 to 290 lbs
- More than 1/3 overweight or obese

Injuries and Restraint Type

- 25 occupants: 1 fatal, 7 serious, 12 minor, 5 none
- All occupants wore lap belt/shoulder harness combinations
- 17 had airbag systems, 12 deployed
- 2 occupants' injuries were mitigated by airbags

Additional Restraint Issues

- Incorrect usage or adjustment of restraint systems
- Restraint design issues affecting nonnormative populations
- Shoulder harness effectiveness

Incorrect Usage or Adjustment of Restraint Systems

- Inadvertently activating incorrect 3-point restraint (Athens, TX)
- Incorrectly adjusting 4-point restraints (Steamboat Springs, CO)

Nonnormative Populations

- Offset airbag position (Fullerton, CA)
- Special conditions specify 5th percentile female through 95th percentile male
- FAA dynamic tests specify 170 lb test dummy, 20 lbs less than average flight crewmember weight

Shoulder Harness Effectiveness

- Analysis of over 37,000 GA accidents between 1983 and 2008
- Risk of fatal or serious injury 50 percent higher with lap belt alone compared to lap belt/shoulder harness combination

A-77-071

- “Amend CFR91.33 and .39 to require installation of approved shoulder harnesses on all general aviation aircraft manufactured before July 18, 1978, after a reasonable lead time, and at all seat locations as outlined in NPRM 73-1.”
- FAA issued AC-21-34 to provide guidance on retrofitting shoulder harnesses

Shoulder Harness Availability

- At least 13 percent of accident involved GA airplanes have not been retrofitted with shoulder harnesses
- Fatalities and injuries would be reduced if lap belt/shoulder harness combinations were used in all small airplanes

Data Systems

- Current airbag systems do not record any data about crash dynamics or airbag deployment
- FAA does not track the installation of safety technologies



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