Aviation Investigation Final Report

Location:	Atlanta, Georgia	**Accident Number:**	ERA16FA182
Date & Time:	May 14, 2016, 16:47 Local	**Registration:**	N24CD
Aircraft:	GREG CONNELL PITTS S-2SW	**Aircraft Damage:**	Destroyed
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Air race/show		

Analysis

The pilot of the Pitts was performing air show maneuvers as part of a flight of two with the other show pilot flying an MX2 airplane. After uneventful departures and performance of a low altitude pass, both pilots initiated a pull-up into a half Cuban-8, with the intention of simultaneously positioning the airplanes on 45º down angles toward show center in preparation for another low altitude pass. The MX2 pilot stated that he rolled out near the show line, and he expected the Pitts to be established over the show line and to his left. Instead, the Pitts was still above him on the 45º down line and well to his right. It is apparent that the Pitts pilot put himself out of position by not adjusting to the crosswind conditions or he did not correctly identify the show line. The evidence indicated that he never lost control of the airplane.

An examination of several spectator videos indicated that, during the half Cuban-8 maneuver, the Pitts pulled over the top, rolled 1 1/2 times to the left, and was then established upright on the 45º down line. The extra roll during the half Cuban-8 was not normal and put him further out of position. The wings of the Pitts then rocked back and forth, first to the left about 45º and then to the right approaching 90º. The airplane remained in a descending right bank and then appeared to level off immediately before ground impact. After ground impact, the airplane caught fire and burned.

Postaccident examination of the wreckage did not reveal evidence of any preimpact mechanical malfunctions or anomalies. The wind at the time of the accident was about perpendicular to the show line, blowing away from the spectators, with gusts up to 25 knots. When asked about the wind conditions, the MX2 pilot acknowledged that they were significant; however, he added that airshow pilots know how to adjust for wind and that the wind did not adversely affect their maneuvering.

Toxicology detected the potentially-impairing medications diphenhydramine and dextromethorphan in urine but not the blood. Since these medications were not detected in the blood, it is unlikely that the pilot was feeling any significant effects from these medications at the time of the accident. Additionally, although pseudoephedrine and ephedrine were detected in urine and blood, these compounds are generally not considered to be impairing and are unlikely to have contributed to the crash. However,

these medications are found in combination in many over-the-counter cough and cold medications used to help decrease head congestion. Head congestion can degrade the vestibular system (the body's balance and orientation system) and impair a pilot's ability to control an airplane during flight. The investigation was unable to determine if the pilot's underlying medical condition at the time of the crash affected his ability to safely control the airplane during low altitude acrobatic flight.

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 proper positioning during performance of an aerobatic maneuver and his subsequent failure to discontinue maneuvering when unable to reestablish proper positioning during a steep descent toward the ground.

Findings

Aircraft	Heading/course - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Delayed action - Pilot

Factual Information

History of Flight

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

On May 14, 2016, about 1647 eastern daylight time, an experimental amateur-built Pitts S-2SW, N24CD, collided with terrain during an aerial display at DeKalb-Peachtree Airport (PDK), Atlanta, Georgia. The commercial pilot was fatally injured. The airplane was destroyed by impact forces and a postcrash fire. The airplane was registered to a corporation and was operated by the pilot under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as an air show flight. Day, visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The local flight originated from PDK about 1642.

The pilot of the Pitts was performing air show maneuvers and was part of a flight of two with the other show pilot flying an MX2 airplane. The MX2 pilot reported that he and the Pitts pilot flew a practice routine the day before the accident. Before the accident flight, he and the Pitts pilot extensively briefed the show routine, then drove out to the "box," and "walked through the maneuvers" several times to prepare. The MX2 pilot stated that he and the Pitts pilot were well prepared for the airshow.

After uneventful departures, the two pilots joined up into formation with the Pitts pilot in the lead and the MX2 pilot on his right wing. The routine began uneventfully, with the formation entering the show box from behind the crowd at 1,000 ft above ground level (agl). They performed a "switch break" with the Pitts breaking to the right and the MX2 breaking to the left. Both pilots made 180º turns back to show center with the Pitts pilot entering the show line from the right on a 030º heading and the MX2 pilot entering the show line from the left on a 210º heading. They had briefed "highway rules," meaning they would pass left shoulder to left shoulder, like driving a car. The two airplanes passed near show center at 30 to 50 ft agl.

After this crossing maneuver, the MX2 pilot called out "ready-pull-now," and both pilots initiated a half Cuban-8, with the intention of simultaneously positioning the airplanes on 45º down angles toward show center, which was to be followed by another low altitude pass. A half Cuban 8 is an aerobatic maneuver where the pilot, from level flight, pulls through 5/8 of a loop, positions the airplane inverted on the 45º down line, rolls upright, then pulls out to level flight from the 45º down line. The MX2 pilot stated that he pulled much harder and positioned himself on the 45º down line much quicker than the Pitts pilot. As the MX2 pilot rolled out near the show line, on a heading of 030º, he expected the Pitts to be established over the show line and to his left, heading 210º. Instead, the Pitts was still above him on the 45º down line and well to his right. He estimated that the Pitts was about 200 ft or more to his right. The MX2 pilot knew that there was no chance of crossing on the show line, so he watched the Pitts to see what the pilot would do. He observed the Pitts pilot make a sharp bank to the right, toward his position, and then the airplane passed under him. The MX2 pilot did not see the Pitts impact the ground; he was not aware of the accident until he changed to the air boss frequency and was informed of it.

The MX2 pilot stated that the Pitts pilot may have inadvertently reverted to using the center of runway 21L as the show line. The actual show line was established between runways 21L and 21R and was marked by orange barrels. The MX2 pilot reported that there was a "significant direct crosswind" blowing away from the spectators; however, he added that airshow pilots know how to adjust for wind, and it did not adversely affect their maneuvering.

A witness, who was working support duties for another air show performer and was standing near the accident site, observed the air show routine and the impact. He reported that it was very windy at the time and that the wind was "howling out of the west." As he saw the two airplanes perform their Cuban-8 maneuvers, he noted that the wind blew the Pitts "too far to the east." The MX2 pilot appeared to be holding his line and compensating for the wind. He recalled that the Pitts pilot performed 11/2 aileron rolls at the top of the Cuban-8, and the rolls were "lazy."

An examination of several spectator videos confirmed that the Pitts pilot performed a crossing maneuver with the MX2 over the airfield and then he pulled up into a Cuban-8. After the Pitts pilot pulled over the top, the airplane rolled 1 1/2 times to the left and was then established upright on the 45º down line. The wings then rocked back and forth, first to the left about 45º and then to the right approaching 90º. The airplane remained in a descending right bank and then appeared to level off immediately before ground impact. The lower, left wing appeared to impact the ground first.

Pilot Information

Certificate:	Commercial	**Age:**	50,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
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:**	June 17, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 2, 2015
Flight Time:	1963 hours (Total, all aircraft), 159 hours (Total, this make and model)		

The pilot held a commercial pilot certificate with airplane multi-engine land, airplane single-engine land, and instrument airplane ratings. He held a Federal Aviation Administration (FAA) second-class medical certificate dated June 17, 2015, with no restrictions. He was the builder of the airplane, and he also held a repairman certificate for the airplane.

According to the pilot's logbook, he had logged about 1,963 hours of flight time as of the last entry, dated April 26, 2016. He completed a 14 *CFR* section 61.56(a) flight review on May 2, 2015, in an RV-10 airplane.

According to the FAA, the pilot obtained an FAA Form 8710-7, Statement of Aerobatic Competency

(SAC), on May 17, 2014. The 2014 SAC was limited to solo aerobatics and "circle the jumper" maneuvers only. According to his pilot logbook, the pilot updated his SAC to include solo and formation aerobatics on July 11, 2015.

Aircraft and Owner/Operator Information

Aircraft Make:	GREG CONNELL	**Registration:**	N24CD
Model/Series:	PITTS S-2SW NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	001CGC
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	July 24, 2015 Condition	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	52 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	159 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	AEIO-540-FBAE
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The single-engine, single-seat, bi-wing airplane was fitted with a fixed, tailwheel landing gear. It was equipped with a Lycoming AEIO-540-FBAE engine rated at 325 horsepower. An examination of the maintenance records revealed that the airplane was manufactured in 2014 by the pilot.

According to the maintenance logbooks, a condition inspection was completed on July 24, 2015, at a total airframe time of 106.7 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PDK,998 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Few / 7000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 25 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.93 inches Hg	**Temperature/Dew Point:**	28°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Atlanta, GA (PDK)	**Type of Flight Plan Filed:**	None
Destination:	Atlanta, GA (PDK)	**Type of Clearance:**	Unknown
Departure Time:	16:42 Local	**Type of Airspace:**	Class C

The reported weather conditions at PDK at 1653, about 6 minutes after the accident, included few clouds at 7,000 ft, visibility 10 statute miles or greater, and surface wind from 290º at 17 knots (kts) with gusts to 25 kts. Wind at 1645 was from 290º at 17 kts with gusts to 21 kts. Wind at 1650 was from 280º at 17 kts with gusts to 25 kts. At 1647, the two-minute average wind speed, which was updated every 5 seconds and reported once a minute, was 17 kts with gusts to 25 kts. Additional wind data is included in the public docket for this investigation.

Airport Information

Airport:	DeKalb Peachtree PDK	**Runway Surface Type:**	Concrete
Airport Elevation:	998 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21L	**IFR Approach:**	None
Runway Length/Width:	6001 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	33.875556,-84.303054(est)

The airplane impacted the grass infield between runways 21L and 21R. The wreckage debris field was about 500 ft in length and was oriented on a heading of 235°. The main wreckage consisted of the fuselage, empennage, and the right wing. A post-crash fire consumed a majority of the main wreckage. A parachute was found in the cockpit seat, and there were no indications of deployment. The left wing upper and lower surfaces separated from the main wreckage during the impact sequence and were not burned.

Flight control continuity was established from the ailerons, elevator, and rudder surfaces to the cockpit controls. All fractures to the flight control connection rods exhibited signatures of overstress. The fuel tank was breached from fire and impact; however, some residual fuel was observed. The wooden propeller blades were separated at the hub and were splintered.

Engine internal continuity was confirmed from the propeller flange to the rear accessory drives. Compression and suction were observed on all cylinders when the crankshaft was rotated manually. The No. 2 through No. 6 top spark plug electrodes exhibited normal wear and color when compared to a spark plug inspection chart. The No. 1 top spark plug electrode had a thin layer of black soot. Both magnetos were removed and produced spark on all leads when tested.

The fuel injection servo separated from the engine during impact. The throttle and mixture arms were in place and secure. The airflow section was about 75% obstructed with dried mud.

The fuel flow divider was opened; it was clean and there was a small amount of residual fuel present. The fuel injectors were unobstructed. The rubber gasket was flexible and undamaged.

The engine-driven fuel pump was removed for examination. The unit pumped fuel when operated manually.

Medical and Pathological Information

At the time of his most recent FAA medical certification exam, the pilot reported no chronic medical conditions or ongoing use of medications.

The Dekalb County Medical Examiner, Decatur, Georgia, performed an autopsy of the pilot and determined that the cause of death was blunt trauma, and the manner was accident. The autopsy report

documented 40 to 50% focal luminal obstruction of coronary arteries without thrombi or plaque hemorrhage, and there was no evidence of old or new myocardial ischemic damage. No other significant natural disease was identified.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, conducted toxicological testing on samples from the pilot. The non-impairing pain medication ibuprofen; the sedating antihistamine diphenhydramine; and the cough medicine dextromethorphan, and its metabolite dextrorphan were detected in urine but not in blood. The non-sedating decongestant pseudoephedrine and its isomer ephedrine were detected in urine and in cavity blood.

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Mark Ricker; FAA/FSDO; Atlanta, GA
Original Publish Date:	April 17, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93165