

Aftermarket Safety Equipment

The installation and use of aftermarket safety equipment like shoulder harnesses, engine monitoring equipment, enhanced and synthetic vision systems, and angle of attack indicators, can significantly reduce the likelihood or severity of some general aviation (GA) accidents.

Fasten Your Seatbelt

Many GA aircraft are limited to single-belt restraint systems, but adding shoulder belts can give you the best chance of sustaining minimal or no injury in many accident scenarios. Some of these systems also integrate inertia reels and rotary buckles with quick-disconnect release mechanisms. It's fairly common to have this kind of equipment installed via a Supplemental Type Certificate (STC) for many older GA aircraft with single-belt restraints.

Airbag seatbelts are another safety-enhancing option worthy of consideration. Several aircraft manufacturers now provide them as standard equipment, and there's a growing aftermarket

installation business for airbag seatbelts. These systems are designed to deploy once a certain amount of consistent longitudinal deceleration is detected and to protect occupants from striking the glare shield, instrument panel, and control yoke.

It's also a good idea to be familiar with your seat belt



AmSafe's Seatbelt Airbag System (SOARS) is an example of an aftermarket lapbelt airbag restraint system, which is designed to mitigate head and torso injury in aircraft crash conditions. *Photo courtesy AmSafe, Inc.*

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system, especially if you install something new, as the latches could open left to right, or right to left. It may not seem like a big deal, but during an emergency, your ability to release a seat belt and exit the aircraft may be compromised by darkness, smoke, or injury. You may also find that some buckles are difficult or impossible to open under load. Using one hand on or under the seat can help take the strain off the buckle before releasing the latch.

Recording in Progress

Additional safety features suitable for GA airplanes are flight data monitoring and recording systems.

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Manufacturers offer self-contained flight data and visual data recorders that can record important flight parameters like heading, altitude, and airspeed, as well as track aircraft component life and wear. Most operators of this equipment must periodically download and analyze the recorded data — often with the aid of dedicated computer programs.

Smartphones with GPS and accelerometer functionality can also act as very capable flight data recorders. In a joint effort with the FAA, the MITRE Corporation developed the General Aviation Airborne Recording Device (GAARD). GAARD is an easy-to-use flight data recording app found on the [App Store](#) or [Google Play](#) and can be used on its own with your smartphone. Similarly, GAARD can also be integrated with an aircraft's Attitude Heading Reference System (AHRS) or Automatic Dependent Surveillance–Broadcast (ADS-B) system to capture additional parameters with greater fidelity.

The Eyes Have It

Enhanced Vision (EV) systems use sensors on the aircraft to “see through” weather or darkness. While this sensor comes in a variety of forms, by far the most common is infrared (IR), which senses temperature differences and produces a high quality, real-time image of the outside scene. IR cameras are available for installation on GA airplanes, and their output can be displayed on multi-function displays. They are quite useful in depicting terrain in weather or on a dark night.

Synthetic vision (SV) is another option that tends to be more accessible in terms of cost and equipment. SV combines imagery from sensors and navigation systems to create a virtual view. This picture of the flight environment is overlaid with aircraft instrumentation and weather information to create a single image that contains all of the information necessary for safe flight operations.

A New Angle on Safety

Although they have been used for years mainly on military aircraft, angle of attack (AOA) indicators have become increasingly popular on GA aircraft. This is mainly due to a 2014 FAA policy that simplified the design approval requirements for AOA indicators. As a result, this life-saving technology is showing up on more new aircraft and is available in a number of more affordable options for retrofit as well.

Published in July 2016, the FAA's Non-Required Safety Enhancing Equipment (NORSEE) policy includes avionics, electronic instruments, displays, and mechanical equipment for 14 CFR parts 23, 27, and 29 aircraft. Equipment approved as NORSEE has a variety of uses, including increasing overall situational awareness; providing information that is in addition to the aircraft primary system; providing independent cautionary or warning indications; and providing additional safety protections.

Equipment that could be considered NORSEE includes, but is not limited to, traffic advisory systems, terrain awareness and warning systems, attitude indicators, fire extinguishing systems, and autopilot or stability augmentation systems.

NORSEE does not bypass the existing certification processes or the current level of FAA oversight; approval is based on the idea that the addition offers safety benefits that outweigh the potential risks. NORSEE failure should not result in a reduction in safety.

Part 23 and Me

The next, and most recent change in the aircraft certification landscape took place in August 2017 when the final rule overhauling airworthiness standards for GA airplanes took effect. The substantial overhaul of 14 CFR part 23 enables faster installation of innovative, safety-enhancing technologies into small airplanes, while reducing costs for the aviation industry. The performance-based standards approach in the rule recognizes that there is more than one way to deliver on safety, and it offers a way for industry and the FAA to collaborate on new and existing technologies and to keep pace with evolving aviation designs and concepts.

