National Transportation Safety Board
Aviation Accident Final Report

Location:	Bronson, MI	**Accident Number:**	CHI02FA067
Date & Time:	01/23/2002, 0735 EST	**Registration:**	N371JD
Aircraft:	Cessna 402B	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The aiplane was destroyed when it impacted the ground while maneuvering at a low altitude following a loss of control in instrument meteorological conditions. The airplane was on a flight in instrument meteorological conditions when radar and voice contact were lost. Prior to the loss of communication, controllers advised the pilot to check altitude. At this point, the radar data shows that the airplane was about 400 feet below the assigned altitude. Subsequently, the pilot said, "roger sir my auto pilot i just cut off uh correcting immediately." This was the last received transmission from the pilot. The radar data shows that the airplane then began a descending right turn at an average rate of descent of 1,276 feet per minute. This descent was followed by a climbing left turn with an average rate of climb of 5,423 feet per minute. The radar data shows that the radius of the left turn continued to decrease until radar contact was lost about 500 feet above the last assigned altitude. A witness who saw the airplane just prior to impact described the airplane maneuvering beneath the clouds prior to pulling up sharply and then pitching down and impacting the ground. There was a utility wire and associated poles running across the airplane's fight path in the field where the wreckage was located. The airplane exploded and burned upon impact. No anomalies were found with the airplane or associated systems. The autopilot section of the Pilot 's Operating Handbook states, "Sustained elevator overpower will result in the autopilot trimming against the overpower force." The result is that if up elevator pressure is applied with the autopilot engaged, the autopilot will trim the airplane nose down.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The maneuver to avoid the utility wire while maneuvering resulting in an inadvertent stall and subsequent impact with the ground. Factors were the pilot's inadvertent activation of the elevator trim, resulting in a loss of control during flight in instrument meteorological conditions, as a result of pilot's lack of knowledge concerning the operation of the autopilot system. Another factor was the utility wire.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
1. (F) AUTOPILOT - NOT UNDERSTOOD - PILOT IN COMMAND
2. (F) ELEVATOR TRIM - INADVERTENT ACTIVATION - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
3. (F) OBJECT - OTHER
4. (C) MANEUVER TO AVOID OBSTRUCTIONS - PERFORMED - PILOT IN COMMAND
5. (C) STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On January 23, 2002, about 0735 eastern standard time, a Cessna 402B, N371JD, piloted by a commercial pilot, was destroyed when it impacted the ground near Bronson, Michigan. A witness described the airplane maneuvering at a low altitude just prior to impact. The 14 CFR Part 91 positioning flight was operating on an instrument flight rules flight plan in instrument meteorological conditions. The pilot, who was the sole occupant, was fatally injured. The business flight originated from the Kirsch Municipal Airport (IRS), Sturgis, Michigan, about 0730 and was bound for the Ann Arbor Municipal Airport (ARB), Ann Arbor, Michigan.

A witness to the accident described the airplane flying south about 200 feet above the ground and then turning back to the north. He said that he saw the airplane making a descending left turn back to the west when the airplane pulled up sharply and then pitched nose down and impacted the ground. He said there was a large explosion and fireball.

The airplane impacted the ground at coordinates 41 degrees 53.845 minutes north, 85 degrees 11.005 minutes west.

PERSONELL INFORMATION

The pilot held commercial pilot and flight instructor certificates with single and multi-engine airplane, and instrument airplane ratings. Records show that the pilot completed an initial competency check as required by 14 CFR Part 135 on March 15, 2001, in a Cessna 310 airplane. On October 15, 2001, the pilot completed a competency check in the Cessna 402B airplane.

Company paperwork indicates that the pilot had accumulated 1,800 hours total flight experience, 800 hours cross-country flight experience, 150 hours night flight experience, 125 hours total instrument experience, 100 hours of in-flight instrument experience, and 50 hours of night cross-country flight experience as of the date of the competency check in the Cessna 402B. The pilot's personal flight log was not recovered.

The pilot's first class medical certificate was issued on August 01, 2001. No limitations were listed on the medical certificate.

AIRCRAFT INFORMATION

The airplane was a Cessna model 402B aircraft. The 402B is a low-wing twin-engine airplane with an aluminum primary structure. Two 300-horsepower Teledyne Continental Motors model TSIO-520-E engines powered the airplane. The airplane was configured to carry eight occupants including the two pilot stations.

Maintenance records show that an annual inspection was completed on the airplane on October 3, 2001, at a total time of 7,239.2 hours time in service, and a 100-hour inspection was performed on December 21, 2001, at a total time of 7,339.0. The right engine had accumulated 3,406.3 total hours time in service, and 1,273.3 hours since being overhauled on March 6, 1997. The left engine had accumulated 884.9 hours time in service since undergoing a factory rebuild on May 16, 1998. Logbook records show that the engines had undergone a 100-hour inspection on December 21, 2001. At the time of the 100-hour inspection, the right and left engines had accumulated 1,373.1 hours, and 983.8 hours time in service respectively.

The airplane was equipped with a Cessna model 400B Nav-O-Matic autopilot system.

METEOROLOGICAL INFORMATION

The weather reporting station located at the departure airport, IRS, about 13 nautical miles southwest of the accident site, recorded the following observations:

Observation time: 0655

Wind direction: 200 degrees magnetic

Wind speed: 9 knots

Visibility: 7 statute miles

Sky condition: 1,000 feet overcast

Temperature: 4 degrees Celsius

Dew point: 2 degrees Celsius

Altimeter Setting: 29.82 inches of Mercury

Observation time: 0737

Wind direction: 200 degrees magnetic

Wind speed: 9 knots

Visibility: 4 statute miles with mist

Sky condition: 600 feet overcast

Temperature: 4 degrees Celsius

Dew point: 3 degrees Celsius

Altimeter Setting: 29.82 inches of Mercury

Observation time: 0757

Wind direction: 200 degrees magnetic

Wind speed: 8 knots

Visibility: 3 statute miles with mist

Sky condition: 400 feet overcast

Temperature: 4 degrees Celsius

Dew point: 3 degrees Celsius

Altimeter Setting: 29.82 inches of Mercury

The weather reporting station located at the Branch County Memorial Airport, Coldwater, Michigan, about 6 nautical miles east of the accident site, recorded the following observations:

Observation time: 0715

Wind direction: 210 degrees magnetic

Wind speed: 9 knots

Visibility: 7 statute miles

Sky condition: 1,000 feet overcast

Temperature: 6 degrees Celsius

Dew point: 6 degrees Celsius

Altimeter Setting: 29.81 inches of Mercury

Observation time: 0735

Wind direction: 210 degrees magnetic

Wind speed: 8 knots gusting to 15 knots

Visibility: 5 statute miles with mist

Sky condition: 800 feet overcast

Temperature: 6 degrees Celsius

Dew point: 6 degrees Celsius

Altimeter Setting: 29.81 inches of Mercury

Observation time: 0755

Wind direction: 210 degrees magnetic

Wind speed: 9 knots

Visibility: 4 statute miles with mist

Sky condition: 600 feet overcast

Temperature: 6 degrees Celsius

Dew point: 6 degrees Celsius

Altimeter Setting: 29.81 inches of Mercury

COMMUNICATIONS

The aircraft was in communication with the Kalamazoo, Michigan, Air Traffic Control Tower, Arrival Radar East position (ARE). The following excerpts are from transcripts of the recorded conversations between ARE and N371JD. The full transcripts are appended to this report.

0720:26 N371JD (unintelligible) *(three) seven one juliet delta

0720:46 ARE twin cessna seven er three seven one juliet delta kalamazoo how soon and which runway

0720:52 N371JD ah three seven one juliet delta be runway one eight ready in two minutes

0720:57 ARE roger have a full route clearance to ann arbor when you're ready

0721:02 N371JD three seven one juliet delta go ahead

0721:05 ARE eh twin cessna three seven one juliet delta is cleared to ann arbor via direct litchfield and the cruxx four arrival maintain three thousand departure will be on one two one point two squawk three one seven zero

0721:25 N371JD o k cleared to ann arbor via the litchfield crutch four arrival three thousand feet one two one point two and three one seven zero in the box

0721:36 ARE twin cessna one juliet delta readback is correct hold for release call me when you're number one ready to depart

0721:42 N371JD cessna one juliet delta roger

0724:45 N371JD kalamazoo (unintelligible) *(three seven one) juliet delta's ready to go runway one eight

0726:11 ARE twin cessna one juliet delta i'm sorry you said you were ready to go

0726:14 N371JD one juliet delta thats affirmative ready on one eight

0726:17 ARE roger you're released left turn on course to litchfield maintain three thousand the altimeter two niner eight zero

0726:24 N371JD o k left turn on course to litchfield three thousand three seven one juliet delta

0729:27 N371JD kalamazoo---three---

0729:34 ARE *(twin) cessna three seven one juliet delta kalamazoo departure ident please maintain three thousand

0729:39 N371JD identing---(unintelligible)

0730:22 ARE twin cessna one juliet delta squawk three one seven zero please thirty one seventy

0730:27 N371JD uh thirty one seventy standby

0730:32 N371JD my transponder does read three one seven zero what are you seeing on your screen

0730:36 ARE i got three three seven zero try that uh second digit again

0730:43 N371JD how's that

0730:45 ARE *(stand) by

0730:46 ARE traffic three seven one juliet delta's trying to acquire here going direct litchfield (unintelligible)

0731:16 ARE i'll let you deal with her

0731:19 ARE maybe we can change her beacon code (unintelligible)

0731:21 ARE can you try and do that [person's name] make it three three seven zero (unintelligible)

0731:33 ARE and she's on course to litchfield now

0731:36 ARE o k

0731:42 ARE o k

0731:43 ARE all right got it

0731:44 ARE all right

0732:32 ARE twin cessna three seven one juliet delta radar contact seven miles east north east of the sturgis beacon and uh maintain three thousand on course uh litchfield

0732:46 N371JD (unintelligible)

0733:00 ARE twin cessna one juliet delta mode c indicates two thousand six hundred altimeter two niner eight zero maintain three thousand

0733:09 N371JD uh you kinda faded out for three seven one juliet delta i'm uh seeing three thousand feet on my altimeter ah whats the current altimeter setting

0733:17 ARE twenty nine eighty two niner eight zero mode c indicates now two thousand five hundred---descending

0733:27 N371JD uh three seven one juliet delta roger sir my auto pilot i just cut off uh correcting immediately

0733:33 ARE very good low altitude alert mode c indicates two thousand climb

0733:42 N371JD uh dya get that kalamazoo

0733:46 ARE twin cessna one juliet delta i've lost your mode c say altitude now

0733:50 N371JD three seven one juliet del---(unintelligible)

0733:54 ARE twin cessna one juliet delta you're breaking up climb and maintain three thousand you're descending

0734:01 ARE piper four two whiskey can you hear any transmissions

0734:04 N2542W four two whiskey affirmative

0734:06 ARE roger

0734:10 N2542W ah she said she had lost her ah autopilot she was ah trying to take it herself

0734:15 ARE o k well now she's at thirty four hundred feet twin cessna one juliet delta you're a little high now ah you wanna return to sturgis and land or continue on

0734:30 ARE twin cessna three seven one juliet delta kalamazoo

0734:35 ARE twin cessna one juliet delta kalamazoo

No further communications were received from the accident airplane.

WRECKAGE AND IMPACT INFORMATION

The National Transportation Safety Board (NTSB) on-scene investigation began on January 23, 2002. The airplane impacted the ground about 100 feet from an east west tree line on a heading of about 315 degrees. Subsequent to the initial impact with the ground, the airplane impacted trees and the main wreckage came to rest within the tree line. A post-impact fire and explosion ensued. The initial impact ground scar consisted of a linear scar with 5 impact craters. The spacing of these craters was consistent with the lateral spacing of wing tip tanks, the engines, and the fuselage. All of the primary flight controls were located within the debris field.

The first major piece of wreckage along the debris field was the left engine and engine nacelle. The engine was resting inverted and was still attached to the nacelle. The propeller was

separated from the engine. The bottom side and front of the engine were broken in several pieces.

The right engine was found along the tree line and was still attached to the right nacelle. The propeller was separated from the engine. The accessory case area was broken

The on-scene examination of the engines consisted of examination of the upper set of spark plugs from each engine, and borescope examination of the cylinders and pistons through the spark plug holes. No anomalies wer detected during the on-scene examination of the engines. Both engines were retained for teardown inspection.

The fuselage was fragmented and came to rest within the tree line. The tail section of the fuselage was separated at the empennage. The cabin section of the fuselage was destroyed. The remains of the cabin floor were located beneath the tail surfaces. The instrument panel, instruments and all avionics components were destroyed. The avionics wiring was found wrapped around trees. The circuit breaker panel and ignition switch panel were damaged and reliable switch and circuit breaker positions were not able to be determined. The nose landing gear was found along the wreckage path. Both main landing gear were found in the retracted position. Various instruments and instrument components were found along the wreckage path.

Both elevators remained attached to the horizontal stabilizer. The vertical stabilizer and rudder were separated from the tail section. The control cables for both the elevators, and the rudder remained attached to their respective bellcranks. The right and left aileron bellcranks were located and each bellcrank had cable ends attached. Due to the extent of the damage, control system continuity could not be verified, however, all identified cable breaks had signatures consistent with tension overload.

Four gyroscopic instrument cores were located and examined. Two attitude gyroscope cores were examined and both were found to have rotational scoring to the rotors and the rotor housings. The attitude gyroscope cores were found separated from the instrument housings. The third gyroscope core examined was a directional gyroscope core. It was also found separated from the instrument housing. Rotational scoring was found on the rotor and rotor housing of the directional gyroscope core. The fourth gyroscope examined was the horizontal situation indicator. The instrument remained primarily intact with the core within the instrument housing. Rotational scoring was found on the rotor and housing of this gyroscope, as well.

The autopilot components found were severely damaged. The autopilot computer and controller were not found. A trim actuator and a roll servo were found and both had significant impact damage.

The trim actuator, autopilot roll servo, engines, and cabin heater, were retained for further examination.

About 200 feet east-southeast of the impact point, lies a northeast/southwest oriented utility wire. The utility wire is suspended from telephone/utility poles running through the field where the wreckage was found.

MEDICAL AND PATHOLOGICAL INFORMATION

Spectrum Health, Grand Rapids, Michigan, performed an autopsy on the pilot on January 24, 2002.

A Final Forensic Toxicology Fatal Accident Report listed negative results for all tests performed. No blood samples were available for carbon monoxide testing.

TESTS AND RESEARCH

The engines were examined under the direct supervision of a NTSB investigator. Complete disassembly of both engines was performed. The examination of the engines revealed no signs of abnormal wear or operation. No anomalies were found that could be determined to have existed prior to impact.

The cabin combustion heater was sent to the NTSB Materials Laboratory for examination. The heater was significantly deformed due to impact. According to the report of the examination, four fractures were found in the stainless steel combustion chamber. Three of the fractures had signatures consistent with overstress failure. The fourth fracture was found in a welded seam of the combustion chamber. This fracture measured about 0.7 inch long and the widest opening was 0.025 inch. These measurements were taken when the heater was in the post-impact deformed state. The width of the gap prior to impact is not known.

The TA-495A trim actuator, and the PA-495A-1 roll servo, were examined under the supervision of the FAA. The only tests that could be performed were tests that confirmed that the motors within the units were intact and capable of producing power. No visible defects were noted during the examinations that were determined to have existed prior to impact.

Radar data for the accident flight was obtained from the FAA. The aircraft ground track was plotted on a sectional aeronautical chart. The first recorded data point, at 07:29:04.84, places the airplane about 1 nautical mile south of IRS at 1,400 feet pressure altitude. The ground track shows the airplane's departure from IRS, followed by a left turn to the northeast.

At 07:33:18.73, the airplane's ground track begins to turn to the right followed by a turn to the left. The left turn continues and tightens until the last recorded data point at 07:34:15.16.

A plot of the airplane's altitude returns shows the airplane climbing from the first data point until reaching a pressure altitude of 2,700 feet at 07:30:39.01. About 07:33:18.73, the airplane begins to descend from a pressure altitude of 2,600 feet until reaching a pressure altitude of 1,800 feet at 07:33:56.35. The average rate of descent for this time period was calculated to be 1,276 feet per minute.

The altitude returns show that, following the descent, the airplane climbed from a pressure altitude of 1,800 feet at 07:33:56.35 to a pressure altitude of 3,500 feet at 07:34:15.16. The average rate of climb for this time period was calculated to be 5,423 feet per minute. No subsequent radar returns were received. Various plots of the radar data are appended to this report.

According to the "400B Nav-O-Matic Autopilot System" supplement, Section 3, of the "Pilot's Operating Handbook" for the Cessna 402B, "Sustained elevator overpower will result in the autopilot trimming against the overpower force."

ADDITIONAL INFORMATION

The FAA, Teledyne Continental Motors, and Cessna Aircraft Company were parties to the investigation.

The wreckage was released to a representative of the insurance company.

Pilot Information

Certificate:	Commercial	**Age:**	29, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	08/01/2001
Occupational Pilot:		**Last Flight Review or Equivalent:**	10/15/2001
Flight Time:	1800 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N371JD
Model/Series:	402B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	402B1322
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	12/21/2001, 100 Hour	**Certified Max Gross Wt.:**	6300 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	7339 Hours as of last inspection	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, not activated	**Engine Model/Series:**	TSIO-520-E
Registered Owner:	Riley Aviation, Inc.	**Rated Power:**	300 hp
Operator:	Riley Aviation, Inc.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	BLIA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Dawn
Observation Facility, Elevation:	IRS, 925 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	0737 EST	**Direction from Accident Site:**	246°
Lowest Cloud Condition:	Unknown	**Visibility**	4 Miles
Lowest Ceiling:	Overcast / 600 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.82 inches Hg	**Temperature/Dew Point:**	4°C / 3°C
Precipitation and Obscuration:			
Departure Point:	STURGIS, MI (IRS)	**Type of Flight Plan Filed:**	IFR
Destination:	ANN ARBOR, MI (ARB)	**Type of Clearance:**	IFR
Departure Time:	0730 EST	**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:	N/A	**Aircraft Explosion:**	On-Ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.897500, -85.183333

Administrative Information

Investigator In Charge (IIC):	John M Brannen	**Report Date:**	08/26/2003
Additional Participating Persons:	Greg Schmidt; Cessna Aircraft Company; Wichita, KS R.S. Boyle; Teledyne Continental Motors; Mobile, AL Robert Koneful; FAA-South Bend, Indiana-FSDO; South Bend, IN		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		