# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

**Date:** March 31, 2008

**In reply refer to:** A-08-14 and -15

Soaring Society of America, Inc.
Attn: Government Liaison Committee
Post Office Box 2100
Hobbs, New Mexico 82241-2100

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations address expanding the safety efforts by the Soaring Society of America, Inc., (SSA) for glider operations. These recommendations are derived from the Safety Board's investigation of the August 28, 2006, midair collision involving a Raytheon Aircraft Company Hawker 800XP airplane and a Schleicher ASW27-18 glider and are consistent with the evidence we found and the analysis we performed. Information supporting these recommendations is discussed below. The Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.

### Background

On August 28, 2006, about 1506 Pacific daylight time,[1] a Raytheon Aircraft Company Hawker 800XP airplane, N879QS, and a Schleicher ASW27-18 glider, N7729, collided in flight near Smith, Nevada, about 42 nautical miles (nm) south-southeast of the Reno/Tahoe International Airport (RNO), Reno, Nevada, at an altitude of about 16,000 feet above mean sea level (msl). The airline transport-certificated captain and first officer in the Hawker received minor injuries, and the three passengers were not injured. The private pilot in the glider received minor injuries, and both aircraft sustained substantial damage. Visual meteorological conditions prevailed at the time of the collision. The Hawker, which was fractionally owned by multiple corporations and managed by NetJets Aviation, Inc., was operating under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91, Subpart K, as an executive/corporate flight. It

[1] All times are in Pacific daylight time unless otherwise noted.

departed from Carlsbad, California, about 1400 and was en route to RNO with an instrument flight rules (IFR) flight plan filed. The glider was registered to a private owner and was operated by the pilot under the provisions of 14 CFR Part 91 as a personal flight. It departed from Minden, Nevada, about 1300 for a local flight with no flight plan filed.[2]

The collision occurred in an area that is frequently traversed by air carrier and other turbojet airplanes inbound to RNO and that is also popular for glider operations because of the excellent thermal and mountain wave gliding opportunities there.[3] The Hawker flight was in radar and radio contact with an air traffic control (ATC) facility. The glider pilot, who intended a 5-hour flight in the local area to familiarize himself with the glider, was not communicating with ATC and was not required to do so.[4] Before the collision, the Hawker had been descending toward RNO on a stable northwest heading for several miles, and the glider was in a 30º, left-banked, spiraling climb. According to statements from the Hawker's captain and the glider pilot, they each saw the other aircraft only about 1 second or less before the collision and were unable to maneuver to avoid the collision in time. Damage sustained by the Hawker disabled one engine and other systems; however, the flight crew landed the airplane. The damaged glider was uncontrollable, and the glider pilot bailed out and parachuted to the ground.

Because of the lack of radar data for the glider's flight, it was not possible to determine at which points in each flight each aircraft may have been in the other's available field of view. Although Federal Aviation Regulations (FARs) require all pilots to maintain vigilance to see and avoid other aircraft (this includes pilots of flights operated under IFR, when visibility permits), a number of factors that can diminish the effectiveness of the see-and-avoid principle were evident in this accident. For example, the high closure rate of the Hawker as it approached the glider would have given the glider pilot only limited time to see and avoid the jet. Likewise, the closure rate would have limited the time that the Hawker crew had to detect the glider, and the slim design of the glider would have made it difficult for the Hawker crew to see it. Although the demands of cockpit tasks, such as preparing for an approach, have been shown to adversely affect scan vigilance, both the Hawker captain, who was the flying pilot, and the first officer reported they were looking out the window before the collision. However, the captain saw the glider only a moment before it filled the windshield, and the first officer never saw it at all.

Although the Hawker was equipped with a traffic alert and collision avoidance system (TCAS)-II capable of generating vertical resolution (collision avoidance) advisories (RA), the glider's Mode C transponder was turned off (and, therefore, not detectable by the Hawker's equipment) because the glider pilot wanted to reserve battery power for radio use. Although transponder installation is not required on gliders, FARs require that any person operating a transponder-equipped aircraft must use the transponder.[5] Had the glider pilot turned on his

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[2] The report for this accident, LAX06FA277A/B, can be found on the Safety Board's Web site at <http://ntsb.gov/ntsb/brief2.asp?ev_id=20060906X01297&ntsbno=LAX06FA277A&akey=1>.

[3] The area surrounding RNO is known for its world-class gliding and hosts a number of gliderports and glider clubs. Three airports surrounding RNO service glider operations: Minden-Tahoe Airport (35 nm south of RNO), Reno/Stead Airport (14 nm north-northwest of RNO), and Truckee-Tahoe Airport (23 nm southwest of RNO).

[4] The collision occurred in Class E airspace that has no requirements for two-way radio communication.

[5] According to 14 CFR 91.215(c), "each person operating an aircraft equipped with an operable ATC transponder . . . shall operate the transponder, including Mode C equipment, if installed."

transponder, the Hawker's TCAS-II likely would have depicted the glider on the flight crew's monitor and would have generated an RA to alert the crewmembers and prompt them to deviate their course in time to prevent the accident.

According to Reno Terminal Radar Approach Control (TRACON) personnel, it is not uncommon for arriving and departing air traffic to receive TCAS RAs because of transponder-equipped gliders operating in the area. For example, in a 30-day interval before the accident, the facility recorded four such TCAS RA events reported by pilots.[6] Each event involved a conflict between a transport-category airplane operated under 14 CFR Part 121 and a glider. In addition, the glider's transponder, if turned on, would have provided position and altitude information to ATC personnel who could have used that information to provide separation services and traffic advisories to the Hawker crew.

The Safety Board determined that the probable cause of this accident was the failure of the glider pilot to utilize his transponder and the high closure rate of the two aircraft, which limited each pilot's opportunity to see and avoid the other aircraft.

The investigative findings from this accident revealed safety issues related to limitations of the see-and-avoid concept in preventing midair collisions, especially when one or more high-speed aircraft are involved; the regulatory exemption that allows gliders to operate without transponders; and glider design and electrical power limitations that present unique challenges for the installation and operation of transponders. The Safety Board has issued four safety recommendations to the Federal Aviation Administration (FAA) regarding these issues.

**Distribution of Transponder Safety Information**

The Safety Board recognizes that the SSA, through the efforts of its Soaring Safety Foundation and its supporting groups, such as glider clubs, chapters, and glider fixed-base operators (FBOs) in all SSA regions, periodically distributes safety information to the glider community regarding transponders. For example, the Pacific Soaring Council, Inc., (PASCO)[7] publishes and disseminates a seasonal newsletter to glider pilots throughout its local area, which includes the areas surrounding RNO.[8] Since January 1998, all of the newsletters have included the safety message encouraging the use of transponders within 50 nm of RNO.[9] The SSA also published a two-part safety article in the February and March 2002 issues of *Soaring* magazine that discussed the safety benefits of transponder use in gliders and considerations regarding

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[6] The facility retains TCAS RA reports for only 30-day intervals. Safety Board investigators reviewed reports for the most recent available 30-day interval before the accident.

[7] PASCO is a nonprofit group that supports the SSA's Region 11.

[8] PASCO not only distributes the newsletters to its members but also makes them available to the public on its Web site at <http://www.pacificsoaring.org>.

[9] The safety message states, "The potential conflict between gliders and commercial air traffic near Reno has increased with the growth of commercial jet traffic into . . . [RNO] during the past few years. PASCO emphasizes that glider pilots operating in the Reno area must be alert for all air traffic arriving and departing RNO. Transponder signals are received by . . . [TCAS] on board commercial aircraft as well as by . . . [ATC] radar. By ATC Letter of Agreement, gliders in the Reno area can transmit the 0440 transponder code in the blind, without establishing radio contact with Reno Approach Control. PASCO recommends that gliders operating cross country, within 50 nm of Reno-Tahoe Airport, install and use a Mode C altitude encoding transponder."

transponder size and weight, installation, maintenance, and battery power. The article was updated in December 2004 and was also published on the SSA's Soaring Safety Foundation Web site.[10]

The Safety Board commends the SSA's efforts to distribute safety information. However, the Board notes that, on November 5, 2003, the SSA submitted a petition to the FAA requesting that pilots of transponder-equipped gliders be allowed to turn the transponders off when flying more than 40 nm from the primary airport in Class B airspace and more than 20 nm from the primary airport in Class C airspace.[11] The intent of the petition was to encourage voluntary transponder installations by exempting those installations from the "always on" requirement of 14 CFR 91.215(c). According to the SSA, this would allow glider pilots to conserve the limited battery power of gliders during exceptionally long flights outside of congested airspace to ensure that power would be available for the pilots to use the transponders in the vicinity of airports with significant air traffic. The FAA responded on January 22, 2008, and denied the SSA's request but stated that the FAA has an ongoing rulemaking project that proposes revisions to 14 CFR 91.215(c) that will cover the relief that the SSA's petition sought. Although the Board recognizes that gliders have electrical power limitations, the Board is opposed to any rulemaking action that would enable such exemptions because aircraft would remain at risk for a midair collision, as demonstrated by this accident, which occurred more than 40 nm from RNO, a Class C airport.

As a result of this accident and numerous documented near midair collisions (NMACs) involving nontransponder-equipped gliders, the Safety Board has issued a safety recommendation to the FAA regarding transponder requirements for gliders.[12] However, rulemaking action can be a lengthy process. The Safety Board concludes that the circumstances of this accident can serve to educate glider operators about collision hazards associated with the failure to use a transponder as required by 14 CFR 91.215(c), which are similar to the hazards associated with operating a nontransponder-equipped glider. The Safety Board further concludes that an immediate safety benefit could be achieved by voluntary transponder installations because such installations would be subject to mandatory use. Therefore, the Safety Board believes that the SSA should, using the circumstances of the August 28, 2006, midair collision near Smith, Nevada, inform your members, glider clubs, chapters, and glider FBOs of the circumstances of this accident and, through your publications, Web site, and conferences, as appropriate, use the information to encourage voluntary transponder installations and emphasize the importance of their use, as required by 14 CFR 91.215(c).

**Air Traffic Control and Glider Pilot Working Groups**

Following this accident, a Safety Board investigator, members of the local glider groups (many of whom are SSA members), and personnel from the Reno TRACON facility met to discuss collision concerns in the RNO area. The talks resulted in the establishment of four

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[10] This article discussed the problems associated with a flight crew's ability to see and avoid a glider in flight and informed glider pilots that transponders make their aircraft visible to both ATC radar screens and TCASs.

[11] The petition was open for public comments in FAA docket No. FAA-2003-16475.

[12] Safety Recommendation A-08-10 was adopted on March 18, 2008, and recommends that the FAA "remove the glider exemptions from the [FARs] that pertain to transponder requirements and use."

working groups composed of Reno TRACON personnel and local glider pilots that developed a glider pilot briefing document for their area of operation and distributed it to local glider groups. The briefing document outlines detailed guidance and information related to routes and radio communications that the controllers and pilots (of both powered and nonpowered aircraft) developed to help ensure safety for all aircraft operating around RNO and to improve communications between glider pilots and ATC. For example, the briefing document contains an illustration depicting RNO arrival and departure routes; detailed textual descriptions of the depicted routes, variations of the routes, and the typical altitudes and flightpaths at which air carrier traffic can be expected; guidance for suggested ATC radio communications, position reporting, phraseology, and etiquette; frequently asked questions; and other guidance for using transponders, becoming familiar with the area, obtaining RNO traffic information, and understanding RNO ATC radar coverage limitations.

In addition to the briefing document, the glider community developed a cockpit card for glider pilots that delineates the arriving and departing jet traffic routes, ATC-identified intersections and their minimum altitudes, and radio communication procedures. This card contains an abbreviated, ready-reference version of some of the information from the briefing document, including the illustration depicting RNO arrival and departure routes and guidance for communicating with RNO ATC.

All of these tools are designed to educate RNO-area glider pilots on the midair collision potential and provide them with information to help them mitigate the risk; however, the risk persists, and more improvements are needed. For example, in an August 2007 Aviation Safety Reporting System (ASRS) report, a captain of a Boeing 737-300 reported that, while the captain's flight was at 14,000 feet msl 25 nm southwest of RNO, a controller advised that traffic with a transponder was showing at or near the flight's altitude.[13] The captain did not see the traffic but noted that the TCAS unit provided an RA to descend, and the captain did so; however, the TCAS then "quickly commanded ['climb, climb now']," and the captain initiated a maximum-power climb with a course deviation to the west. The captain reported then seeing a glider pass off the right side of the airplane, about 200 feet away and coming head-on. The captain reported that, because the glider was climbing and descending, the TCAS reversed its initial RA and that the captain had to respond with "aggressive" maneuvers. Although this ASRS report did not provide any information about whether the controller knew or advised that the traffic was a glider or provided any advisories on its altitude or flightpath variations, the report further illustrates that both flight crews and ATC personnel could benefit from the ability to readily identify glider transponder returns and understand the limitations and variable flightpaths that may be associated with them.

In addition, RNO is not the only area where a collision threat persists. A review of the ASRS database revealed that, from 1988 to August 2007, 60 NMACs involving air carrier/corporate jet traffic and gliders were reported, and areas such as RNO; Chicago, Illinois;

[13] The report did not provide any information as to whether the traffic was using a unique transponder code, was in radio communication with ATC, or was known to ATC personnel to be a glider.

Washington, D.C.; and Colorado Springs, Colorado, had multiple events.[14] The Safety Board concludes that, because of the SSA's widespread membership and its ability to disseminate information to the glider community, the SSA can serve as a valuable resource for improving its RNO-area working group and developing similar working groups in other areas to develop guidance and distribute information that can improve safety in local airspace areas nationwide. Therefore, the Safety Board believes that the SSA should encourage your members, glider clubs, chapters, and glider FBOs to develop working groups with local ATC facilities to develop and distribute detailed guidance and information related to air traffic routes, ATC radio communications, transponder use, and other pertinent information to improve the safety of glider and aircraft operations in their area.

Therefore, the National Transportation Safety Board recommends that the Soaring Society of America:

> Using the circumstances of the August 28, 2006, midair collision near Smith, Nevada, inform your members, glider clubs, chapters, and glider fixed-base operators of the circumstances of this accident and, through your publications, Web site, and conferences, as appropriate, use the information to encourage voluntary transponder installations and emphasize the importance of their use, as required by 14 *Code of Federal Regulations* 91.215(c). (A-08-14)

> Encourage your members, glider clubs, chapters, and glider fixed-base operators to develop working groups with local air traffic control (ATC) facilities to develop and distribute detailed guidance and information related to air traffic routes, ATC radio communications, transponder use, and other pertinent information to improve the safety of glider and aircraft operations in their area. (A-08-15)

The Safety Board also issued safety recommendations to the FAA. In your response to this letter, please refer to Safety Recommendations A-08-14 and -15. If you need additional information, you may call (202) 314-6177.

Chairman ROSENKER, Vice Chairman SUMWALT, and Members HERSMAN, HIGGINS, and CHEALANDER concurred with these recommendations.

*[Original Signed]*

By: Mark Rosenker
Chairman

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[14] Because ASRS reports are voluntary, it is possible that other NMAC events occurred but were unreported. During that timeframe, the RNO area had nine reported NMAC events; Chicago Midway International Airport area in Chicago, Illinois, had four reports; the City of Colorado Springs Municipal Airport area in Colorado Springs, Colorado, had three reports; and the Washington, D.C., area, which includes more than one airport and the surrounding areas, had four NMAC reports filed. Some reports did not specify the area where the event occurred, and those reports were excluded when determining area totals.