NATIONAL TRANSPORTATION SAFETY BOARD

Aviation Investigation Final Report

Location:	Byron, California	**Accident Number:**	WPR16LA150
Date & Time:	July 23, 2016, 19:00 Local	**Registration:**	N256TA
Aircraft:	Beech 65 A90	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft structural failure	**Injuries:**	15 None
Flight Conducted Under:	Part 91: General aviation - Skydiving		

Analysis

The commercial pilot reported that, while setting up for a skydiving jump run, the airspeed was a little slow, and the airplane abruptly stalled, rolled left, and began rotating downward. A jumper, seated in the copilot's seat, stated that the pilot did not retard the throttles during the recovery attempt and that the airplane's airspeed increased rapidly. The jumper also reported that he heard a "loud bang" during the recovery sequence. The pilot briefly recovered the airplane to a wings-level attitude, but it then subsequently stalled and entered another spin. During the second spin event, all the jumpers successfully egressed. After about nine rotations, the pilot recovered the airplane to a wings- and pitch-level attitude, and shortly thereafter, it broke off to the left and stalled and rotated downward again. The pilot recovered the airplane again and flew back to the airport because the airplane was handling abnormally, and he landed it without further incident.

After landing, a witness noted that the airplane's right horizontal stabilizer and elevator were missing; they were subsequently recovered in a field a few miles south of the airport. Magnified optical examination revealed that all the fracture surfaces on the right horizontal stabilizer, elevator, and attachment bracket were consistent with overstress separations, which was likely the source of the loud bang heard by the jumper during the recovery sequence. No indications of fatigue or corrosion were observed. Therefore, it is likely that the right horizontal stabilizer and the attached elevator were overstressed during the airplane's left spin recovery, which led to their in-flight separation. Due to the dynamics during a spin recovery, only the right horizontal stabilizer experienced g forces and air flow beyond its limit.

The Airplane Flight Manual contained a spin recovery procedure, which stated to "immediately move the control column full forward, apply full rudder opposite to the direction of the spin, and reduce power on both engines to idle. These three actions should be done as near simultaneously as possible." It is likely that the pilot's failure to follow these procedures led to the airplane's airspeed rapidly increasing and caused increased air flow, which required additional g forces to recover.

Postaccident, the airplane's weight and balance were calculated for the accident flight, and the center of gravity (CG) was determined to be about 6 to 7 units aft of the limit. An aft CG results in the airplane being in a less stable flight condition, which decreases the ability of the airplane to right itself after maneuvering and likely contributed to the pilot's inability to maintain level flight.

Probable Cause and Findings

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

The pilot's failure to maintain an adequate airspeed and his exceedance of the airplane's critical angle of attack, which resulted in an aerodynamic stall and subsequent spin. Also causal to the accident was the pilot's failure to follow prescribed spin recovery procedures, which resulted in increased airspeed and airflow and the subsequent overstress separation of the right horizontal stabilizer. Contributing to the accident was the pilot's inadequate preflight weight and balance calculations, which resulted in the center of gravity being aft of the limit.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Use of equip/system - Pilot
Personnel issues	Incorrect action performance - Pilot
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Use of checklist - Pilot
Personnel issues	Weight/balance calculations - Pilot
Aircraft	CG/weight distribution - Capability exceeded

Factual Information

History of Flight

Enroute-climb to cruise	Aerodynamic stall/spin
Enroute-descent	Aircraft structural failure (Defining event)

On July 23, 2016, about 1900 Pacific daylight time, a Beech 65-A90, N256TA, sustained substantial damage following a loss of control while climbing out near the Byron Airport (C83) Byron, California. The commercial pilot and the 14 passengers were not injured. The airplane was registered to N80896 LLC, and operated by Bay Area Skydiving under the provisions of 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the sky-diving flight. The local flight departed C83 about 1851.

According to the pilot, as the airplane neared the planned jump area and altitude, about 12,500 ft, mean sea level, he initiated a left turn to line up for the drop zone. He stated the airplane's airspeed was a little slow and then "suddenly the airplane abruptly stalled, rolled off to the left, and began rotating nose-down." He stated that the airplane "did a couple of downward barrel rolls." One of the jumpers, seated in the co-pilots seat, heard a "loud bang" during the recovery sequence and stated that "the pilot did not retard the throttles during the recovery, causing the airplane to develop too much speed." The jumper further stated that during the recovery he felt the g-force on his stomach. The pilot said that he temporarily recovered the airplane to a wings level attitude for a few seconds and observed that the airplane was about 90° off the planned heading, and slow in airspeed.

Subsequently, the pilot stated there was a "shock" to the controls and "simultaneous the airplane suddenly broke hard to the left," stalled a second time, and began to rotate downward. The pilot told the sky-divers to jump out of the airplane. The parachutists complied, and all of them successfully exited the airplane during this second spin event. The pilot then initiated the spin recovery procedures to no apparent effect through about 9 rotations, and stated that the roll rate was a lot more rapid than the first spin event. He then pulled both propeller controls levers to the feather position and was able to get out the spin. He recovered the airplane to a wings and pitch level attitude, but shortly thereafter, the airplane "broke left" and stalled for a third time. The pilot recovered the airplane again by lowering the pitch attitude and increasing the airspeed.

The pilot turned back towards the airport and since the airplane was handling abnormally, he adjusted the elevator trim to its full nose up position to help him maintain straight and level flight. He stated that the full nose up trim setting was used on the approach. In addition, the pilot flew the approach 15 knots faster than required, in order to compensate for the control issue of a marked decrease in elevator performance.

The pilot described the landing as being nose low relative to a normal landing. After landing at C83, a witness observed that the airplane's right horizontal stabilizer, with the attached elevator, was missing. The separated airplane parts were subsequently located in a field a few miles south of the airport.

The pilot reported that there were no abnormalities with the airplane on the previous flights that day, or during his pre-flight inspection for the accident flight. He stated that the weather was clear and that there was a light chop. Further, he reported no engine issues during the flight.

Postaccident examination of the airplane revealed that the wing's top and bottom skins were unremarkable. The engine mounts, and the left horizontal stabilizer attachment points were examined for overstress, but none was observed. No signs of flutter were observed on the left horizontal stabilizer.

The right horizontal stabilizer, with the elevator attached, that had separated from the airplane, was examined. The right elevator and elevator trim tab remained attached to their respective attachment points. Fractures were observed on the main and trailing edge horizontal spars on the right horizontal stabilizer. There was some wrinkling on the skin surface. The attachment bracket that connected the right horizontal stabilizer to the airplane, and to the other horizontal stabilizer, exhibited fracture surfaces on the right side where the right horizontal stabilizer attached.

Portions of the right horizontal stabilizer, elevator, and the attachment bracket were sent to the National Transportation Safety Board Materials Laboratory for further examination. Magnified optical examination of the fractures surfaces revealed features consistent with overstress separations. No indication of fatigue or corrosion was observed. Deformation and fracture patterns in the right horizontal stabilizer spars were indicative of the stabilizer tip bending up and the lower spar also had upward tearing of the webs.

The airplane's flight manual spin recovery states: "immediately move the control column full forward, apply full rudder opposite to the direction of the spin, and reduce power on both engines to idle. These three actions should be done as near simultaneously as possible, then continue to hold this control position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral during recovery."

The airplane's weight and balance was calculated for the accident flight. The center of gravity (CG) was estimated to be about 6-7 units aft of the limit. Due the center of gravity (cg) being aft of the limit, the maximum allowable gross weight was unable to be determined at the time of the accident. According to the FAA Pilot Handbook of Aeronautical Knowledge states, "as the CG moves aft, a less stable condition occurs, which decreases the ability of the aircraft to right itself after maneuvering or turbulence."

Pilot Information

Certificate:	Commercial	**Age:**	30,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	December 4, 2014
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	March 16, 2016
Flight Time:	(Estimated) 1860 hours (Total, all aircraft), 20.5 hours (Total, this make and model), 1706.1 hours (Pilot In Command, all aircraft), 284.2 hours (Last 90 days, all aircraft), 9.1 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:			

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Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:		**Last Flight Review or Equivalent:**	
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Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N256TA
Model/Series:	65 A90 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	1967	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	LJ-256
Landing Gear Type:	Retractable - Tricycle	**Seats:**	15
Date/Type of Last Inspection:	December 5, 2015 Continuous airworthiness	**Certified Max Gross Wt.:**	9650 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo prop
Airframe Total Time:	14543.9 Hrs as of last inspection	**Engine Manufacturer:**	Pratt and Whitney
ELT:	C126 installed, not activated	**Engine Model/Series:**	PT6A-20
Registered Owner:	On file	**Rated Power:**	550 Horsepower
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:	LVK,399 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	18:53 Local	**Direction from Accident Site:**	229°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	280°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.81 inches Hg	**Temperature/Dew Point:**	32°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Byron, CA (C83)	**Type of Flight Plan Filed:**	None
Destination:	Byron, CA (C83)	**Type of Clearance:**	None
Departure Time:	18:51 Local	**Type of Airspace:**	

Airport Information

Airport:	BYRON C83	**Runway Surface Type:**	
Airport Elevation:	78 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	14 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	15 None	**Latitude, Longitude:**	37.828334,-121.625831(est)

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Michael Arraiz; Federal Aviation Administration; Oakland, CA Henry Soderlund; Textron Aviation; Wichita, KS
Original Publish Date:	March 5, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93667

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.