



# Aviation Investigation Final Report

<b>Location:</b>	Mount Pleasant, South Carolina	<b>Accident Number:</b>	ERA14FA387
<b>Date &amp; Time:</b>	August 14, 2014, 11:25 Local	<b>Registration:</b>	N66241
<b>Aircraft:</b>	Cessna 150	<b>Aircraft Damage:</b>	Substantial
<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

The commercial pilot indicated to the flight school that hired him that he was a flight instructor; however, he did not hold a flight instructor certificate. He had been providing flight instruction to flight school students for about 1 month at the time of the accident. On the day of the accident flight, the commercial pilot and the student pilot were flying their third instructional flight together. After completing a preflight inspection, the commercial pilot and student pilot taxied to the runway and began the takeoff roll. Witnesses reported that the airplane departed the runway about midfield and immediately looked unstable. Multiple observers stated that the airplane stalled about 100 ft above ground level and subsequently entered a nose-down dive before it impacted the ground seconds later.

Examination of the wreckage revealed a fractured flap switch return spring, which prevented the switch from returning to the OFF position. A subsequent laboratory examination confirmed electrical continuity for the flap switch contacts but could not determine when the spring fractured. Postaccident examination of the wreckage revealed that the flap actuator jackscrew was consistent with the flaps in the retracted position. No other evidence of preimpact mechanical malfunctions or failures that could have precluded normal operation was found. A witness stated that he observed the airplane begin its ground roll with the flaps fully extended. However, there were no previously reported issues with the flap system and the postaccident wreckage examination showed that the flaps were in the retracted position at impact; thus, it is possible that the flaps were extended during takeoff and were subsequently retracted before impact.

Review of the commercial pilot's logbook showed that he had accumulated more than 350 total hours of flight experience but had not flown an airplane of similar make and model to the accident airplane in at least 7 years. His lack of experience as a flight instructor and in make and model suggests that he may not have possessed the skills to quickly recognize and remediate a stall at a low altitude. Additionally, the student pilot would not have likely been proficient in recognizing and recovering from a stall at his training level. The student pilot had not had any formal training experience before his two previous lessons with the commercial pilot. At this stage in his flight training, the student pilot would have been learning basic flying skills, which suggests that the commercial pilot was likely demonstrating the

takeoff or should have been ready to retain control of the airplane if the student pilot was operating the flight controls. While the commercial pilot told the flight school owner that he was a certificated flight instructor, a check of his logbook would have revealed that he did not hold a flight instructor certificate.

Toxicological testing detected the presence of hydrocodone and its metabolites in the commercial pilot's urine; however, it was not detected in the blood so would not have been impairing. An inactive metabolite of cyclobenzaprine was detected in his blood and urine but would not have impaired the pilot. Although the commercial pilot's toxicology testing detected Tramadol, an opioid pain medication, in his heart blood at 20 times the normal level, such levels are indicative of chronic use. Further, the flight school owner did not observe any abnormal behaviors with the commercial pilot on the day of the accident. Thus, it is likely that the commercial pilot was not impaired from the sedating effects of the medication at the time of the accident. Tramadol, particularly at high doses, is associated with an increased risk of seizure; however, the investigation was unable to determine if the commercial pilot's chronic pain condition or a seizure due to extremely high levels of tramadol impaired him and contributed to the accident.

### Probable Cause and Findings

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

The commercial pilot's exceedance of the airplane's critical angle-of-attack during the initial climb, which resulted in an aerodynamic stall and impact with terrain. Contributing to the commercial pilot's failure to recognize and remediate the stall were his lack of experience as a flight instructor and lack of recent experience in the accident airplane make and model.

Findings	
Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Qualification/certification - Pilot
Personnel issues	Recent experience w/ equipment - Pilot

# Factual Information

## History of Flight

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

On August 14, 2014, about 1125 eastern daylight time, a Cessna 150M, N66241, was substantially damaged when it impacted terrain during the initial climb after takeoff from Mount Pleasant Regional Airport-Faison Field (LRO), Mount Pleasant, South Carolina. The commercial pilot and student pilot were fatally injured. The airplane was registered to Hanger Aviation, Inc., and operated by a private individual. Visual meteorological conditions prevailed, and no flight plan was filed for the local instructional flight. The flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

The airplane was operated by the student pilot's father, who in July 2014 employed Coastal Aviation, Inc., a flight school at LRO, to provide flight instruction to his son in the airplane. The owner of the flight school assigned the commercial pilot, who was recently hired as a flight instructor, to instruct the student. According to the student pilot's father, his son was attending college near LRO, and the commercial pilot helped him reposition the airplane to LRO for his son's convenience in the weeks that preceded the accident.

The commercial pilot and student pilot had previously completed approximately two 1-hour long instructional flights together. On the day of the accident, a witness observed the commercial pilot and the student pilot inspect the fuel for contaminants and check the flight controls during their preflight inspection. According to another witness, the airplane began its takeoff roll on runway 35, a 3,700-foot-long, asphalt runway, with the flaps fully extended. Several people reported that the airplane lifted off the ground about midfield and immediately looked unstable, which they described as the wings banking to the right and left. When the airplane reached an altitude of approximately 100 feet above ground level, it entered a steep left turn. Two pilots reported that the airplane then lost forward momentum and appeared to stall. It immediately entered a nose down attitude followed by a right wing low attitude and was in a "straight downward dive" when it impacted the ground. One of the witnesses who attempted to help the occupants reported a strong odor of fuel at the accident site. The witnesses did not report hearing any interruptions in engine power.

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	33,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>	Lap only
<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 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	May 25, 2011
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	September 20, 2013
<b>Flight Time:</b>	354.5 hours (Total, all aircraft), 3 hours (Total, this make and model), 8.5 hours (Last 30 days, all aircraft)		

## Student pilot Information

<b>Certificate:</b>	None	<b>Age:</b>	22,Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Lap only
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	None None	<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3 hours (Total, all aircraft), 3 hours (Total, this make and model)		

The commercial pilot, age 33, held a Federal Aviation Administration (FAA) commercial pilot certificate with ratings for airplane single-engine land, airplane multiengine land and instrument airplane. He did not hold a flight instructor certificate, but had received a logbook endorsement from a flight instructor to take the practical test for his airplane single-engine flight instructor certificate. His most recent FAA first-class medical certificate was issued on May 25, 2011, at which time he reported 275 total flight hours. The last entry in the commercial pilot's logbook was dated June 9, 2014, which showed a total of approximately 350 flight hours. A review of his logbook entries from August 2007 to June 2014 indicated that he had not accumulated any time in the accident airplane make and model.

The student pilot, age 22, was seated in the left seat, and did not possess a medical certificate or student pilot certificate. His logbook was not recovered. According to the student pilot's father, his son had some experience as a passenger, but had not accumulated any formal training as a student pilot.

According to the owner of the flight school, the commercial pilot indicated that he was a certified flight instructor seeking employment. He was hired by Coastal Aviation, Inc. as a flight instructor in July 2014 and began providing instruction to the student pilot in early August 2014.

A flight schedule from Coastal Aviation was cross-referenced with logbooks provided by some of the commercial pilot's students to approximate how long the commercial pilot had been providing

instruction. The logbooks included multiple entries that were signed off by the commercial pilot and included a "CFI" number. The review showed that the commercial pilot had provided about 8.5 hours of flight instruction in the 30 days that preceded the accident.

According to the owner of Coastal Aviation, Inc., the airplane was solely used as a training airplane for the student pilot. The commercial pilot and the student pilot were the only people who flew the airplane between the repositioning flight and the accident flight. He stated that the commercial pilot appeared alert on the morning of the accident and did not exhibit any signs of impairment.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N66241
<b>Model/Series:</b>	150 M	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1975	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal; Utility	<b>Serial Number:</b>	15075945
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	January 13, 2014 100 hour	<b>Certified Max Gross Wt.:</b>	1600 lbs
<b>Time Since Last Inspection:</b>	16 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	3524 Hrs at time of accident	<b>Engine Manufacturer:</b>	Continental
<b>ELT:</b>	C91 installed, not activated	<b>Engine Model/Series:</b>	O-200 SERIES
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	100 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

The two-seat, high-wing, fixed tricycle-gear airplane, was manufactured in 1974 and powered by a Continental Motors O-200-A84, 100-horsepower engine. A review of the airplane's maintenance history revealed that its most recent 100 hour inspection that was completed on January 13, 2014, at which time it had accumulated approximately 3,507 total hours in service. In addition, the engine had accrued about 1,690 total hours since major overhaul. At the time of the accident, the airplane had accumulated an additional 16 hours since the inspection.

The wing flap system was electrically operated by a flap motor located in the right wing. The flap position was controlled by a switch and mechanically indicated by a pointer housed in the left front doorpost. During deployment, the flap switch lever is depressed and held in the DOWN position until the desired degree of extension is reached. When the operator releases the switch, the lever will return to the center position automatically through a spring in the switch case. The operator places the flap switch in the UP position to retract the flaps; however, the switch is designed to remain in the UP position without manual intervention. Once the flaps reach their maximum extension or retraction, limit switches will automatically shut off the flap motor. The flaps take approximately 9 seconds to fully deploy and about 6 seconds to completely retract.

According to the owner of the flight school, the commercial pilot did not report any issues with the wing

flap system in the accident airplane prior to the accident flight. The father of the student pilot stated that he did not experience any issues when he operated the wing flaps during the previous repositioning flight.

The airplane was serviced with 10 gallons of 100-low-lead aviation grade gasoline the day before accident.

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	LRO, 12 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	11:15 Local	<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	8 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/ None
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/ N/A
<b>Altimeter Setting:</b>	30.04 inches Hg	<b>Temperature/Dew Point:</b>	27°C / 19°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Mount Pleasant, SC (LRO )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Mount Pleasant, SC (LRO )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	11:25 Local	<b>Type of Airspace:</b>	Class G

The recorded weather at LRO, at 1115, included calm wind, visibility 8 statute miles, sky clear, temperature 27 degrees Celsius (C), dew point 19 degrees C; and a barometric altimeter of 30.04 inches of mercury.

Given the reported atmospheric conditions, the density altitude at the time of the accident was calculated as approximately 1,559 feet.

### Airport Information

<b>Airport:</b>	MT PLEASANT RGNL-FAISON FIELD LRO	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	12 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	35	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3700 ft / 75 ft	<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<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>	32.904167,-79.786109

The airplane came to rest in a near vertical, nose-down, position orientated on a 310-degree magnetic heading in a field of sparse vegetation about 1,100 feet beyond the departure end of runway 35. All major components of the airplane were accounted for at the accident site. No debris path was observed with the exception of a few pieces of Plexiglas that came to rest a few feet forward of the airplane.

The propeller blades and hub remained attached to the propeller flange, which exhibited multiple axial cracks. One propeller blade was bent aft at the inboard end and both propeller blades displayed chordwise scratches and polishing on their cambered sides.

Both wings remained attached to the fuselage and exhibited leading edge crush damage that spanned the entire length of each wing. Both ailerons were in the neutral position and each wing flap exhibited some upward bending. The flap actuator jackscrew displayed no threads, consistent with a flaps retracted position, and the flap switch was also in the neutral position. The flap motor was tested using a 12 volt battery and electrical continuity was confirmed for both the upward and downward movement of the flap mechanism. The wing fuel tanks were deformed, but not breached and were estimated to contain a combined total of approximately 15 gallons of fuel.

The aft fuselage and empennage were buckled and canted to the right; however, no damage was observed on the elevator and rudder control surfaces. Measurement of the elevator pitch trim jackscrew corresponded to an approximate neutral position.

Elevator, rudder, and aileron control continuity were traced from their respective flight control surfaces to the flight controls at the cockpit.

The fuel selector valve was in the OPEN position and no obstructions were observed when compressed air was circulated through the valve. The fuel bowl was intact and the fuel strainer screen was void of contaminants.

One primary ignition lead was severed from the right magneto and another lead separated from the No. 1 cylinder top spark plug. Both magnetos were removed from the engine accessory section and tested. Each magneto produced spark on all four posts and the impulse coupling engagements could be heard when rotated by hand.

The top spark plugs were removed and the bottom plugs were examined with a borescope. All spark plugs appeared gray in color and displayed signatures consistent with normal operation.

The carburetor was impact damaged and the mixture control cable was separated a few inches from the

mixture control arm. Both the carburetor floats and needle valve operated normally. The fuel inlet line and fuel inlet screen were free of debris or contaminants.

A handtool was used to rotate the crankshaft, which confirmed continuity through the powertrain and attached accessories. The cylinders displayed normal operating signatures and all valves appeared to be seated properly when examined with a borescope.

The wing flap switch lever moved freely in the UP or DOWN positions when manipulated by hand; however, the switch did not automatically return from the down to the neutral (center) position as designed. Further examination of the wing flap switch lever at the NTSB material's laboratory in Washington, DC, confirmed electrical continuity of the switch contacts at all three switch positions: UP, DOWN, and OFF. A radiograph examination showed that the center position return spring was fractured, which prevented the switch from automatically returning to the OFF position.

## **Medical and Pathological Information**

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An autopsy was performed on the commercial pilot by the Medical University of South Carolina, Department of Pathology and Lab Medicine, Charleston, South Carolina. The autopsy report listed the pilot's cause of death as "blunt head trauma."

Forensic toxicology testing was performed on specimens of the commercial pilot by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma, which detected 10.76 ug/ml of tramadol in the pilot's heart blood, 11.571 ug/ml in the vitreous, 13.794 ug/g in the muscle, 18.424 ug/g in the brain, 38.93 ug/g in the liver, and 0.593 ug/ml in the urine. The therapeutic range of tramadol was considered 0.05 ug/ml to 0.50 ug/ml. The drug's active metabolite was detected in the pilot's blood and urine. Additionally, norcyclobenzaprine was detected in the heart blood and urine and testing also identified the presence of hydrocodone and its metabolites in the urine, but not in the blood.

Tramadol was a schedule IV controlled substance and prescription opioid medication commonly used to treat pain. Hydrocodone was a narcotic analgesic marketed under many names including Vicodin. Norcyclobenzaprine was a metabolite of cyclobenzaprine, a prescription muscle relaxant marketed under various names including Flexeril. All three medications contain warnings related to impairment of mental and/or physical ability required for the performance of potentially hazardous tasks (e.g. driving, operating heavy machinery).

The pilot's personal medical records showed multiple visits in 2010 for symptomatic kidney stones. In May 2010, the pilot was evaluated for two gastrointestinal problems and placed on tramadol and prednisone, a steroid used to treat the inflammatory process and reduce the body's immune response. According a medical record entry made by the pilot's gastroenterologist on May 19, 2011, the pilot's Crohn's disease was in remission.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Stein, Stephen
<b>Additional Participating Persons:</b>	Daryl McMillan; FAA/FSDO; West Columbia, SC Kurt Gibson; Continental Motors, Inc.; Mobile, AL Paul Yoos; Textron Aviation; Wichita, KS
<b>Original Publish Date:</b>	September 22, 2016
<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=89877">https://data.nts.gov/Docket?ProjectID=89877</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](#).