



NTSB

SAFETY ALERT

National Transportation Safety Board

★ **Prevent Midair Collisions: Don't Depend on Vision Alone** ★

Augment your reality to help separate safely

The problem

- The "see-and-avoid" concept has long been the foundation of midair collision prevention. However, the inherent limitations of this concept, including human limitations, environmental conditions, aircraft blind spots, and operational distractions, leave even the most diligent pilot vulnerable to the threat of a midair collision with an unseen aircraft.
- Technologies in the cockpit that display or alert of traffic conflicts, such as traffic advisory systems and automatic dependent surveillance–broadcast (ADS-B), can help pilots become aware of and maintain separation from nearby aircraft.¹ Such systems can augment reality and help compensate for the limitations of visually searching for traffic.

Related accidents

The National Transportation Safety Board (NTSB) has investigated midair collisions in high-traffic areas near airports or practice areas, in cruise flight, in controlled and uncontrolled airspace, and in a variety of weather conditions.

- A Cessna 172M and an NA265-60SC Sabreliner collided on August 16, 2015, while maneuvering for landing at Brown Field Municipal Airport, San Diego, California. The pilot (sole occupant) of the Cessna and all four crewmembers aboard the Sabreliner died. This accident occurred within controlled airspace with a relatively high traffic density. The controller failed to properly identify the aircraft in the pattern and to ensure that the control instructions were being followed before turning the Sabreliner into the Cessna's path. A postaccident simulation showed that a cockpit display of traffic information in one or both of the airplanes could have provided a traffic picture that would likely have allowed the pilots to

¹ To receive a complete traffic picture and benefit fully from this technology, aircraft must be equipped with *both* ADS-B In and ADS-B Out. Due to the design of the ADS-B system, aircraft equipped with *only* ADS-B In may be presented with incomplete traffic information. Although the information could be useful when operating near an ADS-B Out-equipped aircraft, in other situations, a pilot could potentially receive a traffic picture that omits the closest traffic, resulting in false security.

become aware of and look for the other airplane and may have prevented the accident. ([WPR15MA243A/B](#))

- A Cessna 150M and a Lockheed Martin F-16CM collided in midair near Moncks Corner, South Carolina, on July 7, 2015. The two occupants of the Cessna died, and the F-16 pilot ejected and landed safely using a parachute. The F-16 pilot was receiving air traffic control (ATC) services at the time of the collision. The controller failed to provide an appropriate resolution to the conflict between the F-16 and the Cessna. Because of the high closure rate involved, each pilot had a limited opportunity to see and avoid the other airplane. A postaccident simulation showed that technologies in the cockpit that display or alert of traffic conflicts might have provided both pilots with clear traffic depictions and/or aural alerts as the conflict developed and could have enabled them to develop a plan of action to avoid the collision. ([ERA15MA259A/B](#))
- A Beechcraft V35B and a Piper PA-28-140 collided in midair near Warrenton, Virginia, on May 28, 2012. The pilot and flight instructor aboard the Beechcraft died, and the pilot of the Piper was seriously injured during his subsequent forced landing. At the time of the collision, the Piper pilot was in contact with ATC and was receiving services but had not been alerted to the presence of the Beechcraft. Even though the controller received a conflict alert on his radar system, he assessed that there was no conflict and did not issue an immediate safety alert. A postaccident simulation showed that technologies in the cockpit that display or alert of traffic conflicts might have provided the pilots with about 30 seconds of aural and visual alerts before the collision. (Transportation Safety Board of Canada Aviation Investigation Report [A12H0001](#))
- A Piper PA-32R-300 and a Eurocopter AS350BA collided over the Hudson River near Hoboken, New Jersey, on August 8, 2009. The pilot and two passengers aboard the Piper and the pilot and five passengers aboard the Eurocopter died. ATC services were being provided, but the controller was distracted, and the aircraft collided. Both aircraft were equipped with collision avoidance technologies, but the pilots made ineffective use of the technologies to maintain their awareness of the other aircraft. (NTSB Report [AAR-10/05](#))

What can you do?

- Educate yourself about the benefits of flying an aircraft equipped with technologies that aid in collision avoidance. Whether you are flying in congested airspace or a remote location, a cockpit display or alert of traffic information will increase your awareness of surrounding traffic.
- Become familiar with the symbology, display controls, alerting criteria, and limitations of such technologies in your aircraft, whether the systems are portable or installed in the cockpit. High-density traffic around airports can make interpreting a traffic display challenging due to display clutter, false traffic alerts, and system limitations.

- Use information provided by such technologies to separate your aircraft from traffic before aggressive, evasive maneuvering is required. Often, slight changes in rate of climb or descent, altitude, or direction can significantly reduce the risk of a midair collision long before the conflicting aircraft has been seen.
- Remember that while such technologies can significantly enhance your awareness of traffic around you, unless your system is also capable of providing resolution advisories, visual acquisition of and separation from traffic is your primary means of collision avoidance (when weather conditions allow).

Interested in more information?

The following Federal Aviation Administration (FAA) resources can be accessed from www.faa.gov:

- Advisory Circular (AC) 90-48D, "[Pilots' Role in Collision Avoidance](#)," alerts pilots of the potential hazards of midair collisions and emphasizes pilot education, operating practices, procedures, and improved scanning techniques. The AC also discusses technologies in the cockpit that display or alert of traffic conflicts.
- The FAA's [NextGen program on ADS-B](#) offers up-to-date requirements, coverage maps, and program information.

The website www.seeandavoid.org, which is funded by the FAA and the Air National Guard, aims to eliminate midair collisions by providing pilots with educational resources and other information about airspace, aircraft visual identification, aircraft performance, and flight hazards.

The NTSB's Aviation Information Resources web page, www.nts.gov/air, provides convenient access to NTSB aviation safety products. The reports for the accidents referenced in this safety alert are accessible by NTSB accident number from the [Aviation Accident Database](#) link, and each accident's public docket is accessible from the [Accident Dockets](#) link for the Docket Management System. This safety alert and others, such as [SA-045, "See and Be Seen: Your Life Depends on It,"](#) can be accessed from the [Aviation Safety Alerts](#) link.