Aviation Investigation Final Report

Location:	SAN JOSE, California	**Accident Number:**	LAX00FA231
Date & Time:	June 15, 2000, 12:25 Local	**Registration:**	N8659V
Aircraft:	Bellanca 8KCAB	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During an aerobatic maneuver, the airplane impacted level terrain while in a descending, steep bank, right turn. On a clear day, the renter pilot acquired a parachute from the flight school and departed with the intent of performing aerobatic maneuvers during his pleasure flight. He had recently received a promotion at work. There were no communications with the pilot after he departed the airport. His route of flight, maneuvers performed, and altitudes utilized could not be determined. The airplane was not transponder equipped. About 50 minutes after takeoff, a witness observed the airplane between 400 and 500 feet above ground level in a medium bank descending right turn. The bank angle increased to about 60 degrees, and the witness lost contact with the airplane when his view became obstructed by ground objects/terrain. The accident site was located the following day. Wreckage was observed fragmented over a 115-foot-long path. The pilot was found lap-belted and shoulder harnessed in his seat with a fully stowed parachute. The cockpit door's emergency release pin assembly, which when utilized separates the entire door from the fuselage, was found seated. No evidence of any preexisting mechanical malfunctions or in-flight part separations were detected during the subsequent wreckage examination. The pilot had no physical limitations or reported physiological impairments. No evidence of drugs was found in toxicological specimens. The airplane was FAA certificated in the acrobatic category and was designed to withstand 6 positive and 5 negative Gs. The adverse effects of acceleration-induced G-force to a pilot's physiology while maneuvering within this range have been documented by the FAA and other organizations. Identified possible impairments include reduced vision to loss of consciousness (G-LOC). The effects of G-LOC may last 30 seconds and result in a loss of airplane control. A pilot who has recently been exposed to elevated G-loads may have increased tolerance to its effect. The pilot's flight record logbook indicated that he had not flown the Decathlon or performed aerobatics in 5 months.

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 control of the airplane for undetermined reasons while intentionally performing an aerobatic maneuver.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
1. REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
2. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On June 15, 2000, about 1225 Pacific daylight time, a Bellanca 8KCAB, N8659V, descended into terrain while maneuvering about 11 miles east-southeast of the Reid-Hillview of Santa Clara County Airport, San Jose, California. The airplane was destroyed, and the private pilot was fatally injured. Visual meteorological conditions existed, and no flight plan was filed for the local area personal flight, which was performed under 14 CFR Part 91. The airplane was operated by Amelia Reid Aviation, San Jose. The flight originated from the Reid-Hillview Airport about 1137.

The airplane's owner reported to the National Transportation Safety Board investigator that the pilot had rented the airplane from her flight school to perform a personal flight in which the pilot likely intended to practice aerobatic maneuvers. The pilot blocked time in the flight school's airplane rental log for a flight from 1100 to 1300.

The owner stated that, years earlier, she had instructed the pilot in the performance of aerobatic maneuvers. The pilot was authorized to take with him one of the flight school's parachutes while he practiced maneuvers. When he exited the school's office he had one of the parachutes with him. The owner also reported that the airplane's fuel tanks should have been about 3/4 full when the pilot departed.

The Federal Aviation Administration (FAA) reported that the airplane departed from the Reid-Hillview Airport using runway 31R. Thereafter, the pilot made a right downwind departure and exited the airspace to the southeast. There were no further radio communications with the pilot.

About 1225 a witness, who was at work in an office building (about 3/4 mile southwest of the accident site), reported that he observed the accident airplane maneuver seconds before it collided with the terrain. When he first observed the airplane it was only between 400 and 500 feet above the terrain. The witness stated that he is an avid pilot, and he also performs aerobatic maneuvers. According to the witness, he observed the airplane in a descending right turn with a bank angle that initially was about 40 degrees. The airplane's bank angle increased to over 60 degrees, whereupon obstacles and terrain blocked his view of the airplane. The witness estimated that the total length of time he observed the airplane before it disappeared behind the terrain was between 2 and 3 seconds. No smoke or fire was noted during the airplane's descent. The witness further estimated that the airplane was between 1/4 and 1/2 mile away from his location at the time of his observation. The witness provided the Safety Board investigator with a written statement and a drawing highlighting his observations of the airplane's flight path.

The following day, about 1000, workers in the vicinity of the accident site observed what they initially believed was a pile of rubbish. They proceeded to the site, and upon further exploration, observed evidence of the crashed airplane.

PERSONNEL INFORMATION

A review of the pilot's personal flight record logbook number two, covering the period from April 17, 1997, through June 3, 2000, indicated that he had logged a total of about 558.1 flight hours. Of this flight time, 22 hours were flown in the accident model of airplane.

The pilot had flown on 25 occasions during the 12-month period that preceded the accident flight. Of these flights, he listed "AKRO PRACTICE" on three occasions for a total of 3.4 hours. His most recently logged "AKRO PRACTICE" flight occurred about 5 months before the accident, on January 13, 2000. The flight was performed in the accident airplane.

Family members reported that on the night preceding the accident the pilot had retired at 2200, his customary time. He awoke the following morning between 0500 and 0600. The pilot did not manifest any unusual characteristics.

A review of the pilot's medical records provided by his personal physician did not reveal any medical appointments within several weeks of the accident. The pilot was not undergoing any known treatment.

Family members and work associates reported that the pilot was in excellent health. He did not take prescription or over the counter medication, and he did not have any physical impairments. The pilot exercised on a regular basis. The day preceding the accident flight the pilot had received a significant promotion at work.

AIRCRAFT INFORMATION

The FAA certificated the Bellanca, 8KCAB (Decathlon) airplane, in the acrobatic category. The FAA approved Airplane Flight Manual indicates that the airplane's structure was designed to withstand limit loads (the maximum loads to be expected in service, which is less than the ultimate load) of 6 positive and 5 negative Gs.

The airplane's owner reported that prior to her last flight in the accident airplane on June 12, she had completely topped off both of its fuel tanks. Thereafter, she flew the airplane for about 1 hour. During her flight all of the airplane's systems appeared to function normally. No binding of the controls or any mechanical problems were noted with the airplane. According to her fuel log record, no fuel was placed into the airplane before the accident flight. On this basis, she believes that at the time of the accident flight, the airplane's tanks were about 3/4 full, which corresponds to approximately 30 gallons of fuel.

The airplane was not equipped with a transponder. The airplane was equipped with a quick release mechanism to jettison the right side cockpit door. In part, the mechanism consists of a metal ring which, when pulled and an associated handle rotated, releases the entire door from the airplane.

The airplane's maintenance logbooks were reviewed by the FAA. The FAA reported that all required airworthiness directives had been complied with and were up to date.

METEOROLOGICAL INFORMATION

The pilot-witness, who reported being located near the accident site, indicated that at the time of his observations the sky was clear. The wind was calm, and the temperature was about 92 degrees Fahrenheit.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was examined at the accident site, located on private property at UTC Pratt & Whitney Space Propulsion, Chemical Systems Division, 600 Metcalf Road, San Jose, California. The global positioning satellite coordinates for the initial point of impact (IPI) crater are about 37 degrees 13 minutes 53 seconds north latitude by 121 degrees 39 minutes 57 seconds west longitude.

Terrain surrounding the accident site principally consists of open dirt fields sparsely covered with native shrub-like vegetation. The site's elevation is estimated at 820 feet mean sea level. The distance between the IPI and the farthest airplane component found was about 115 feet. The principal axis of the wreckage distribution path was 190 degrees, magnetic.

Evidence demarking the initial point of impact (IPI) was noted by the formation of a 6 foot wide by 8 foot long oval shaped impact crater. The crater was approximately 3 feet deep and contained portions of airplane wreckage consisting principally of the propeller assembly and engine cowl fragments.

A few yards south of the IPI wood spar fragments from the destroyed right wing were found along with the right wing's separated lift struts. Between 10 and 50 feet south, a fuel line containing drops of fuel and additional fragments from the right wing were found. Between 75 and 100 feet farther south, the gascolator bowl attachment fitting, crushed right side door hinge, handle, and emergency release pin assembly were located. The outer 8-foot-long spanwise portion of the left wing with its intact wing tip was found with the main wreckage, which was upside down and oriented in a northerly direction.

The engine, devoid of one magneto and other accessories, was the component found farthest south from the IPI. The distance between the IPI and the engine was about 115 feet. The engine was found separated from its airframe mounts. The front right side and bottom portions of the engine, in the area where the number 1 cylinder had been located and in the

area of the crushed oil sump, were observed impact damaged. A film of oil was noted over the engine.

MEDICAL AND PATHOLOGICAL INFORMATION

On June 17, 2000, an autopsy was performed by the medical examiner-coroner in the County of Santa Clara, 850 Thornton Way, San Jose, California 95128. Results of toxicology tests performed by the Institute of Forensic Sciences for the county coroner, and by the FAA's Civil Aeromedical Institute, Toxicology and Accident Research Laboratory, did not reveal evidence of ethanol or any drugs.

SURVIVAL ASPECTS

The pilot was found in the airplane's front seat and secured by its lap belt and shoulder harness. He was wearing a parachute, which was fully stowed.

The cockpit door's emergency egress safety locking pin was found seated. The door frame around the pin assembly was found crushed in a heavily impact damaged area of the fuselage.

TESTS AND RESEARCH

Propeller Examination.

The propeller was observed sheered from its crankshaft mounting flange. The blades were found torsionally twisted and bent into an "S" shape. Scratches were noted on the cambered surfaces, and the leading edges were gouged.

Engine and Accessory Examination.

The front right side and bottom portions of the engine were observed to have sustained the predominant impact damage. No evidence of any preimpact damage was noted. The oil cooler was attached to the engine by fragments of its oil lines. The spark plugs exhibited signatures consistent with normal wear, according to the Lycoming engine participant. The fuel filter was clear. Several drops of fuel were observed in the flow divider and in the engine driven fuel pump.

One magneto was found in bushes about 10 feet south of the engine. It was devoid of its wiring harness. The magneto's drive gear was rotated by hand, and spark was observed from all distributor cap posts. The second magneto was found on its engine mounting pad. Neither the impact damaged crankshaft nor the magneto's drive gear could be rotated. (See the Lycoming engine participant's report for additional details.)

Airframe Examination.

The airplane was partially laid out at the accident site. The cockpit and instrument panel were found destroyed. All of the flight control surfaces were found with the main wreckage. The rudder, elevators, and horizontal stabilizer assemblies were found attached to the empennage.

The right wing was found crushed. Its main spar was observed fragmented in over six locations, principally in a spanwise direction, from the wingtip to the fuselage attachment point. The aileron was found separated from the wing at its attachment hinges.

An 8-foot-long outboard spanwise section of the left wing, with the attached aileron, was found in one piece. The inboard portion of its main spar was found broken from the fuselage.

The continuity of the elevator and rudder flight control system was confirmed between the attached rudder and elevator assemblies and the cockpit control sticks. Integrity of the aileron cable control system was confirmed between the ailerons' attachment hinges and breaks in the cables, which exhibited a broomstraw appearance. There was no evidence of soot or fire signatures in any of the observed wreckage.

A review of the airplane's maintenance records was performed by the FAA. Logbook entries were noted for all required inspections.

G-Induced Loss of Consciousness.

The FAA reviewed the physiological effects of G-forces on pilots performing aerobatic maneuvers in Advisory Circular (AC) number 91-61, published February 28, 1984. In the AC, identified hazards from G-loading ranged from reduced vision to loss of consciousness, which may result in a loss of airplane control.

The AC states that the effects of an induced loss of consciousness (commonly referred to as G-LOC) can last 30 seconds, or longer. G-LOC has been documented to occur to pilots exposed to less than 6 Gs. While the AC indicates that there is significant variation among pilots, it states that an incapacitation countermeasure to minimize the hazards of acceleration may relate to increasing the frequency of exposure to G-stress events. This action may "tune" the human system, making it less sensitive to higher G-loads.

The Australian government's Bureau of Air Safety Investigation (BASI) conducted a study entitled "The Possibility of G-Induced Loss of Consciousness (G-LOC) During Aerobatics in a Light Aircraft," which was published in February 1988 as Research Report 872-1017. The research involved an investigation into the rates of G onset and G levels experienced by a light aircraft pilot during aerobatics. To accomplish the research, BASI equipped a Bellanca 8KCAB Decathlon with instrumentation to enable acceleration values to be measured during performance of a series of maneuvers. In pertinent part, BASI concluded that an instantaneous loss of consciousness may occur without any prior warning while performing aerobatic maneuvers in this model of airplane.

ADDITIONAL INFORMATION

The airplane operator overflew the aerobatic practice area where the accident occurred. The operator reported that the area is "over a valley" and "it appeared as if the pilot was not flying the plane prior to impact. East of the accident site are some flat fields that could have been used for an emergency landing."

The airplane wreckage was released to its owner on June 17, 2000. No parts were retained.

Pilot Information

Certificate:	Private	**Age:**	53,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	February 2, 2000
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	November 19, 1998
Flight Time:	558 hours (Total, all aircraft), 22 hours (Total, this make and model), 470 hours (Pilot In Command, all aircraft), 9 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bellanca	**Registration:**	N8659V
Model/Series:	8KCAB 8KCAB	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Aerobatic; Normal	**Serial Number:**	175-75
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	April 12, 2000 100 hour	**Certified Max Gross Wt.:**	1800 lbs
Time Since Last Inspection:	28 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4368 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	AEIO-320-EIB
Registered Owner:	AMELIA REID	**Rated Power:**	150 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	Amelia Reid Aviation	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RHV,133 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	11:45 Local	**Direction from Accident Site:**	293°
Lowest Cloud Condition:	Clear	**Visibility**	15 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.86 inches Hg	**Temperature/Dew Point:**	33°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Jose, CA (RHV)	**Type of Flight Plan Filed:**	None
Destination:	San Jose, CA (RHV)	**Type of Clearance:**	None
Departure Time:	11:37 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	37.231388,-121.665832

Administrative Information

Investigator In Charge (IIC):	Pollack, Wayne
Additional Participating Persons:	Terje Kristiansen; FAA WP-FSDO; San Jose, CA Mark Platt; Textron Lycoming; Van Nuys, CA
Original Publish Date:	November 25, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=49453