



Aviation Investigation Final Report

Location:	Trenton, South Carolina	Accident Number:	ERA23LA132
Date & Time:	February 28, 2023, 12:49 Local	Registration:	N945HS
Aircraft:	STILP TANNER E SAVANNAH S	Aircraft Damage:	Substantial
Defining Event:	Flight control sys malf/fail	Injuries:	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Flight test		

Analysis

The pilot/builder in the right seat was on the fifth test flight in his amateur-built airplane with another pilot on board who was assisting. While turning from left base to the final leg of the traffic pattern for landing, with the left-seat pilot at the controls, the Y-stick that controlled both pitch and roll jammed. Both pilots attempted to free the Y-stick with force, but it remained jammed with no control of the flaperons and elevator. The airplane remained in a left, descending turn until it collided with trees and terrain about one mile short of the runway. The airplane sustained substantial damage; the right-seat pilot was seriously injured and the left-seat pilot had minor injuries.

An examination of the wreckage, including the flight control system, was conducted after the accident. Flight control continuity was confirmed from the flaperons, elevator, and rudder to the cockpit controls, except for the impact-related overload fractures. No areas of flight control binding or improper installation were found that would have prevented normal operation. An examination of the Y-stick revealed that the lower portion of the stick had minimal clearance with the cockpit floor and surrounding structure by design. The stick-to-floor clearance was smallest when the stick was near neutral (straight up). The clearance increased as bank was increased left or right. According to the kit manufacturer, the smallest Y-stick-to-structure clearance was 4.83mm (roll input neutral with full forward stick).

The actual Y-stick pre-accident clearance dimensions of the accident airplane could not be determined because of cockpit floor deformation from impact damage. There was no device installed on the floor that would have prevented a foreign object, such as a note pad, mobile phone, logbook, etc., from rolling or sliding under the Y-stick. Both pilots believed that a note pad used by the right-seat pilot to record flight test data fell to the floor during flight and jammed the control. Examination of photos of the 8.5 inch by 11-inch note pad revealed damage consistent with lower Y-stick impingement. It is likely that the note pad fell to the floor

during flight and slid under the Y-stick during to the turn to final; when the stick was moved toward neutral, the jam occurred.

The kit manufacturer offered, as an option, a soft boot to cover the lower portion of the Y-stick; however, it is not known if this boot would have prevented the accident scenario.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The loss of control during the base turn to final due to the impingement of the Y-stick control by a notepad.

Findings

Aircraft	Lateral/bank control - Attain/maintain not possible
Aircraft	(general) - Malfunction

Factual Information

History of Flight

Approach-VFR pattern final	Flight control sys malf/fail (Defining event)
Approach-VFR pattern final	Collision with terr/obj (non-CFIT)

On February 28, 2023, about 1249 eastern standard time, an experimental amateur-built Savannah S airplane, N945HS, was substantially damaged when it was involved in an accident near Trenton, South Carolina. The private pilot in the right seat was seriously injured and an airline transport pilot in the left seat received minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 test flight.

The pilot in the right seat, who also owned and built the airplane, reported that they were in the traffic pattern for a local flight at Edgefield County Airport (6J6), Trenton, South Carolina. The left-seat pilot was at the controls and was turning from left base to final for runway 29 when the Y-stick “locked up.” The right-seat pilot joined him on the controls in an attempt to free the jam, but the Y-stick remained locked in both the pitch and roll axes. The airplane continued in a left, descending turn until it collided with trees about one mile short of the runway.

The wreckage came to rest inverted. The fuselage, wings, and empennage sustained substantial damage. The engine and propeller separated from the airframe during impact.

The right-seat pilot reported that the accident flight was the fifth test flight conducted in the airplane and the airplane’s total time was about 2.5 hours. The engine ran smoothly during the event. He also stated that the airplane was “very balanced” and the flight up to the flight control malfunction was uneventful. He believed that an 8.5 inch by 11-inch note pad that he used to record flight test data fell to the cockpit floor during the flight and lodged under the bottom of the Y-stick.

The left-seat pilot reported that he was mentoring the right seat pilot through the flight test phase of the build. He had logged about 7,500 hours of flight experience in a variety of airplanes. He also stated that he was an airframe and powerplant mechanic with 38 years of experience in both civilian and military aircraft. The accident flight was his first flight in the Savannah S. He carefully examined the airplane for about 45 minutes before the flight and felt that the pilot did a “really nice job” with its construction.

The left-seat pilot further stated that he was at the controls and was in the traffic pattern at 6J6 when, during the turn from left base to final, the Y-stick “locked up.” The airplane was about 400 ft above the ground in a 500-600 fpm descent at 65 mph with a 3° glide path. The Y-stick was jammed in both pitch and roll axes. He yelled through the intercom, “The stick is

jammed!" and the right seat pilot also grabbed the stick. They attempted to break the jam with force but were unsuccessful; the airplane collided with trees and then impacted the ground. He believed that the note pad that the right seat pilot was using during the flight jammed the stick. He continued by stating that the Y-stick-to-floor clearance, in his opinion, was a "gigantic design flaw" that "everybody missed at [the airframe kit manufacturer]" He questioned why the issue with the Y-stick had not come up before and why the kit manufacturer had not engineered a solution to it.

After recovery to the pilot's workshop, the wreckage was examined by the NTSB investigator-in-charge (IIC) and an FAA inspector. The left wing had been removed by recovery personnel and the right wing separated from impact forces; however, the empennage remained attached. Flight control continuity was confirmed from the elevator and rudder to the cockpit Y-stick and the rudder pedals. No areas of binding or interference were found. The airplane was equipped with flaperons. A single Y-stick control, located between the cockpit seats, operated both the flaperons and elevator. The flaperon control system, located aft of the cockpit seats, was intact and all connections were secure with the exception of overload fractures to the outermost push-pull tube for each wing. The flaperon controls moved freely when the Y-stick was manipulated and there were no areas of binding or structure interference observed.

Further examination of the Y-stick control revealed that the smallest clearance between the lower portion of the stick and the cockpit floor occurred with the Y-stick approximately neutral (stick straight up). When the Y-stick was moved in the roll axis (left or right), the stick-to-floor clearance increased. Full left or full right Y-stick inputs resulted in the maximum stick-to-floor clearance. There was no device installed on the cockpit floor designed to prevent a foreign object from rolling or sliding under the stick (the kit manufacturer offered, as an option, a soft boot to cover the lower portion of the Y-stick).

The note pad that the pilots believed interfered with the Y-stick control was documented after the wreckage was recovered; however, it was not examined in detail during the initial wreckage examination. The right-seat pilot subsequently provided photos of the note pad after a request from the NTSB IIC. The 8.5 inch by 11-inch note pad consisted of several pages and a cardboard backing. There was no manufacturer's information inscribed on the pad identifying its origin. The photos indicated an area of puncture damage that was consistent in size and shape with the bottom of the Y-stick and also appeared to penetrate the entire pad thickness.

The airplane kit designer and manufacturer, I.C.P. srl, provided data at the IIC's request on Y-stick-to-floor clearances in various positions of the control. The data revealed that the smallest clearance occurred with roll input central (neutral) and pitch full nose down (forward). This scenario resulted in a clearance of 4.83mm between the bottom of the stick and the seat spar corner and 8.31mm between the bottom of the stick and the floor. The largest clearance occurred with full right roll input and full nose up pitch input. In this configuration, there was 31.4mm clearance between the bottom of the stick and the seat spar corner.

Due to the deformation damage to the cockpit floor, the pre-accident Y-stick clearance measurements of the accident airplane could not be determined.

Pilot Information

Certificate:	Private	Age:	30,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	February 7, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	May 17, 2022
Flight Time:	65 hours (Total, all aircraft), 4 hours (Total, this make and model)		

Other flight crew Information

Certificate:	Airline transport	Age:	62,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	August 18, 2021
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 7500 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	STILP TANNER E	Registration:	N945HS
Model/Series:	SAVANNAH S	Aircraft Category:	Airplane
Year of Manufacture:	2022	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	21-12-54-0832
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	December 2, 2022 Condition	Certified Max Gross Wt.:	1320 lbs
Time Since Last Inspection:	4 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	4 Hrs at time of accident	Engine Manufacturer:	Yamaha
ELT:	C91A installed, activated, did not aid in locating accident	Engine Model/Series:	Apex
Registered Owner:	On file	Rated Power:	150
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KDNL, 410 ft msl	Distance from Accident Site:	20 Nautical Miles
Observation Time:	12:53 Local	Direction from Accident Site:	216°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.84 inches Hg	Temperature/Dew Point:	26°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Trenton, SC	Type of Flight Plan Filed:	None
Destination:	Trenton, SC	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class G

Airport Information

Airport:	Edgefield County 6J6	Runway Surface Type:	Grass/turf
Airport Elevation:	611 ft msl	Runway Surface Condition:	Dry
Runway Used:	29	IFR Approach:	None
Runway Length/Width:	2640 ft / 85 ft	VFR Approach/Landing:	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Serious, 1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	1 Serious, 1 Minor	Latitude, Longitude:	33.7325,-81.80861(est)

Administrative Information

Investigator In Charge (IIC): Hicks, Ralph

Additional Participating Persons: Charles Lewis; FAA/FSDO; Columbia, SC
James Jackson; FAA/FSDO; Columbia, SC
Giulio Rosati; ANSV
Federico Peronato; I.C.P. srl

Original Publish Date: May 2, 2024

Last Revision Date:

Investigation Class: [Class 3](#)

Note: The NTSB did not travel to the scene of this accident.

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=106801>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).