



# Aviation Investigation Final Report

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<b>Location:</b>	Diamondhead, Mississippi	<b>Accident Number:</b>	ERA18FA174
<b>Date &amp; Time:</b>	June 22, 2018, 06:59 Local	<b>Registration:</b>	N7239Q
<b>Aircraft:</b>	Cessna 172	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The student pilot obtained his first solo endorsement 10 days before the accident after he had accrued about 165 hours of flight experience. On the day of the accident, he was performing solo traffic pattern work, which included full-stop landings and then taxiing back for each subsequent takeoff. However, interpolation of radar data and the timing of the call to report the accident indicated that the pilot had performed a touch-and-go landing before the accident takeoff and flight.

A witness described the airplane at a low altitude and airspeed as it crossed, at treetop height, an interstate highway immediately beyond the departure end of the runway. The airplane then disappeared below the trees.

Examination of the wreckage site and the airplane wreckage revealed evidence consistent with engine power at impact and no preimpact mechanical anomaly. Measurement of the exposed threads of the flap actuator corresponded with a full-flap, 40° extension setting.

According to the manufacturer's owner's manual, "flap settings of 30° to 40° are not recommended at any time for take-off." Thus, because the pilot took off with 40° of flaps, the airplane was unable to attain the normal climb speed and entered a stall/mush from which the pilot could not recover because of the low altitude.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's failure to retract the flaps following landing and the stall/mush that resulted during the subsequent full-flap takeoff and initial climb.

## Findings

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<b>Personnel issues</b>	Use of equip/system - Student/instructed pilot
<b>Aircraft</b>	TE flap control system - Incorrect use/operation
<b>Aircraft</b>	Angle of attack - Capability exceeded

## Factual Information

### History of Flight

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

On June 22, 2018, at 0659 central daylight time, a Cessna 172L, N7239Q, was destroyed when it collided with trees, powerlines, and terrain during the initial climb after takeoff from Diamondhead Airport, Diamondhead, Mississippi. The student pilot was fatally injured. The airplane was owned by the student's flight instructor, who was the operator of the Title 14 *Code of Federal Regulations* Part 91 solo instructional flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed.

According to the student pilot's flight instructor, the purpose of the flight was to conduct solo traffic pattern work at the airport. The student pilot was to conduct full-stop landings and taxi back to the approach end of the runway before initiating the next takeoff. The flight instructor also stated that the student pilot was "not supposed to perform" touch-and-go landings.

A police detective saw the airplane while he was traveling westbound on the interstate near the departure end of runway 36. He said that the airplane appeared over the interstate, just above treetop height, traveling "slowly" northbound.

The witness used a model airplane to show that, as the accident airplane crossed the roadway, the nose pitched up from a level attitude. Once the airplane was across the interstate and above the trees on the north side, the nose gradually pitched down as the airplane rolled and turned to the left until it was out of view below the trees. The witness stated that his car was directly abeam the airplane at that time and that he saw smoke above the trees when he was about 1/2 mile past the accident site. The witness stated that he used the radio in his car to contact police dispatch about the accident. The accident was reported to 911 at 0659:03.

Radar data obtained from the Federal Aviation Administration (FAA) depicted that the airplane was first detected on radar at 0628:28 then completed four left-hand traffic patterns. The last radar return was at 0658:24, near the end of the fourth approach; the airplane was at an altitude of 225 ft mean sea level (msl) and was 1,100 ft from the approach end of the runway. No further radar targets were associated with the accident airplane.

## Pilot Information

<b>Certificate:</b>	Student	<b>Age:</b>	69, 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>	None	<b>Second Pilot Present:</b>	No
<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>	September 1, 2017
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	169 hours (Total, all aircraft), 169 hours (Total, this make and model)		

The student pilot was issued an FAA third-class medical and student pilot certificate in September 2017. A review of his logbook revealed that he had accrued 169.1 total hours of flight experience. His first solo endorsement was dated June 12, 2018, after he had accrued 164.9 hours of flight experience.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N7239Q
<b>Model/Series:</b>	172 L	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1972	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	17260539
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	October 1, 2017 Annual	<b>Certified Max Gross Wt.:</b>	2299 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	4898 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	O-320-E2D
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	160 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

According to FAA records, the accident airplane was manufactured in 1972. Its most recent annual inspection was completed on October 1, 2017, at 4,8984 total aircraft hours.

The Cessna 172 owner's manual stated the following about wing flap settings:

Normal and obstacle clearance take-offs are performed with wing flaps up. The use of 10° flaps will

shorten the ground run approximately 10%, but this advantage is lost in the climb to a 50-foot obstacle. Therefore, the use of 10° flaps is reserved for minimum ground runs or for take-off from soft or rough fields. If 10° of flaps are used for minimum ground runs, it is preferable to leave them extended rather than retract them in the climb to the obstacle. In this case, use an obstacle clearance speed of 65 MPH. As soon as the obstacle is cleared, the flaps may be retracted as the airplane accelerates to the normal flaps-up climb speed of 80 to 90 MPH.

During a high altitude take-off in hot weather where climb would be marginal with 10° flaps, it is recommended that the flaps not be used for take-off. Flap settings of 30 ° to 40 are not recommended at any time for take-off.

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KHSA,23 ft msl	<b>Distance from Accident Site:</b>	3 Nautical Miles
<b>Observation Time:</b>	11:50 Local	<b>Direction from Accident Site:</b>	270°
<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>	/	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.93 inches Hg	<b>Temperature/Dew Point:</b>	24°C / 24°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Diamondhead, MS (66Y )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Diamondhead, MS (66Y )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	06:59 Local	<b>Type of Airspace:</b>	Class G

At 0650, the weather recorded at Stennis International Airport, Kiln, Mississippi, which is 3 miles west of the accident site, reported clear skies and calm winds. The temperature was 24°C, the dew point was 24°C, and the altimeter setting was 29.93 inches of mercury.

The calculated density altitude at the time of the accident was 1,100 ft.

### Airport Information

<b>Airport:</b>	DIAMONDHEAD 66Y	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	14 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	36	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3800 ft / 75 ft	<b>VFR Approach/Landing:</b>	Traffic pattern

Diamondhead Airport was at 14 ft elevation and positioned between Interstate 10 and Cutoff Bayou. Runway 36/18 was 3,800 ft long and 75 ft wide. Runway 36 ended immediately prior to Interstate 10, which was a four-lane divided highway oriented east-west.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	30.369167,-89.390556

The wreckage was examined at the site, and all major components were accounted for at the scene. The wreckage path was oriented along a magnetic heading of about 210° and was about 75 ft in length. The airplane came to rest upright and was oriented along a 098° magnetic heading. Several pieces of angularly cut wood, some of which were greater than 8 inches in diameter, were scattered around the airplane.

The cockpit, cabin area, right wing, and the empennage were consumed by a postcrash fire. The left wing displayed uniform crushing along the leading edge. Striation marks and tearing along the leading edge, consistent with contact with a wire, were visible. The tail section showed thermal damage but was mostly intact.

The engine was exposed, the propeller remained attached, and each displayed significant thermal damage. The right magneto and oil filter were separated from the engine, and the left magneto remained secure in its mounts.

The engine was rotated by hand through the vacuum pump pad. Continuity was confirmed through the accessory section to the valve train and power train. Thumb suction and compression were observed at all cylinders except for the No. 2 cylinder. The No. 2 cylinder intake valve appeared not fully seated. The cylinder was removed and checked for leaks with water. Water drained from the intake port with only valve-spring tension applied to the valve stem. The valve was "staked" using a mallet, and, when water was again poured into the interior of the cylinder, no liquid was observed draining out of the intake port. Coking on the intake valve stem was consistent with the valve in an open position while exposed to the postimpact fire.

Flight control continuity was confirmed from the cockpit area to the flight control surfaces or their associated hardware and attachment points. The flap actuator jackscrew was intact and measured in its as-found condition. Measurement of the exposed threads corresponded with a full-flap, 40° extension setting.

## Medical and Pathological Information

The Mississippi State Medical Examiner's Office, Pearl, Mississippi, performed a pathological examination of the pilot and determined his cause of death as blunt force injuries with thermal injuries.

Toxicology testing performed at the FAA's Forensic Sciences Laboratory found that the pilot's specimens tested negative for drugs and ethanol.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Rayner, Brian
<b>Additional Participating Persons:</b>	Mallory Woodcock; FAA; Jackson, MS Ricardo Asensio; Textron Aviation; Wichita, KS John Butler; Lycoming Engines; Williamsport, PA
<b>Original Publish Date:</b>	April 8, 2020
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=97553">https://data.nts.gov/Docket?ProjectID=97553</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](#).