Aviation Investigation Final Report

Location:	Van Nuys, California	**Accident Number:**	WPR16FA157
Date & Time:	August 2, 2016, 13:22 Local	**Registration:**	N341AL
Aircraft:	ARION AIRCRAFT LLC LIGHTNING LS-1	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot of the light sport airplane contacted the tower controller at his destination airport, where he planned to complete several touch-and-go maneuvers. The airplane touched down hard on the runway, and during the subsequent takeoff, the pilot reported to the controller that he heard a "banging" sound. The controller observed the left main landing gear "dangling" from the airplane. The pilot advised the controller that he planned to return to the airport for landing; however, as the airplane reached the airport boundary, it began a left turn that gradually progressed into a 70° bank angle. The airplane's bank angle increased further before the airplane entered a nose-down attitude and impacted a building, consistent with an aerodynamic stall.

A normal standard-rate turn would have allowed the pilot to rejoin the downwind leg of the traffic pattern and provided additional time to configure the airplane for a normal landing. However, the aggressive bank angle increased the airplane's stall speed and likely contributed to the pilot's exceedance of the airplane's critical angle of attack.

Examinations of the airframe and engine did not reveal any mechanical malfunctions or anomalies that would have precluded normal operation, although the engine ran about 200 rpm below its maximum power output during the engine run. Although the source of this power loss could not be confirmed, it may have been the result of a reduction in fuel flow from a torn carburetor diaphragm and bent float. Data obtained from the airplane's engine monitor revealed that the engine achieved rated power throughout the accident flight, which suggested that the damage observed to the carburetor was the result of impact. A witness reported hearing the engine sputtering seconds before the airplane impacted the ground, and recorded engine data showed a corresponding decrease to idle power. It could not be determined why the pilot may have retarded the throttle to idle power.

The pilot allowed his Federal Aviation Administration (FAA) medical certificate to expire about 2 years before the accident, a few months after he sustained traumatic injuries, including a traumatic brain

injury, in a car accident. Although his personal medical records did not show any permanent neurocognitive or physiological defects, formal testing was not documented. However, acquaintances and flight instructors who flew with the pilot stated that his ability to control the airplane and his decision-making capacity were affected by his injuries. The pilot continued to fly and was involved in three incidents that resulted in damage to the accident airplane; evidence suggested the pilot's physiological condition remained unchanged until the day of the accident. Thus, it is likely that the pilot's injuries impaired his ability to safely operate the airplane and directly contributed to the accident. Furthermore, the pilot ignored recommendations from other pilots to stop flying and continued to operate the airplane with a known physiological impairment.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's loss of airplane control due to an exceedance of the airplane's critical angle of attack, which resulted in an accelerated stall and subsequent impact with a building. Contributing to the accident was the pilot's unreported physiological impairment from traumatic brain injury, which impaired his ability to safety operate the airplane.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Illness/injury - Pilot
Personnel issues	Neurological - Pilot

Factual Information

History of Flight

Landing-flare/touchdown	Abnormal runway contact
Initial climb	Aerodynamic stall/spin (Defining event)
Initial climb	Loss of control in flight
Initial climb	Collision with terr/obj (non-CFIT)

On August 2, 2016, about 1322 Pacific daylight time, an Arion Aircraft Lightning LS-1 light-sport airplane, N341AL, was substantially damaged after it impacted a building during its departure from Van Nuys Airport (VNY), Van Nuys, California. The private pilot was fatally injured. The airplane was owned and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight, which departed Santa Monica Municipal Airport (SMO), Santa Monica, California, at 1308.

According to an acquaintance, the pilot planned to complete several touch-and-go takeoffs and landings at VNY on the day of the accident. Air traffic control (ATC) information from the Federal Aviation Administration (FAA) revealed that the pilot contacted the VNY tower controller and requested a full-stop landing on runway 16L. The pilot subsequently advised the controller that he was not familiar with the area and made multiple requests for navigation assistance, including a request for the controller to announce his base leg turn. Once the controller instructed the pilot to turn for the base leg, the pilot requested to extend his downwind leg to descend further and also requested a touch-and-go landing. According to the controller, the airplane touched down hard about 1,500 ft down the runway and subsequently took off.

Shortly into the airplane's climb, the pilot reported to the controller that he heard a "banging" sound, and the controller informed the pilot that his left main landing gear appeared to be "dangling." The tower controller advised the pilot that he could return to VNY or proceed to another airport at his discretion. The pilot stated that he planned to return to VNY; the tower controller observed the airplane immediately veer to the left and descend. Another pilot reported over the tower frequency that an airplane had crashed east of the airport.

Several witnesses observed the airplane during its departure from VNY. One witness (Witness 3 in Figure 1) observed a piece of the left main landing gear hanging from the airplane as it climbed from runway 16L. The airplane then began a left turn from the departure end of the runway that initially looked normal, but then the airplane decelerated. At this time, two witnesses who had listened to the exchange between the pilot and the controller (Witnesses 1 & 2), reported that, seconds after the pilot's final communication, they observed the airplane enter a hard left turn. One witness described the turn as a "knife edge." The airplane's nose yawed left to a nose-down attitude and the airplane rapidly descended toward the ground. Witness 5, who was a passenger in a helicopter at the time of the accident, reported that the airplane entered the descent from an altitude about 350 ft above ground level and impacted an industrial park below. Witness 4 reported hearing a sputtering engine about 7 seconds

before the airplane impacted the ground.

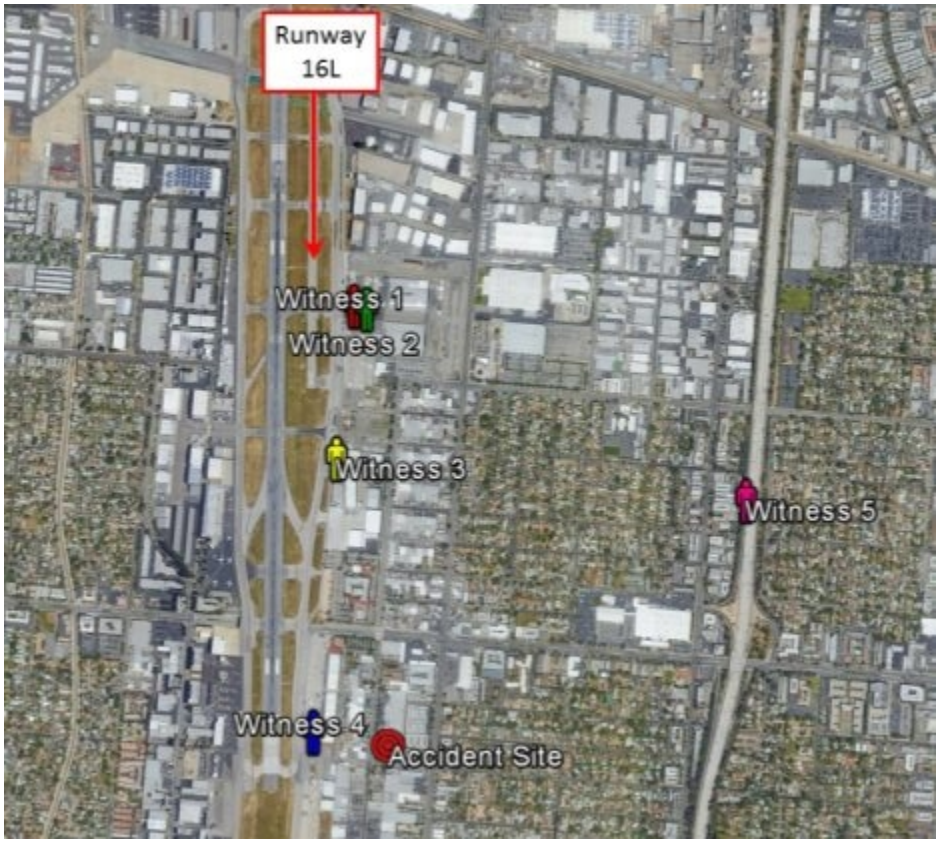

Figure 1 – Witness Locations

Pilot Information

Certificate:	Private	**Age:**	78,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Unknown	**Last FAA Medical Exam:**	September 12, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 15, 2016
Flight Time:	927 hours (Total, all aircraft)		

The pilot, age 78, held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. His most recent third-class medical certificate was issued on September 12, 2012, with no limitations. During the exam, the pilot reported that he had accumulated 908 total hours of flight

experience, 60 hours of which were in the previous 6 months. The pilot's medical certificate was not valid after September 30, 2014.

The pilot's most recent logbook records showed that he had accumulated a total of 19.6 hours from October 14, 2015 to February 2, 2016. His flight experience before 2015 was captured in a logbook that spanned from 2005 to 2008. His most recent flight review was completed on February 15, 2016. According to an acquaintance, in 2014, the pilot was involved in a car accident that resulted in serious injuries and required intensive care treatment for about 5 months. Another witness reported that the pilot took several months to recuperate but was not the same person physically after the car accident. The witness stated that when the pilot returned to flying, he was unable to hold his head straight. He was frequently hunched over and was only capable of using about 10% of his right arm and hand strength. When driving, the pilot frequently used his left hand to pick up his right arm and place it on the gear shift. The witness reported that the pilot's physical condition was the same the day before the accident. The witness further stated that several instructors refused to fly with him; eventually, the pilot found one instructor who agreed to sign him off for a flight review. The witness stated that several of the pilot's peers had encouraged him to stop flying.

Flight Review

The instructor who endorsed the accident pilot for his flight review reported that they started flying together in September 2015 and accumulated 23 hours of flight instruction before the instructor would endorse the pilot for a flight review. The instructor stated that the pilot had difficulty with turn coordination and airplane control in the airport traffic pattern and found landing the airplane to be challenging. The flight instructor informed the pilot that he would not endorse him for the completion of a flight review until he demonstrated consistency in the airplane, which took about 5 months.

Recent Flight History

An acquaintance reported that the pilot had a total of three incidents in the airplane following the car accident, not including the accident flight. The first incident occurred in March 2015 during a landing attempt. The flight instructor who was in the airplane with the pilot during the incident reported that he stopped flying with the pilot due to safety concerns. According to the instructor, the pilot had difficulty entering and exiting the airplane and did not seem mentally "sharp," as he did not look for or listen for other air traffic. During flight, the pilot consistently overcontrolled the airplane and was unable to hold altitude, particularly in the airport traffic pattern. During landing attempts, the pilot would either touch the airplane down early and bounce the airplane or hold the airplane in a nose-high attitude to bleed off airspeed then let the nose drop aggressively. The instructor recounted that during their landing attempt, the airplane touched down on the main landing gear and then floated, but the pilot pushed the control stick forward hard. The nose landing gear subsequently impacted the ground and separated. The instructor discontinued flight instruction with the pilot shortly after the incident.

The second incident occurred in May 2016 during a landing attempt that resulted in damage to the nose landing gear. According to an airport representative who responded to the incident, the pilot stated that the airplane bounced once then impacted the runway in a slight nose-low attitude, which caused the nose landing gear to collapse. The pilot did not want to report the incident and argued that he did not require a medical certificate because the airplane met the requirements of a light sport aircraft that only required a

driver's license to fly. The pilot was "very weak," as his knees and hands bothered him.

The pilot's most recent incident occurred about 1 month before the accident during a landing attempt at SMO. According to the witness, the airplane "came roaring down the runway," landed long, and overran the runway end. The pilot brought the airplane to a stop in the airport's non-movement area.

Aircraft and Owner/Operator Information

Aircraft Make:	ARION AIRCRAFT LLC	**Registration:**	N341AL
Model/Series:	LIGHTNING LS-1 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	
Airworthiness Certificate:	Normal; Special light-sport (Special)	**Serial Number:**	166
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	December 1, 2015 Annual	**Certified Max Gross Wt.:**	1320 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	46.3 Hrs at time of accident	**Engine Manufacturer:**	Jabiru
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	3300A
Registered Owner:	On file	**Rated Power:**	120 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was powered by a Jabiru 3300 normally-aspirated, direct drive, air-cooled, 120-horsepower engine. The pilot's service facility provided the original logbooks, which revealed that the airplane's most recent annual inspection was completed on December 1, 2015, at an airplane and engine time of 46 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	VNY,802 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	12:51 Local	**Direction from Accident Site:**	336°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	31°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SANTA MONICA, CA (SMO)	**Type of Flight Plan Filed:**	None
Destination:	Van Nuys, CA (VNY)	**Type of Clearance:**	None
Departure Time:	13:15 Local	**Type of Airspace:**	Class D

The 1351 recorded weather observation at VNY included wind from 120° true at 8 knots, visibility 10 statute miles, clear skies, temperature 32°C, dew point 11°C, and an altimeter setting of 29.96 inches of mercury.

Airport Information

Airport:	VAN NUYS VNY	**Runway Surface Type:**	Asphalt
Airport Elevation:	802 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	16L	**IFR Approach:**	None
Runway Length/Width:	4013 ft / 75 ft	**VFR Approach/Landing:**	Touch and go;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	34.198055,-118.485275

The airplane came to rest about 1/8 nautical mile from VNY against the side of a building. The initial impact point (IIP) was identified by a broken wooden utility pole and multiple severed wires. The end of the debris path was marked by the main wreckage, which was heavily fragmented about 15 ft beyond the IIP. An odor of fuel was detected at the accident site, which was accompanied by a large fuel stain on the ground beneath the main wreckage. One wooden propeller blade remained attached to the propeller hub, while the second blade was sheared at the propeller root.

The flight control system was fragmented but did not display any anomalies.

The flap system was continuous from the flap motor to the right and left control arms at the wing roots. The flap actuator cylinder was separated from a portion of the actuator that measured about 1.5 inches. According to the manufacturer, this measurement was consistent with 20° of flap extension.

The left main landing gear wheel and fairing had separated from the landing gear strut. The forward face box plate at the junction of the strut and nose landing gear tire displayed scraping and polishing consistent with preimpact ground contact. The cylinder block of the landing gear strut that normally attaches to the main landing gear wheel exhibited impact signatures consistent with overload separation.

Fuel System

About 4 oz of fuel was drained from the gascolator bowl along with trace amounts of debris. The gascolator screen displayed some foreign material.

The fuel selector valve was found in an intermediate position between the right and left fuel tank positions. No obstructions were noted, and the valve rotated successfully to the LEFT, RIGHT, and OFF fuel tank detents. Subsequent testing of the valve showed that fuel flow did not decrease in the position between the left and right tank detents. The mixture control knob was found in the full-rich position.

The fuel boost pump was tested with an 18-volt battery, and it was able to draw air through the fuel inlet hose.

Engine Examination

The crankshaft was rotated by hand at the propeller hub. Mechanical continuity was established throughout the rotating group, valve train, and accessory section, and all rocker arms displayed consistent travel.

The engine was equipped with a dual transistorized ignition system with a timing at 25º before top dead center. The ignition system remained attached to one bracket of the stator mount, but the unit had fractured free from the other mount. The ignition coil was tested using a multimeter and measured about 4.8 ohms at the terminal end, which was within the manufacturer's range of 2 to 5 ohms.

The ignition harness and distributor caps were damaged during the accident sequence and could not be used during the examination. To facilitate an engine run, the engine motor mount, backing plate, distributor caps, ignition harness, and the No. 6 intake pipe were replaced.

Carburetor

The Bing carburetor was collocated with the main wreckage but separated from the engine. The butterfly valve moved freely by hand and was unrestricted. Both carburetor floats were intact; however, one float was bent inboard about 30°. Additionally, the carburetor needle valve diaphragm displayed a tear along the outer rim.

A representative of the engine manufacturer, who also managed a repair facility for the carburetor manufacturer, explained that a torn diaphragm will produce a leak of differential pressure in the piston channel that will reduce the piston's travel, as it will cause the ambient air to reach the top of the dome. Depending on the severity of the tear, the piston could drop into the jet, which will restrict fuel flow.

According to the manufacturer, if one float was canted toward the carburetor case and the other was level, similar to the accident airplane, then the carburetor would continue to feed fuel to the engine.

Engine Run

The left cap from the accident airplane was installed on the stator mount and used for the engine run; a serviceable ignition cap was installed in the right side position. Using the original spark plugs, the engine ran with no anomalies at idle, run-up, and maximum continuous power settings, and during rapid changes from idle to full power.

A peak power of 2,550 rpm was achieved with the throttle advanced to the full position. According to the manufacturer, maximum rated power for the Jabiru 3300A engine is 2,950 rpm, but in the test stand with the test propeller, a maximum continuous power of 2,750 rpm is typical.

The second engine test was completed the following day after the piston and diaphragm from the accident airplane were installed in the test cell carburetor. The engine power fluctuated at maximum power between 2,350 and 2,500 rpm without the use of cylinder No. 5. The examination did not determine why the cylinder did not fire. While the maximum engine power fluctuated, the engine was capable of achieving takeoff power and did not display any interruptions in power.

Flight recorders

The airplane was equipped with a Dynon SV-D1000T primary flight display designed for experimental and light sport aircraft, which captured airplane and engine performance data. According to the recovered data, the airplane began its takeoff roll from SMO about 1308:53 and entered a climb to the southwest. The airplane then changed course to a northern heading and crossed the Santa Monica Mountains toward VNY. Following the airplane's touch-and-go landing on runway 16L about 1321:32, the data showed that the airplane maintained a slow climb on runway heading. The airplane began a slight left turn as it reached the southern end of the airport. At 1322:34, the airplane slowed as its left turn bank angle increased to about 70°. In the 3 seconds that followed, the airplane entered a steep left turn with a maximum

recorded left roll of 95° and a 55º nose-down pitch attitude. The engine rpm, exhaust gas temperature (EGT), and fuel flow were steady during the airplane's climb out. As the airplane's bank angle increased, the engine power decreased from about 2,200 rpm to about 1,200 rpm. It momentarily returned to 2,000 rpm before decreasing to about 1,100 rpm at 1322:43, when the air and position data stopped recording. During this time, the fuel flow and EGT values decreased slightly.

Medical and Pathological Information

The County of Los Angeles, Department of Medical Examiner-Coroner, Los Angeles, California, conducted an autopsy on the pilot. The cause of death was listed as "multiple traumatic injuries." The pilot's autopsy documented 60-70% narrowing of the left anterior descending coronary artery, but there was no evidence of new or old ischemic damage to the heart muscle.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens of the pilot. Testing identified amlodipine and gabapentin in samples of urine and cavity blood. Amlodipine is a blood pressure control medication that is not generally considered impairing. Gabapentin is a central nervous system (CNS) depressant anti-seizure medication that is also used to treat peripheral neuropathy. The medication carries the precaution, "patients should be advised that [gabapentin] may cause dizziness, somnolence and other symptoms and signs to CNS depression. Accordingly, they should be advised neither to drive a car nor to operate other complex machinery until they have gained sufficient experience on [gabapentin] to gauge whether or not it affects their mental and/or motor performance adversely."

Personal medical records showed a history of high blood pressure, elevated lipids, a clotting disorder with a history of deep vein thrombosis and placement of an inferior vena cava filter, asthma, hypothyroidism, and borderline diabetes. Additionally, the pilot was involved in a car accident in May 2014 that resulted in a traumatic brain injury and a spinal cord injury. The traumatic brain injury did not result in any documented significant loss of cognitive function, with the exception of some memory loss around the time of the accident. However, the spinal cord injury resulted in arm pain and weakness that had reportedly resolved by the pilot's September 2015 personal medical examination.

Additional Information

According to 14 *CFR* Part 61.53(b), for operations that do not require a medical certificate:

…a person shall not act as pilot in command, or in any other capacity as a required pilot flight

crewmember, while that person knows or has reason to know of any medical condition that would make the person unable to operator the aircraft in a safe manner.

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen
Additional Participating Persons:	Ivan Salazar; Federal Aviation Administration; Van Nuys, CA Nick Otterback; Arion Aircraft; Shelbyville, TN
Original Publish Date:	June 12, 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=93745