Aviation Investigation Final Report

Location:	Boulder City, Nevada	**Accident Number:**	WPR22FA240
Date & Time:	July 3, 2022, 08:49 Local	**Registration:**	N343BH
Aircraft:	EXTRA FLUGZEUGBAU GMBH EA 300/L	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed on a local flight to perform low-altitude maneuvers in a nearby desert valley. The pilot flew into a gap between ridgelines and performed maneuvers that consisted of flying low through the valley and then performing a turn and climb maneuver to fly in the opposite direction. The maneuvers were similar to aerobatic maneuvers called a wingover, in which the airplane makes a steep climb followed by a turn at the top of the climb using the rudder and a descent flying back in the opposite direction from which the maneuver began. If the rudder turn is executed right at the initiation of a stall, the maneuver is known as a stall turn or a hammerhead.

Three turn reversals were accomplished. On the first turn maneuver, the climb rate was nearly 15,000 fpm and the descent rate more than 10,000 fpm. Additionally, the load factor peaked about 3 g. The second turn maneuver was similar to the first but slightly less aggressive. On the third and final turn maneuver, when the accident occurred, the climb rate was about 6,500 fpm and the descent rate was about 6,800 fpm. The roll angles exceeded 90° at the peaks of the maneuvers. The airplane's airspeed was close to the stall speed at the peak altitude of the first and last turn maneuvers.

According to a witness, the pilot planned to perform the flight maneuvers that morning while a ground photo shoot was taking place. On the final flyby, two witnesses observed the airplane fly overhead and pull up in a climb and subsequently enter a spin towards the ground. The airplane's engine sounded normal during the flyby maneuvers.

A video taken by a witness showed the airplane performing the low altitude flybys near or below the ridgelines and then enter the vertical turn reversals maneuvers. On the final turn maneuver, the airplane went temporarily out of view, and when back in view, it was in a steep nose-down descent with rotation, consistent with a spin.

Impact marks at the accident site, witness observations, review of the flight data, and the video, were all consistent with the pilot losing control by exceeding the critical angle of attack of the airplane during a turn climb maneuver and entering a spin. In addition, examination of the airplane wreckage revealed no evidence of preimpact failures or malfunctions that would have precluded normal operation.

On the last turn maneuver, the pilot experienced a load factor of about 2 g that was the least amount of g sustained during the turn maneuvers performed by the pilot. Referencing the Federal Aviation Administration (FAA) Advisory Circular (AC) 91.61 on g effects; 2 g was substantially below the threshold and minimum range of grey out, which was the first effect of the g-forces that would affect the pilot. Therefore, it was likely that the pilot did not experience any adverse effects (greyout, blackout, or incapacitation) from the g load during the final turn maneuver.

The FAA *Code of Federal Regulations* (*CFR*) Title 14. 91.303 Aerobatic flight, states “No person may operate an aircraft in aerobatic flight - below an altitude of 1,500 ft above the surface.” The pilot was not in compliance with this requirement, which reduced his recovery margin.

Toxicology testing revealed that the pilot had used methamphetamine at some time before the accident. Methamphetamine and its metabolite amphetamine were detected at high concentration in the urine sample, and it was likely that the pilot was still under the influence and experiencing some effects of methamphetamine while flying. Pseudoephedrine and phenylpropanolamine, which are precursors for illicit production of methamphetamine, were detected in the urine. This further supports the evidence of recreational and illicit use of methamphetamine by the pilot. Methamphetamine effects include impaired judgment, impulsivity, and increased risk taking. Therefore, the effects from the pilot’s use of methamphetamine likely contributed to the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The failure of the pilot to maintain control of the airplane by exceeding the airplane’s critical angle of attack while maneuvering in a turning climb at a low altitude, which resulted in an aerodynamic stall and spin from which the pilot was unable to recover. Contributing to the

accident was the pilot's use of methamphetamine and decision to perform aerobatics below the required minimum altitude.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Aircraft	Altitude - Not attained/maintained
Personnel issues	Illicit drug - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Aerodynamic stall/spin (Defining event)

On July 3, 2022, about 0849 Pacific daylight time, an Extra Flugzeugbau GMBH EA 300/L Airplane, N343BH, was destroyed when it was involved in an accident near Boulder City, Nevada. The pilot was fatally injured. The airplane was operated as a Title 14 *CFR* Part 91 personal flight.

A performance study based on automatic dependent surveillance - broadcast (ADS-B) data showed that the airplane departed Henderson Executive Airport (HND), Henderson, Nevada, about 0844, and flew on an east-southeast track and reached a maximum altitude of about 4,244 ft mean sea level (msl). About 9.3 miles from the airport, the pilot flew into a gap between ridgelines and performed a series of rapid climbs, turns, and descents.

The maneuvers consisted of flying low through a valley and then performing a turn and climb maneuver to fly in the opposite direction. The maneuvers were similar to aerobatic maneuvers called a wingover, in which the airplane makes a steep climb followed by a turn at the top of the climb using the rudder and a descent flying back in the opposite direction from which the maneuver began. If the rudder turn is executed right at the initiation of a stall, the maneuver is known as a stall turn or a hammerhead.

Three turn reversals were accomplished. On the first turn maneuver, the climb rate was nearly 15,000 fpm and the descent rate more than 10,000 fpm. Additionally, the load factor peaked about 3 g. On the second turn maneuver, the climb rate was about 8,000 fpm and the descent rate was about 5,000 fpm. On the third, and final turn maneuver, when the accident occurred, the climb rate was about 6,500 fpm and the descent rate was about 6,800 fpm. During the peak altitude of the maneuvers, the airplane's roll angles exceeded 90° and the airspeed was close to the stall speed on the first and last turn maneuvers.

During portions of the maneuvers near the end of the flight, the airplane was less than 200 ft above ground level. The last flight data point indicated that the airplane's altitude was about 2,519 ft msl and was at a ground speed of 48 knots. Subsequently, the airplane impacted desert terrain at an elevation of about 2,050 ft msl. A postimpact fire consumed most of the wreckage.

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airplane fly overhead and pull up in a climb, and subsequently, enter a spin towards the ground. The airplane's engine sounded normal during the flyby.

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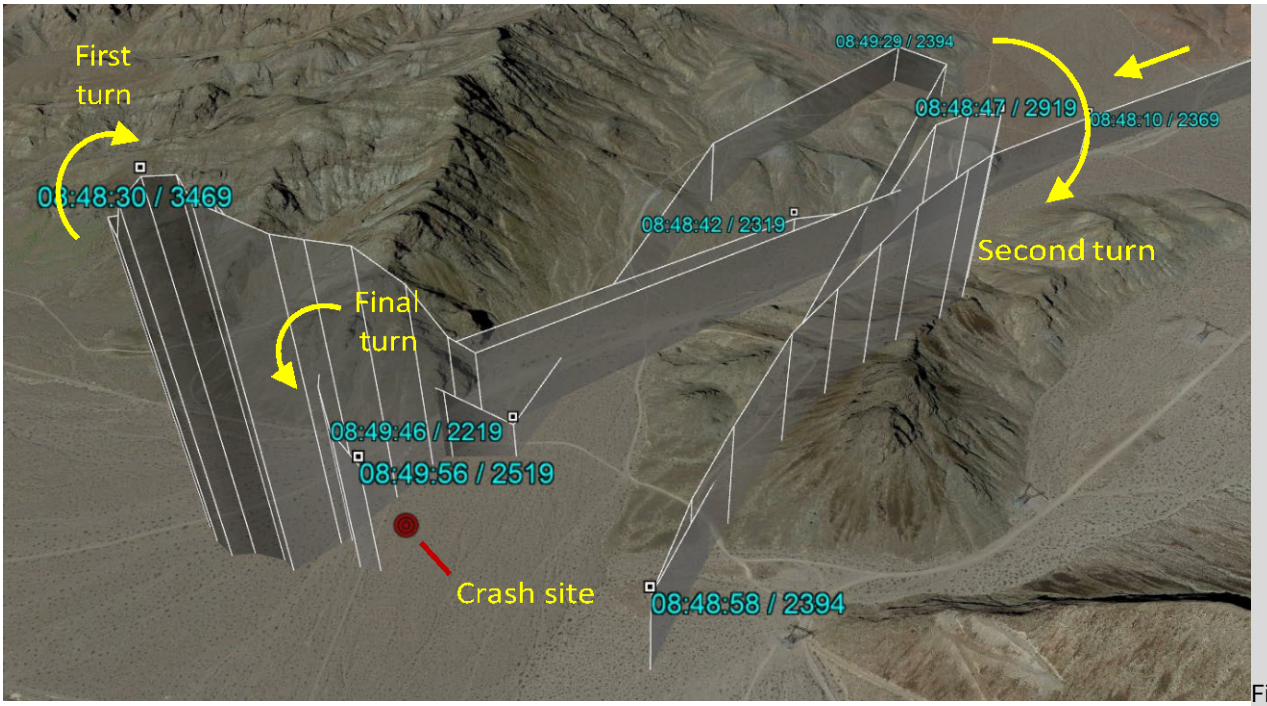

Figure 1: View of the maneuvers looking southwest. Times and altitudes (msl) are indicated for select points.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	58,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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 5, 2022
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 7000 hours (Total, all aircraft)		

According to associates of the pilot, he was a former Marine pilot who flew the F-18 fighter aircraft, and an airline pilot. The flight instructor who provided him training in the accident airplane stated that he was a good pilot and was trained to establish a minimal altitude of t 1,500 ft above ground level (agl) for performing acrobatic maneuvers and 3,000 ft agl for spins. He was trained for recovering from stalls and spins.

Aircraft and Owner/Operator Information

Aircraft Make:	EXTRA FLUGZEUGBAU GMBH	**Registration:**	N343BH
Model/Series:	EA 300/L	**Aircraft Category:**	Airplane
Year of Manufacture:	1996	**Amateur Built:**	
Airworthiness Certificate:	Aerobatic; Normal	**Serial Number:**	037
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:		**Engine Model/Series:**	AEIO-540 SER
Registered Owner:	On file	**Rated Power:**	260 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane’s airframe and engine logbooks were not located during the investigation.

The airplane’s information manual listed the load limit as +/-10 g when one seat was occupied. The recommended minimum entry indicated airspeed (IAS) for a 90° climb maneuver was the design maneuvering airspeed (VA) of 158 knots. Additionally, for a 1/4 loop climb and stall turn, it was 100 knots. The airplane’s stall speed was 60 knots.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KBVU,2202 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	08:55 Local	**Direction from Accident Site:**	168°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	None /
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	N/A /
Altimeter Setting:	29.83 inches Hg	**Temperature/Dew Point:**	32°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Henderson, NV (HND)	**Type of Flight Plan Filed:**	None
Destination:	Henderson, NV (HND)	**Type of Clearance:**	Unknown
Departure Time:	08:44 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	35.9225,-114.95138(est)

Examination of the accident site revealed that the airplane impacted terrain in a remote desert area. The desert terrain consisted of sage brush about a foot high. The airplane fuselage was bent slightly to the right, consistent with a spin. All major components of the airplane were located at the accident site. There was a postimpact fire that consumed most of the airplane wreckage except for the left wing, left horizontal stabilizer, and engine.

The debris field was about 110 ft long. The first identified point of contact was an area of disturbed dirt that led to the area where the fuselage came to rest. The airplane wreckage came to rest upright on about a 250° magnetic heading. The wreckage site was at an elevation of about 2,050 ft msl. Both wings and the engine separated during the accident sequence. All flight control surfaces were found at the accident site. The engine separated from the fuselage and the three-bladed propeller had one blade attached and the other two blades had separated at the hub.

Postaccident examination of the airframe and engine revealed no evidence of preimpact mechanical failures or malfunctions that would have precluded normal operation.

Medical and Pathological Information

The Clark County Coroner, Las Vegas, Nevada, conducted an autopsy on the pilot. The medical examiner determined that the cause of death was “multiple blunt force injuries.”

Toxicology testing performed by the FAA’s Forensic Sciences Laboratory on the pilot’s blood, urine, liver tissue, and muscle tissue, detected methamphetamine, amphetamine, phenylpropanolamine, and pseudoephedrine.

Methamphetamine and its metabolite amphetamine were detected. If methamphetamine is illicitly manufactured from decongestants, the unreacted precursor may be present as a contaminant, potentially accounting for the detection of pseudoephedrine and phenylpropanolamine. Methamphetamine is a potent DEA Schedule II stimulant drug with significant abuse potential. Methamphetamine is commonly used as a recreational drug. However, it also is used in the medical field for the treatment of narcolepsy and obesity. Methamphetamine metabolizes to amphetamine. NHTSA’s Drugs and Human Performance Fact Sheet for amphetamine and methamphetamine states “Performance Effects: Laboratory studies have been limited to much lower doses than those used by methamphetamine abusers. Doses of 10-30 mg methamphetamine have shown to improve reaction time, relieve fatigue, improve cognitive function testing, increase subjective feelings of alertness, increase time estimation, and increase euphoria. However, subjects were willing to make more high-risk choices.” This medication is disqualifying for FAA aeromedical certification.

Phenylpropanolamine is most commonly used as a decongestant but is also used as an appetite suppressant. Phenylpropanolamine is not disqualifying for FAA medical certification.

Pseudoephedrine is an OTC decongestant used to treat nasal congestion and is acceptable for pilots.

Additional Information

According to the FAA Airplane Flying Handbook (FAA-H-8083-3A):

At the same gross weight, airplane configuration, CG location, power setting, and environmental conditions, a given airplane consistently stalls at the same indicated airspeed provided the airplane is at +1G (i.e., steady-state unaccelerated flight). However, the airplane can also stall at a higher indicated airspeed when the airplane is subject to an acceleration greater than +1G, such as when turning, pulling up, or other abrupt changes in flightpath. Stalls encountered any time the G-load exceeds +1G are called “accelerated maneuver stalls.” The accelerated stall would most frequently occur inadvertently during improperly executed turns, stall and spin recoveries, pullouts from steep dives, or when overshooting a base to final turn. An accelerated stall is typically demonstrated during steep turns.

A review of FAA AC 91-61, A Hazard in Aerobatics: Effects of G-Forces on Pilot, revealed the following on individual tolerance to G’s.

“Because of the number of factors involved, it is difficult to predict how much acceleration a certain individual can withstand. Tolerance is related to the rate of onset of acceleration and to the duration of exposure. Individual tolerance depends on factors such as the height of the person, age, elasticity of the blood vessels, training, the responses of the heart and blood vessels, and on health. Because of the many variables involved, the centrifuge data in the following table are useful only as an estimate of the average civilian pilot's tolerance to +G’s. These data were collected from 1,000 Naval aviation pilots and aviation personnel and apply to rates of onset of about +1 G per second—a rate that well may be encountered in civil aerobatic maneuvers.”

Table 1. -Thresholds in Relation to +G Tolerance (AC 91-61, page 8)

Symptom	Average Threshold	Standard Deviation	Range
Grayout	4.1G	+/- 0.7G	2.2 to 7.1G
Blackout	4.7G	+/- 0.8G	2.7 to 7.8G
Unconsciousness	5.4G	+/- 0.9G	3.0 to 8.4G

The National Transportation Safety Board’s performance study of the accident flight data indicated that that maximum load factor that the pilot was subjected to during the three turn and climb maneuvers was approximately 3 g. Specifically, during the third and final turn and climb maneuver, when the accident occurred, the load factor was substantially less than the first two turn and climb maneuvers, with a normal load factor of less than 2 g.

Title 14 CFR 91.303, Aerobatic flight, states in part:

“No person may operate an aircraft in aerobatic flight—Below an altitude of 1,500 feet above the surface.

For the purposes of this section, aerobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.”

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Carey Atnip; FAA; Las Vegas, NV Mark Platt; Lycoming Engines; Williamsport, PA
Original Publish Date:	April 18, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=105412