Aviation Investigation Final Report

Location:	Reno, Nevada	**Accident Number:**	SEA07FA263
Date & Time:	September 13, 2007, 14:45 Local	**Registration:**	N139DK
Aircraft:	Aero Vodochody L-39C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Air race/show		

Analysis

The pilot was racing his jet airplane in a scheduled race in a high speed, low-level, racetrack pattern around pylons. Videos were obtained from spectators of the race and reviewed. The videos showed that a Rockwell T-2B (Buckeye) airplane was leading the group of jets, with the accident airplane immediately behind as the group rounded pylon 8. As the accident airplane rounded the pylon, it banked to the left, and then banked to the right. The bank to the right continued through an inverted position as the airplane descended. Upon impact with the ground, the airplane was upright, in a nose low attitude. It is likely that due to the low altitude of the airplane during the accident sequence, there was limited time available for the pilot to recover from the upset. According to the Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25), "All aircraft generate a wake while in flight. This disturbance is caused by a pair of counter-rotating vortices trailing from the wingtips. The vortices from larger aircraft pose problems to encountering aircraft. The wake of these aircraft can impose rolling moments exceeding the roll-control authority of the encountering aircraft."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's encounter with wake turbulence while maneuvering over a race course. Contributing to the accident was the low altitude at which the encounter occurred.

Findings

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

Findings
1. (F) LOW ALTITUDE FLIGHT/MANEUVER - PERFORMED - PILOT IN COMMAND
2. (C) WAKE TURBULENCE - ENCOUNTERED - PILOT IN COMMAND
3. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

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

Findings
4. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On September 13, 2007, at 1445 Pacific daylight time, an Aero Vodochody L-39C, N139DK, collided with terrain while participating in the Reno Air Races at Reno-Stead Airport, Reno, Nevada. The pilot was operating the privately owned airplane under the provisions of 14 CFR Part 91. The private pilot, the sole occupant, was killed; the airplane was substantially damaged. Visual meteorological conditions prevailed and no flight plan was filed. The airplane departed Reno-Stead about 1410.

The pilot was participating in the jet race of the Reno Air Races. The accident airplane had rounded the last pylon, pylon 8, when according to a witness, the airplane was banked to the left as it rounded the pylon. The airplane then rolled to the right and impacted the ground at a high speed.

An additional witness reported that the accident airplane was following another airplane. As the airplanes rounded the pylon, the accident airplane appeared to be lower. The accident airplane then seemed to roll inverted and impacted the ground moments later.

In an interview with the Jet Class Director of Flight Operations, he indicated that the pilot had discussed a passing procedure that was inconsistent with race rules. After the pilot spoke with the Director of Flight Operations, the pilot agreed not to perform the passing procedure. According to the Director of Flight Operations, the pilot flew the race in accordance with the Jet Class rules. The Director of Flight Operations was flying above the race at the time of the accident, and also viewed a video of the event following the accident. Based on his experience, it appeared that the pilot may have inadvertently entered the wake turbulence from the T-2B Buckeye and was unable to regain control of the airplane prior to its impact with the ground. Additionally, the Director of Flight Operations indicated that all pilots are given training in wake turbulence avoidance procedures during the Reno Pylon Racing Seminar.

PERSONNEL INFORMATION

The 47 year old pilot held a private pilot certificate with an instrument rating and was certified to fly single engine land and sea airplanes. The pilot had about 1,500 hours total time, with 150 hours in the accident airplane. He had flown the accident airplane about 15 hours within the last 90 days.

The pilot attended the Reno Pylon Racing Seminar in 2006, and he had competed in the jet races in 2006 and 2007. According to the check pilot, the pilot flew well during the racing seminar and no problems were noted.

AIRCRAFT INFORMATION

The airplane was issued an experimental Special Airworthiness Certificate on February 8, 2006, for exhibition. A Ukrainian Progress A1-25TL engine powered the airplane. The last inspection of the airplane was on July 11, 2007, at a total time of 961.1 hours. According to the maintenance personnel that worked on the airplane, an additional 15 hours had accrued on the airplane since the inspection.

WRECKAGE AND IMPACT INFORMATION

The wreckage debris field ran generally parallel to runway 8/26 at Reno-Stead and was approximately 705 yards in length. The first identified point of contact consisted of two distinct shapes; one was a large disruption to the soil and spanned outward to the remainder of the debris field and to its left was a mark in the soft soil, rectangular and similar in size and shape to the leading edge of a wing. There was no similar rectangular shape on the right side of the large disruption. The debris field was on a magnetic heading of 240 degrees. Approximately 100 yards into the debris field, the smell of fuel was evident and areas of burn were present.

From the initial soil disruption, the debris field consisted of many small pieces of debris, with multiple large sections. All control surfaces, or portions of them, were identified in the debris field. The engine was separated from the airframe structure during the accident sequence and was the last identified piece of debris within the field. The outer case had been torn from the engine and located by investigators earlier in the debris field. The turbine blades were bent opposite the direction of rotation and portions of the blade tip material were missing.

ADDITIONAL INFORMATION

Videos were obtained from spectators of the Reno Air Races and viewed. The videos showed that a Rockwell T-2B (Buckeye) airplane was leading the group, with the accident airplane behind him. When they rounded pylon 8, the accident airplane was behind the Buckeye. As the accident airplane rounded the pylon, it banked to the left, and then banked to the right. The bank to the right continued through an inverted position as the airplane descended. Upon impact with the ground, the airplane was upright, in a nose low attitude.

According to the Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25), "All aircraft generate a wake while in flight. This disturbance is caused by a pair of counter-rotating vortices trailing from the wingtips. The vortices from larger aircraft pose problems to encountering aircraft. The wake of these aircraft can impose rolling moments exceeding the roll-control authority of the encountering aircraft."

Pilot Information

Certificate:	Private	**Age:**	47,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2006
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	December 1, 2006
Flight Time:	1500 hours (Total, all aircraft), 150 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Vodochody	**Registration:**	N139DK
Model/Series:	L-39C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	934874
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	July 1, 2007 100 hour	**Certified Max Gross Wt.:**	12500 lbs
Time Since Last Inspection:	15 Hrs	**Engines:**	1 Turbo fan
Airframe Total Time:	961 Hrs as of last inspection	**Engine Manufacturer:**	Ukraine Progress
ELT:	Installed, not activated	**Engine Model/Series:**	A1-25-TL
Registered Owner:	Bradley Morehouse	**Rated Power:**	3800 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RNO,4415 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	14:56 Local	**Direction from Accident Site:**	140°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots / 20 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	27°C / -11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Reno/Stead, NV (4SD)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	VFR
Departure Time:	14:10 Local	**Type of Airspace:**	

Airport Information

Airport:	Reno Stead Airport 4SD	**Runway Surface Type:**	
Airport Elevation:	5050 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.664165,-119.883888

Administrative Information

Investigator In Charge (IIC):	Dunks, Kristi
Additional Participating Persons:	William Kunder; Federal Aviation Administration; Reno, NV
Original Publish Date:	April 30, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=66715