**INCIDENT REPORT: EMERGENCY DECLARED ON DOWNWIND**

Date of Incident: August 1, 2022

Time: 14:32 hours

Surface Wind: 8 knots at 260 degrees

Active Runway: 27

*The Minnesota Soaring Club (MSC) fosters a culture of safety by encouraging pilots to report their aviation mistakes. To foster this attitude the MSC replicates NASA’s Aviation Safety Reporting System by 1. Concealing, in incident reports, the identify of pilots who report errors, and 2. Not disciplining pilots who report errors unless the error was deliberate or criminal. This non-discipline stand does not preclude actions to improve pilot skills and knowledge by recommending additional flight instruction.*

*This report deviates from this standard by identifying the pilot, as: 1. The pilot agreed to the use of her name, and 2. The pilot flew with exceptional skill, safety, and thoughtfulness during the incident.*

**CONTACTS & INTERVIEWS**

08/01/2022 Observation of the incident

08/01/2022 Interview with the teen pilot, Emma Scholes, on the field

08/01/2022 Preliminary inspection of MSC’s SZD-51-1 Junior by Stanton staff

08/01/2022 Conversation with Tom Kuhfeld, Staff, Stanton Sport Aviation

08/01/2022 Test flight of the Junior by Stephen Nesser, CFI

08/xx/2022 Inspection of the Junior by Bruce Von Drashek, MSC Director of Equipment

08/20/2022 Inspection of the Junior by Bob Wander, CFI, Sarah Anderson, and Mr. Nesser

**INFORMATION REVIEWED**

SZD-51-1 Junior Service Bulletin BE-009/93 from Allstar PZL Glider

BGA Technical Committee, British Gliding Association, Technical Newsheet [ibid] dated March 4, 1994

Written report by Ms. Scholes dated August 3, 2022

*Gliding: Theory of Flight*, The British Gliding Association, A & C Black (Publishers), 2002.

**THE INCIDENT**

Flight Instruction Camp was conducted on August 1, 2022.

Ms. Scholes, a recently soloed pilot, had her first flight (of that day) in the Junior, from 12:47 to 13:17 hours. The first flight was without incident. She launched again at 14:11 hours. She wore a parachute on both flights.

Ms. Scholes reported that immediately after releasing from tow at 3,000’ AGL, and while flying at-or-below 50 knots, the stick vibrated slightly. Ms. Scholes executed smooth shallow turns to diagnose the problem. The yaw string indicated her turns were uncoordinated. Then the glider slightly turned to the right on its own and the controls became “mushy.” Concerned that she was near stall speed she sped up to 60 knots. “The controls and turning got worse as the flight went on.” As she was wearing a parachute, she considered jumping, but opted to continue flying. While flying towards the pattern she flew at different airspeeds to determine how the glider responded when sped up and slowed down. While turning left the Junior turned with difficulty and the yaw string fell to the side. Ms. Scholes immediately straightened out. She then turned right to enter the pattern and the Junior “turned very quickly and increased airspeed. . . the yaw string, again, went to the side.” She tried the airbrakes and determined they made the Junior vibrate more. She noted that the “stick was vibrating much worse. The controls’ responsiveness was really poor.” She slipped on final believing it would be more stable than using the airbrakes.

While on final Ms. Scholes radioed, to glider ground, that she was having difficulty controlling the Junior, in part because the controls were “mushy.”

At that time the Junior was second in the pattern with a single engine aircraft a quarter-mile ahead on downwind.

Mr. Nesser was Field Operations Officer (FOO). He asked Ms. Scholes if she was declaring an emergency. She declared an emergency.

Mr. Nesser radioed Stanton Air that an emergency had been declared and asked all pilots to immediately leave the pattern. When the single engine aircraft remained in the pattern, Mr. Nesser radioed the aircraft’s pilot asking them to leave the pattern. The pilot promptly did so.

During the prelaunch briefing Mr. Nesser had advised Ms. Scholes to land at 55 knots. Mr. Nesser radioed Ms. Scholes and recommended she land at 60 knots—he hoped that the airspeed would enhance safety given the controls’ mushiness.

Mr. Wander asked students to push the Owl off the field to provide the pilot with the widest landing area possible.

The pilot landed gently and well at 14:33 hours.

Mr. Nesser than radioed to Stanton Air that the emergency had been resolved.

The Junior was grounded.

**DECLARATION OF AN EMERGENCY**

The Aeronautical Information Manual, part 6-1-2 states:

**Emergency Condition- Request Assistance Immediately**

1. An emergency can be either a *distress* or *urgency* condition as defined in the Pilot/Controller Glossary. Pilots do not hesitate to declare an emergency when they are faced with *distress* conditions such as fire, mechanical failure, or structural damage. However, some are reluctant to report an *urgency* condition when they encounter situations which may not be immediately perilous but are potentially catastrophic. An aircraft is in at least an *urgency* condition the moment the pilot becomes doubtful about position, fuel endurance, weather, or any other condition that could adversely affect flight safety. This is the time to ask for help, not after the situation has developed into a *distress* condition.
2. Pilots who become apprehensive for their safety for any reason should *request assistance immediately.* Ready and willing help is available in the form of radio, radar, direction finding stations and other aircraft. Delay has caused accidents and cost lives. *Safety is not a luxury! Take action!*

**SUBSEQUENT ACTIONS**

The Junior was promptly inspected by the staff at Stanton Sport Aviation. No problem was identified in the controls, and it was cleared for flight.

Mr. Kuhfeld suggested that the pilot’s smaller feet may have inadvertently pressed the spring that returns the rudder pedal to neutral (which is an inch behind the horizontal tube that serves as the rudder pedal), causing yaw in flight.

Mr. Nesser took the Junior up for a test flight. During the tow there was significant slop in the ailerons, and accordingly he returned the Junior to the ground without completing the test flight.

Mr. Von Drashek determined that the Junior’s flight controls were within published limits and cleared the Junior for flight.

Mr. Wander, Ms. Anderson, and Mr. Nesser conducted an in-depth preflight of the Junior on August 20, in preparation for Mr. Wander conducting a test flight. Play was noted in the ailerons and horizontal stabilizer. The horizontal stabilizer was removed from the glider. All horizontal stabilizer fittings were inspected, cleaned, and re-greased. It was then re-installed. The horizontal stabilizer, when moderately vibrated from the lateral position, continued oscillating for two seconds after being shaken. Mr. Wander determined that while the Junior could likely be safely flown at normal airspeeds, it would be imprudent to fly it at Vne and therefore no test flight was conducted.

**FLUTTER**

In *Gliding: Theory of Flight* it is noted that all wings have a natural harmonic frequency. (Note: gliders have four wings: left & right wings, vertical stabilizer, and horizontal stabilizer.) This frequency, when established causes a wing to flutter, reducing the control of the glider, and possibly creating catastrophic failure. Structural stiffness tends to have a dampening effect on flutter. Causes of flutter include, “Control circuit wear – either cumulative sloppiness throughout, or local, such as badly worn elevator hinges, or slop in an aerodynamic trimmer circuit.”

**SERVICE PUBLICATIONS**

Allstar PZL Glider published a service bulletin (BE-009/93) about replacement of the “sleeve fixing tailplane in the fin wall.” They wrote that compliance was, “Obligatory where fitting play appeared. In other case – up to User’s decision.”

**ANALYSIS**

Ms. Scholes’ first Junior flight on August 1 was without incident. During her second Junior flight she encountered: deviations in the yaw string disconnected from rudder inputs, vibration during flight, accelerated turn to the right, difficulty turning to the left. There was minimal change in the weather between the two flights. The significant difference between the Junior’s responsive between flights (in which the weather was essentially unchanged) suggests the possibility of a structural, linkage, instrument, or control surface change between flights.

Research shows that accidents are most likely to happen in the first 100 hours following solo. Further, based on a 2020 incident involving a teen pilot, the MSC flight instructors implemented a training regimen in which all teen pilots are given three redundant flights in all emergency procedures regardless of competency during the first two flights in any given emergency procedure. Further, MSC pilots are trained that in an emergency they should, in this order: aviate, navigate, and communicate.

Ms. Scholes upon first detecting a problem attempted to determine the nature of the problem, and when the controls became mushy, increased airspeed. She aviated. Unable to resolve the problem she considered her options, including parachuting from the Junior. This consideration was commendable because she was reviewing all options available. She then turned towards the airport. She navigated. Upon entering the pattern, she announced to glider ground that she was having difficulties controlling the Junior. She communicated. She did as she was trained. She did everything correctly.

Once in the pattern she declared an emergency. The Federal Aviation Administration recommends in their Aeronautical Information Manual, that pilots declare an emergency or urgency condition when they “become doubtful about . . . any other condition that could adversely affect flight safety.” By declaring an emergency Ms. Scholes increased the envelope of safety by: 1. Clearing all other aircraft out of the pattern, 2. Leaving the radio frequency open solely for communications regarding the emergency (which also decreased distraction from radio chatter), 3. Prompting those on the ground to keep the runway as open as possible for her landing, and 4. Using Crew Resource Management (the FOO who cleared other traffic out of the pattern) to minimize distractions so she could focus on the landing. This too was well done.

Ms. Scholes flew with professionalism, skill, and calm in a tense situation. Her actions serve as a model for how to fly when things go wrong, there is limited information available to solve the problem (which is often the case in an in-flight emergency), and the pilot is frightened.

Mr. Kuhfeld suggested that Ms. Scholes small feet could have partially, or fully, slipped from the one-inch tube that serves as a rudder pedal and inadvertently pressed on the spring that returns the rudder pedals to neutral. If she did so a push with the left foot would have an adverse effect on the controls, tending to push the left rudder control back. Similarly, the same action would occur with the right foot. This might explain the variations in the yaw string Ms. Scholes identified, but which Mr. Nesser did not experience.

The inspection cleared the Junior for flight. However, during the test flight by Mr. Nesser there was too much play in the ailerons. Further inspection of the Junior, and the Allstar PZL Glider service bulletin suggest that the connection of the horizontal stabilizer to the vertical stabilizer may have decreased tension holding it in place. In 2021,MSC’s PZL SZD-50 Owl was found to have developed wear, and therefore play in the linkage between the stick and the elevator. Given that both gliders were built by the same company, this raises the possibility that the Junior has worn parts, and replacement of connectors would maximize the safety of flight in the Junior. Mr. Wander noted that the linkage in the ailerons was worn and should be replaced, this would explain the play in the ailerons.

The service publication repair for the Junior’s horizontal stabilizer requires drilling a hole in the horizontal stabilizer. This is a repair that is likely to take more than a month.

An additional piece of information that is relevant. When the Junior was first acquired for MSC, Mr. Nesser noted that when in a slip with the spoilers deployed, the disrupted air from the spoilers hits the horizontal stabilizer causing flutter.

It is unlikely that the actual cause of Ms. Scholes problems will be definitively determined. What follows is a model that may provide the most likely cause:

There were three simultaneous problems with the Junior. First the ailerons were worn and initial inputs (about ten degrees in moving from neutral, and twenty degrees when exiting a turn) from the stick were without effect, and it took larger stick movements to start or exit a turn. Second, Ms. Scholes was inadvertently pressing on the rudder pedal spring, creating opposite inputs—which would explain unintended variations in the yaw string. And, third, the horizontal stabilizer had, because it was loose, harmonically oscillated creating vibrations and diminished control. The mild changes in airspeed that Ms. Scholes attempted may have been insufficient to break the harmonic flutter. However, when Ms. Scholes flew in a slip on final, the disrupted airflow over the elevator may have been enough to dampen or stop the oscillations and return the Junior to stable flight.

MSC instructors “fit” a student to the glider by sliding the rudder pedals forward and back, putting cushions behind the student’s back, and moving the seat position. They have not considered how little feet might slip from the rudder pedals.

MSC has a strong commitment to safety—this includes not taking chances that the Junior is safe to fly. The Junior was grounded despite being advised that it is likely safe to fly under normal airspeeds. This was prudent.

Pilots do not know how they will behave in an emergency until one occurs in solo flight. We all hope that we will respond with calm and skill. The only way to truly find out is by having an emergency. That Ms. Scholes flew so well suggests that her flight training was sufficient, and that she is a pilot who belongs in the cockpit.

The author of this report wants to commend Ms. Scholes for her skill and calm in a frightening situation. Ms. Scholes dreams of becoming a Navy pilot. The Navy should be advised that Ms. Scholes has been stress tested and passed with flying colors.

**RECOMMENDATIONS**

1. That the MSC flight instructors continue triple-redundant emergency flight training of all teen pilots.
2. That the repair noted in Allstar PZL Glider service bulletin (BE-009/93) be completed before the Junior is returned to flight.
3. That the Junior’s worn aileron parts be replaced.
4. That MSC flight instructors note how a student pilot’s size impacts possible variations in moving the controls and provide advice and training for potential difficulties.

Respectfully submitted,



Stephen Nesser, CFI-G

Chief Flight Instructor

Minnesota Soaring Club

August 29, 2022