



# Aviation Investigation Final Report

<b>Location:</b>	Branchville, New Jersey	<b>Accident Number:</b>	ERA22FA058
<b>Date &amp; Time:</b>	November 11, 2021, 10:48 Local	<b>Registration:</b>	N90559
<b>Aircraft:</b>	Cessna 172	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

## Analysis

While on an instructional flight, control of the airplane was lost during a flight maneuver, and the airplane impacted the terrain in a heavily wooded area. Data recovered from the Garmin G1000 integrated flight instrument system revealed that the airplane climbed to a cruise altitude of about 6,400 ft and remained on a northwesterly heading for the first 17 minutes of the flight. The airplane's airspeed began to decrease due to an engine power reduction from 2,400 rpm to 1,300 rpm. The airplane began to pitch nose up, ultimately reaching a maximum pitch attitude of about 37° as the airspeed slowed to 28 knots indicated. The airplane reached a left-wing-down bank angle of 102° and a nose-down pitch attitude of 79°. The G1000 recorded the airplane's descent rate at over 8,000 ft/minute 3 seconds later. A surveillance security video showed the airplane in a very steep spiral turn that continued until the airplane was out of view of the camera. Based on the data recovered from the G1000, the reduction of power was intentional, and the aerodynamic stall was induced. The flight instructor's logbook and receipts from previous flights show the flight instructor and private pilot had practiced step spiral turns on several occasions.

All the major airplane components were located at the accident site. Examination of the airplane and the engine did not reveal any anomalies with the flight controls that would have precluded normal operation.

Although toxicological testing of the flight instructor's blood was positive for THC and the THC metabolite THC-COOH, given the circumstances of this accident and the low concentration found in his blood, it is unlikely that the flight instructor's performance was impaired by THC at the time of the accident.

## Probable Cause and Findings

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

The flight instructor's failure to recover from a steep spiral turn during an instructional flight.

### Findings

<b>Personnel issues</b>	Aircraft control - Instructor/check pilot
<b>Aircraft</b>	(general) - Not attained/maintained

## Factual Information

### History of Flight

<b>Maneuvering</b>	Loss of control in flight (Defining event)
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

#### HISTORY OF FLIGHT

On November 11, 2021, about 1048 eastern standard time, a Cessna 172S, N90559, was destroyed when it was involved in an accident near Hampton Township, New Jersey. The flight instructor and a private pilot were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

A witness in the vicinity of the accident site reported that he heard an airplane maneuvering near his home and noticed various engine pitch changes. He listened to the airplane for a few minutes before returning home. Upon his return, emergency vehicles were in his driveway, prompting him to report what he heard to the authorities.

An airplane performance study was conducted using data from the airplane's Garmin G1000 integrated flight instrument system. The G1000 recorded time, position, altitude, attitude, airspeed, acceleration, and engine parameters. The data indicated that the flight departed Essex County Airport (CDW), Caldwell, New Jersey, around 1029. The airplane climbed to a cruise altitude of about 6,400 ft and maintained a northwesterly heading for the first 17 minutes of the flight.

At 10:46:30, the airspeed began to decrease due to a power reduction from about 2,400 rpm to 1,300 rpm. Shortly before 1047, the airplane pitched nose up, reaching a maximum pitch attitude of about 37° at 10:47:04 as the airspeed slowed to 28 knots indicated.

At 10:47:10, the airplane reached a left-wing-down bank angle of 102° and a nose-down pitch attitude of 79°. The G1000 recorded the airplane's descent rate at over 8,000 ft/minute 3 seconds later.

The recorded airplane data indicated that the pilot initiated a recovery attempt between 10:47:10 and 10:47:30. The pitch attitude increased to 32°, the rate of climb rose to over 2,000 ft/minute, and the airplane was wings-level for 20 seconds as power was increased to 2,400 rpm. However, airspeed only momentarily recovered at 10:47:16.

The G1000 did not capture load factors for the final seconds of the flight, likely due to buffering between volatile and non-volatile memory (See "NTSB Vehicle Performance Study" in the public docket).

A surveillance video from a camera located at the Sussex County Sheriff's Communications Center showed the airplane in a very steep spiral turn, continuing this maneuver until it was out of view of the surveillance camera.

## PILOT INFORMATION

A review of the private pilot's logbook revealed that the flight instructor had provided training for the "steep spiral turn" maneuver on numerous occasions during the private pilot's flight training. The "steep spiral turn" is a maneuver requiring specific techniques, and if not executed correctly, common errors can occur. These errors are outlined in the Airplane Flying Handbook (FAA-H-8083-3C), Chapter 10, Performance Maneuvers. Understanding and addressing these potential errors are crucial for safe flight operations.

Section 4, Normal Procedures, of the Cessna 172 Pilot Operating Handbook, page 4-40, explains the procedure for spin training and exiting spins.

## WRECKAGE AND IMPACT EXAMINATION

The airplane came to rest oriented on a magnetic heading of 330°, and all major components of the airplane were located at the accident site. The fuselage, from the firewall to the empennage, revealed crush and other related impact damage. The instrument panel and cockpit were destroyed by impact forces. Both wings remained partially attached to the fuselage, and the ailerons and flaps were impact damaged. Flight control surface cable continuity was observed from the flight surfaces to the cockpit controls. The horizontal stabilizers and vertical stabilizer remained attached to the empennage; however, they displayed damage consistent with impact. Both elevators were impact-damaged and remained partially attached to the horizontal stabilizers. The rudder remained attached to the vertical stabilizer and displayed impact damage. Examination of the engine did not reveal any pre-impact mechanical malfunctions or failures that would have precluded normal operation. The propeller remained attached to the engine and displayed chordwise scoring and aft bending. Tree branches showing fresh cuts consistent with propeller slash marks were noted on several trees at the accident site.

## MEDICAL AND PATHOLOGICAL INFORMATION

Certified flight instructor

According to the autopsy report by the County of Morris Medical Examiner, Morristown, New Jersey, the cause of death for the flight instructor was multiple injuries and the manner of death was accident.

Toxicological testing detected THC in the flight instructor's blood at 1.5 and 9.3 ng/mL. THC-COOH was detected in one blood specimen at 2.7 ng/mL, another testing facility found the specimen unsuitable for testing. THC and THC-COOH were not detected in vitreous fluid. The flight instructor's peripheral blood was also positive for caffeine and cotinine.

## Private pilot

According to the autopsy report, the cause of the private pilot's death was multiple injuries and the manner of death was accident. Toxicological testing did not detect any ethanol or tested-for drugs in the private pilot's blood.

### Flight instructor Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	54, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	November 22, 2020
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	(Estimated) 14750 hours (Total, all aircraft), 14750 hours (Total, this make and model)		

### Student pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	49, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	April 2, 2021
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	(Estimated) 440 hours (Total, all aircraft), 369 hours (Total, this make and model)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N90559
<b>Model/Series:</b>	172 S	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2011	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal; Utility	<b>Serial Number:</b>	172S11076
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	November 10, 2021 Annual	<b>Certified Max Gross Wt.:</b>	2450 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	4868.7 Hrs at time of accident	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C126 installed, activated, aided in locating accident	<b>Engine Model/Series:</b>	IO-360-L2A
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	180 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	CDW, 173 ft msl	<b>Distance from Accident Site:</b>	15 Nautical Miles
<b>Observation Time:</b>	09:53 Local	<b>Direction from Accident Site:</b>	144°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility:</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	6 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>	80°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	30.32 inches Hg	<b>Temperature/Dew Point:</b>	11°C / 1°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Caldwell, NJ (CDW)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Caldwell, NJ (CDW)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	10:30 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	41.0791,-74.4785(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Alleyne, Eric
<b>Additional Participating Persons:</b>	Nicholas Geiser; FAA/FSDO; Allentown, PA Joseph Sablan; FAA/FSDO; Allentown, PA
<b>Original Publish Date:</b>	January 4, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=104237">https://data.nts.gov/Docket?ProjectID=104237</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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](#).