Aviation Investigation Final Report

Location:	Tehachapi, California	**Accident Number:**	WPR09LA325
Date & Time:	July 4, 2009, 13:29 Local	**Registration:**	N97869
Aircraft:	Aero Vodochody L-29	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The accident airplane was participating in formation flight consisting of three airplanes. The lead pilot of the formation reported that after overflying the city in a trailing formation, the flight conducted a series of turns and the number two and three (accident airplane) were to join up on his left and right wing. As the flight conducted a right turn, the number two airplane joined up on the lead pilot's left wing and the number three airplane was observed passing the lead pilot to his right. As the turn continued, the lead pilot observed the accident airplane pitch upwards and roll to the left over the formation. Witnesses located near the accident reported observing a three-jet formation overfly the area at an altitude of about 500 feet above ground level (agl). The accident airplane was observed trailing the other two airplanes. The witnesses reported that the three airplanes initiated a right turn to a northerly heading and the accident airplane made a sharp right climbing turn to join up with the other two airplanes. Subsequently, the accident airplane pitched upwards and rolled to the left over the other two airplanes, transitioning from the right side to the left side. Witnesses further reported that the accident airplane completed the roll in a nose low attitude and descended into terrain where a post-crash fire ensued. Examination of the airplane revealed no pre-impact mechanical anomalies with the engine or airframe.

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 clearance from terrain while performing a low altitude maneuver.

Findings

Aircraft	Altitude - Not attained/maintained
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Maneuvering-aerobatics	Low altitude operation/event (Defining event)
Maneuvering-aerobatics	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On July 4, 2009, about 1329 Pacific daylight time, an Aero Vodochody L-29 airplane, N97869, was substantially damaged when it impacted terrain while maneuvering near Tehachapi, California. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations part 91. The commercial pilot and airline transport pilot were killed. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight. The local flight originated from the Tehachapi Municipal Airport (TSP), Tehachapi, about 1300.

Several witnesses located adjacent to the accident site reported observing three jet airplanes overflying the area on a westerly heading at an estimated altitude of about 500 feet above ground level (agl). The accident airplane was observed trailing the other two airplanes. The witnesses reported that the three airplanes initiated a right turn to a northerly heading and the accident airplane made a sharp right climbing turn to join up with the other two airplanes. Subsequently, the accident airplane pitched upwards and rolled to the left over the other two airplanes, transitioning from the right side to the left side. Witnesses further reported that the accident airplane completed the roll in a nose low attitude and descended into terrain where a post-crash fire ensued.

The pilot of the lead formation airplane reported that the flight departed “single ship” and joined up in an extended trail position with about 500 to 800 feet of separation. The flight climbed to an altitude of 5,000 feet mean sea level (msl) and overflew the city on a westerly heading. Following the overhead pass, the flight initiated a climbing left turn to 6,000 feet msl. The lead pilot stated that he rolled out on a heading of approximate 190 degrees and then reversed the turn to the right “to complete a 90/270 degree turn in order to return for a pass over the city.” The lead pilot further stated that the number two airplane was to join up on his left wing and that the number three airplane (the accident airplane) was to join up on his right wing. As the lead pilot initiated the right turn, the number two airplane joined up to his left. As the flight was rolling through a heading of about 290 degrees, "…number three passed me by on the right and got ahead of me. I continued turning and then observed number three pull up and begin a left roll over the formation.” The lead pilot added that he waited for number three to join up. A few seconds later, the lead pilot “called for a check in.” The pilot of number two responded, however, no response was obtained from the number three airplane.

The pilot of the number two airplane reported that after flying over the city, "…we turned north as part of a racetrack pattern and after passing abeam the runway at TSP, the lead pilot called for a rejoin to fingertip formation. I took the left side as we prepared to turn south for a flyover in fingertip." The pilot stated that they were at an altitude of between 1,500 and 2,000 feet agl. He further reported, "[I] noticed from my peripheral vision that #3 was approaching the right wing position faster than normal. I lost sight when #3 was directly opposite me on the other side of Lead. Shortly thereafter I saw #3 climb up and toll to the left. I lost sight of it when it passed in front of lead." The pilot added that "I cannot confirm who was flying during and after the rejoin attempt, but assume #3 went up and to the left to dissipate speed from the rejoin."

PERSONNEL INFORMATION

It could not be determined which of the pilots was manipulating the flight controls when the accident occurred. Therefore, for the purposes of this report, the pilot/registered owner seated in the front seat is referred to as the first pilot and the pilot seated in the rear seat is referred to as the second pilot.

First Pilot/Registered Aircraft Owner

The pilot, age 42, who was seated in the front seat, held a commercial pilot certificate with airplane single-engine land, multi-engine land, and instrument ratings. A second-class airman medical certificate was issued on March 20, 2009, with no limitations stated. The pilot's logbook was not recovered for examination. The pilot reported on his most recent medical certificate application; he had accumulated 3,300 total flight hours.

Second Pilot

The pilot, age 62, who was seated in the rear seat, held an airline transport pilot certificate with an airplane multi-engine rating and a commercial pilot certificate with an airplane single-engine land rating. He also possessed a flight instructor certificate with airplane single-engine land, multi-engine land, and instrument ratings. A second-class airman medical certificate was issued on February 19, 2009, with the limitations stated of "must wear corrective lenses." The flight instructor's logbook was not recovered for examination. The pilot reported on his most recent medical certificate application; he had accumulated 18,900 total flight hours.

AIRCRAFT INFORMATION

The two-seat, dual flight control, low-wing, retractable-gear airplane, serial number (S/N) 2847, was manufactured in 1968. It was powered by a single M701c-500 turbine engine, rated at 800 pounds of thrust. An experimental airworthiness certificate was issued on October 6, 1994. The airframe and engine logbooks were not located during the investigation.

METEOROLOGICAL INFORMATION

A review of recorded data from the weather observation station located at TSP revealed at 1300, conditions were: wind from 300 degrees at 11 knots gusting to 14 knots, visibility 10 statute miles, clear sky, temperature 29 degrees Celsius, dew point 4 degrees Celsius, and an altimeter setting of 30.14 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site by a Federal Aviation Administration (FAA) inspector revealed that the airplane impacted an open field and residential road about 4 miles southwest of TSP. The wreckage debris path measured approximately 285 feet in length, oriented on a northerly heading. All major components of the airplane were located within the wreckage debris path. The wreckage was recovered to a secure location for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

The Kern County Coroner conducted an autopsy on the owner/first pilot on July 6, 2009. The medical examiner determined that the cause of death was "...Multiple Blunt Force Injuries."

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the first pilot. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested. The toxicology report showed positive results for 6.766 (ug/ml, ug/g) Acetaminophen detected in blood, an unspecified amount of Dihydrocodeine detected in the liver, 0.084 (ug/ml, ug/g) Hydrocodone detected in the Liver. Dihydrocodeine and Hydrocodone were not detected in the blood.

A family member of the first pilot reported that he was prescribed Hyrodrocodone for back pain, however, was not actively taking it.

The Kern County Coroner conducted an autopsy on the second pilot on July 6, 2009. The medical examiner determined that the cause of death was "...Multiple Blunt Force Injuries."

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the second pilot. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested. The toxicology test was positive for 0.662 (ug/ml) of Cyanide, which was detected in the blood.

TESTS AND RESEARCH

The recovered wreckage of the airplane was examined on July 28, 2009, at the facilities of Aircraft Recovery Services, Chino, California.

Examination of the recovered wreckage revealed that the left wing remained attached to the center fuselage section. The right wing was separated from the center fuselage section at the wing root by wreckage recovery personnel. Extensive fire damage was observed around the

right wing attach point.

The left wing was mostly intact and exhibited fire damage. The outboard four feet of the left wing was separated. The inboard and outboard flap assemblies remained attached to the wing. The inboard portion of the left aileron remained attached to its mounts and the outboard portion of the aileron was separated. The left main landing gear was observed in the retracted position. The left wing auxiliary fuel tank was separated from the wing and was severely crushed.

The right wing was intact and exhibited fire damage. The leading edge was crushed aft to the forward wing spar about 5 feet inboard of the wingtip. The inboard and outboard flaps remained attached to the wing. The right aileron remained attached to its mounts. The right main landing gear was observed in the retracted position. The right wing auxiliary fuel tank was separated from the wing and was severely crushed.

The forward portion of the fuselage from the nose of the airplane to bulkhead number 10 (aft of the rear seat) was fragmented into multiple pieces and exhibited fire damage. The center section of the fuselage was intact and exhibited severe fire damage. The rear section of the fuselage was separated from the center section of the fuselage near bulkhead number 19 (forward of the wing flap assemblies). The empennage was partially separated from the rear fuselage section at the base of the vertical stabilizer. The left air brake assembly remained attached to the fuselage and was observed in the extended position. The right air brake fuselage attach brackets were impact damaged and separated from the fuselage. The right air brake hydraulic actuator was observed in the "extended" position. The engine was separated from the fuselage. The structure surrounding the fuselage was severely deformed and torn.

The horizontal stabilizer remained attached to the vertical stabilizer. The elevator remained attached to the horizontal stabilizer via all mounts. The elevator exhibited fire and impact damage. The rudder and tail cone assembly were separated from the vertical stabilizer.

Flight control continuity was established from the elevator and rudder control torque tubes forward to the center fuselage section. The elevator and rudder control torque tubes were fractured in multiple areas. The fractures were consistent with impact related damage and fire damage. Continuity was established from the left and right wing root to the ailerons. Remains of the forward and rear cockpit controls were recovered and exhibited impact related damage. All major components of the cockpit flight control system were located. The recovered components exhibited impact damage.

Instruments displaced from the instrument panels were located within the recovered wreckage debris. The airspeed indicator faceplate and indicating needle (position unknown) was displaced from the instrument housing. The needle on the airspeed indicator was observed indicating 0.7 mach. The engine power percentage gauge was observed at a reading of about 90 percent.

No pre impact mechanical anomalies were noted with the recovered airframe.

The engine was separated into multiple sections. The compressor section was partially intact. Four of the seven combustion chambers were separated from the engine. The compressor wheel exhibited severe impact thermal damage. Rotational scoring and rub marks were observed on the compressor housing and compressor wheel shaft. The turbine section was displaced and impact damaged. The turbine wheel was intact. All of the turbine wheel blade tips were bent opposite the direction of rotation. The turbine wheel was displaced against the stator assembly. A majority of the stator vanes were separated. Rotational scoring marks were observed around the turbine wheel on the casing.

No pre impact anomalies were noted with the recovered portions of the engine.

Pilot Information

Certificate:	Commercial	**Age:**	42,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	March 20, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 3300 hours (Total, all aircraft)		

Co-pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	62,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	February 19, 2009
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 18900 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Vodochody	**Registration:**	N97869
Model/Series:	L-29	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	2847
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Turbo jet
Airframe Total Time:		**Engine Manufacturer:**	Motorlet
ELT:		**Engine Model/Series:**	M701c-500
Registered Owner:	DAVID L ZWEIGLE	**Rated Power:**	800 Lbs thrust
Operator:	DAVID L ZWEIGLE	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	WJF,2351 ft msl	**Distance from Accident Site:**	26 Nautical Miles
Observation Time:	13:56 Local	**Direction from Accident Site:**	155°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	22 knots / 28 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	34°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tehachapi, CA	**Type of Flight Plan Filed:**	Unknown
Destination:	Tehachapi, CA	**Type of Clearance:**	None
Departure Time:	13:00 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	35.134998,-118.439163(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Terrence M McMaster; Federal Aviation Administration; Van Nuys, CA
Original Publish Date:	May 11, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=74187