



Aviation Investigation Final Report

Location:	Tarkio, Missouri	Accident Number:	CEN09LA427
Date & Time:	July 10, 2009, 14:27 Local	Registration:	N26HB
Aircraft:	ZIVKO AERONAUTICS INC EDGE 540	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Air race/show		

Analysis

The aerobatic airplane impacted the ground following a loss of control during an practice flight. The pilot was an aerobatic performer who was scheduled to perform at an airshow the following day. Video of the accident flight showed the airplane in a climbing vertical roll which was followed by what appeared to be an inverted spin. The rotation of the spin was halted with the airplane in a near vertical descent. During the recovery from the dive, the airplane suddenly rolled to the right and rotated about 1-1/2 turns before impacting the ground in a nose-low, right-wing-down attitude. Audible engine sounds were present throughout the recording. An examination of the airplane failed to reveal any pre-impact deficiencies with regard to the airplane's structure, flight control system or other airplane systems. The pilot had been intermittently prescribed a prescription stimulant for weight loss approximately 2-3 years prior to the accident and had not indicated the use of the medication to the FAA at that time. The medication was found on post-mortem toxicology testing, suggesting use within the several days preceding the accident, but the nature of the specimens tested did not permit more accurate estimation of when it may have last been used or whether the pilot may have been impaired by such use. Given the challenging maneuvers being performed, even slight impairment may have been sufficient to contribute to the accident.

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 aircraft control during the aerobatic flight.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained

Factual Information

History of Flight

Maneuvering-aerobatics	Loss of control in flight (Defining event)
Maneuvering-aerobatics	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On July 10, 2009, about 1427 central daylight time, a Zivko Aeronautics Edge 540, N26HB, piloted by a commercial pilot, was destroyed when it impacted the ground near the Gould Peterson Municipal Airport (K57), Tarkio, Missouri. The flight was a practice flight by an aerobatic performer who was scheduled to perform at an airshow the following day. The airplane impacted the ground during recovery from one of the aerobatic maneuvers. The 14 CFR Part 91 flight was operated in visual meteorological conditions and was not on a flight plan. The pilot was fatally injured. The local flight originated from K57 at an undetermined time.

A witness provided a video of the accident flight. The video showed the airplane in a climbing vertical roll which was followed by what appeared to be an inverted spin. The rotation of the spin was halted with the airplane in a near vertical descent. During the recovery from the dive, the airplane suddenly rolled to the right and rotated about 1-1/2 turns before impacting the ground in a nose low, right wing down attitude. Audible engine sounds were present throughout the recording.

PERSONNEL INFORMATION

The pilot, age 36, held a commercial pilot certificate with airplane single engine land, airplane multiengine land, and instrument airplane ratings. The certificate also listed type ratings for DC-3 and Lear Jet airplanes. She was an international aerobatic performer and a three-time member of the United States Unlimited Aerobatic Team.

The pilot held a second class medical certificate issued on May 27, 2009. No limitations were listed on that medical certificate. On the application for that medical certificate the pilot reported a total of 1700 hours of flight time.

AIRCRAFT INFORMATION

The airplane was a Zivko Aeronautics Edge 540, serial number 0022, single seat aerobatic monoplane. The Edge 540 was designed for full competition unlimited aerobatics. The airplane had an all composite wing and steel tube fuselage structure. A modified Lycoming AE10-540-EXP engine, serial number L-50324-98, turning a Hartzell HC-C3YR-4AX composite, three blade,

constant speed propeller powered the airplane. According to manufacturer information, the airplane had a maximum gross weight of 1,800 pounds, an aerobatic gross weight of 1,550 pounds and the airframe was capable of withstanding -12 to +12 g loading.

METEOROLOGICAL INFORMATION

The weather at the Shenandoah Municipal Airport (SDA), Shenandoah, Iowa, about 18 nautical miles north of the accident site, at 1415, was: Winds 110 at 14 knots gusting to 20 knots; visibility 10 statute miles; scattered clouds at 3,500 feet above ground level (agl); temperature 26 degrees Celsius; 23 degrees Celsius; altimeter setting 29.96 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Examinations of the airplane were conducted following the accident by representatives of the Federal Aviation Administration (FAA), and the aircraft manufacturer.

The airplane's fuselage was crushed and fragmented from the nose aft to the cockpit section. The aft fuselage remained partially intact with fractures and bending of various structural members. The vertical stabilizer and rudder were intact and remained attached to the aft fuselage. The left horizontal stabilizer and elevator remained attached to the aft fuselage. The right horizontal stabilizer was separated from the airplane. The right wing was fragmented. The left wing was separated from the fuselage and was fractured about mid span into two main pieces. The wing spar attachment to the fuselage was intact.

The airplane's elevator control system components remained unbroken from the control stick to the elevator surface with the exception of the push-pull tube from the control stick to the forward idler bell-crank. The fractured portion of the push-pull tube exhibited bending, and flattening of the tube at the break consistent with impact damage. Other components in the elevator control system had varying amounts of deformation but remained intact.

Both rudder pedals remained unbroken and were still attached to fuselage structure. The right rudder cable was intact. The left rudder cable was separated in the area of the cockpit. The broken ends of the cable exhibited features consistent with overload failure.

The airplane's aileron control system exhibited multiple breaks in push-pull tubes. All of the tubing breaks exhibited bending and flattening of the tubes at the breaks consistent with impact damage. One of the machined end fittings of the push-pull tube that connected the torque tube to the center aileron bell-crank had separated from the tube. The fitting was fastened to the tube with four rivets spaced 90-degrees apart around the circumference of the tube. The rivet holes in the end fitting exhibited axial elongation toward the end that was inserted into the tube. The rivet holes in the tube exhibited axial tearing toward the end of the tube. The rivets were not found. The damage to the end fitting and tube was consistent with rivets having been in place prior to the separation.

No pre-impact deficiencies with respect to the airplane's control system were found.

No examination of the airplane's engine was conducted.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot listed the cause of death as massive blunt trauma.

A Final Forensic Toxicology Fatal Accident Report prepared by the FAA, listed the following findings:

- >> 0.068 (ug/ml, ug/g) Phentermine detected in Blood
- >> Phentermine detected in Gastric
- >> Phentermine detected in Heart
- >> Phentermine detected in Lung

A review of the pilot's personal medical records indicated multiple prescriptions for phentermine, for weight loss, in 2006 and 2007, including prescriptions filled on May 5, 2006, May 12, 2006, and June 21, 2006, but no prescriptions for phentermine filled at the pilot's pharmacy since September 5, 2007. Phentermine was not noted on sequential applications for 2nd class FAA airman medical certificates completed by the pilot on June 15, 2006, March 6, 2008, and May 27, 2009.

Pilot Information

Certificate:	Commercial	Age:	36,Female
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Single
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 2 Without waivers/limitations	Last FAA Medical Exam:	May 27, 2009
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:	1700 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	ZIVKO AERONAUTICS INC	Registration:	N26HB
Model/Series:	EDGE 540	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Experimental (Special)	Serial Number:	0022
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	March 26, 2009 Condition	Certified Max Gross Wt.:	1800 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	793 Hrs as of last inspection	Engine Manufacturer:	LYCOMING
ELT:		Engine Model/Series:	IO-540 SER
Registered Owner:	On file	Rated Power:	300 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:	SDA,971 ft msl	Distance from Accident Site:	18 Nautical Miles
Observation Time:	14:15 Local	Direction from Accident Site:	360°
Lowest Cloud Condition:	Scattered / 3500 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	14 knots / 20 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	100°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.95 inches Hg	Temperature/Dew Point:	26°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tarkio, MO (K57)	Type of Flight Plan Filed:	None
Destination:	Tarkio, MO (K57)	Type of Clearance:	None
Departure Time:	14:15 Local	Type of Airspace:	

Airport Information

Airport:	Gould Peterson Municipal K57	Runway Surface Type:	
Airport Elevation:	913 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:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	40.440567,-95.379768(est)

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	Marvin Moore; FAA-Kansas City FSDO; Kansas City, MO William Zivko; Zivko Aeronautics; Guthrie, OK
Original Publish Date:	December 20, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=74247

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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](#).