



National Transportation Safety Board Aviation Accident Final Report

| | | | |
|--------------------------------|--|-------------------------|-------------|
| Location: | Plano, IL | Accident Number: | CEN14FA522 |
| Date & Time: | 09/28/2014, 2002 CDT | Registration: | N37E |
| Aircraft: | CESSNA T337G | Aircraft Damage: | Substantial |
| Defining Event: | Controlled flight into terr/obj (CFIT) | Injuries: | 1 Fatal |
| Flight Conducted Under: | Part 91: General Aviation - Personal | | |

Analysis

The private pilot was approaching the destination airport at the conclusion of a cross-country flight in dark night, visual meteorological conditions. According to radar track data, the pilot had maintained a gradual descent profile during the final 7 minutes of the flight. About a minute before the accident, during a routine conversation, the tower controller at the destination airport told the pilot that he saw the airplane on radar at 1,800 ft mean sea level (msl). At that time, the airplane was about 1,200 ft above the ground and descending. The airplane subsequently collided with trees located along a ridge at an elevation of about 645 ft msl. The destination airport was located at 712 ft msl. According to radar track and engine monitoring data, the pilot did not attempt to slow the airplane's descent before the accident. A postaccident examination of the airplane and flight instruments did not reveal any anomalies that would have precluded normal operation during the accident flight. Additionally, the pilot had selected a Kollsman window setting that would have minimized any altimeter indication errors.

The 80-year-old pilot had moderate-to-severe coronary artery disease, which can result in a sudden loss of consciousness; however, based on available radar track data and his communications with the airport tower controller, it is unlikely that his coronary artery disease contributed to the accident. The pilot also had longstanding, open-angle glaucoma, which had required a series of medical and surgical treatments over the years, and cataracts in both eyes. The cataract in the left eye had been removed in 2008, but the cataract in the right eye had recently increased in size. An ophthalmology evaluation in the weeks before the accident noted a significant increase in the size of a central scotoma (blind spot) related to longstanding glaucoma in the left eye, and declining corrected distant visual acuity bilaterally. Although the pilot met the Federal Aviation Administration medical certification standard of 20/40 vision in daylight conditions, the glaucoma and cataract likely impaired his night vision and, as such, impeded his ability to judge altitude using available visual cues in dark nighttime conditions. Additionally, toxicology testing identified diphenhydramine, a sedating antihistamine, in the pilot's blood at therapeutic levels. Research has shown that the use of diphenhydramine can

impair cognitive and psychomotor performance. The pilot's failure to identify the airplane's low altitude during cruise descent further supports that he was likely impaired by the use of diphenhydramine.

Probable Cause and Findings

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

The pilot's failure to recognize the airplane's low altitude and arrest the airplane's descent on approach to the airport in dark night conditions, which resulted in controlled flight into terrain. Contributing to the accident was the pilot's degraded night vision due to glaucoma and a cataract and his impairment from the use of diphenhydramine.

Findings

| | |
|-----------------------------|--|
| Aircraft | Altitude - Not attained/maintained (Cause) |
| Personnel issues | Task monitoring/vigilance - Pilot (Cause) Visual function - Pilot (Factor) OTC medication - Pilot (Factor) |
| Environmental issues | Dark - Not specified |

Factual Information

History of Flight

Enroute-descent

Controlled flight into terr/obj (CFIT) (Defining event)

On September 28, 2014, about 2002 central daylight time, a Cessna model T337G airplane, N37E, was substantially damaged when it collided with trees and terrain during cruise-descent near Plano, Illinois. The private pilot was fatally injured. The airplane was registered to and operated by Inline Aviation LTD under the provisions of 14 Code of Federal Regulations Part 91 without a flight plan. Night visual meteorological conditions prevailed for the cross-country flight. The flight departed Litchfield Municipal Airport (3LF), Litchfield, Illinois, about 1855 and was en route to Aurora Municipal Airport (ARR), Sugar Grove, Illinois.

According to air traffic control data, after departing 3LF, the flight proceeded on a direct course toward ARR and climbed to a cruise altitude of 7,500 ft mean sea level (msl). At 1951:52 (hhmm:ss), the pilot established radio contact with the Aurora tower controller and reported being about 15 minutes to the south of the airport and asked if the tower closed at 2100. The tower controller answered "affirmative" and the pilot replied that he would be landing in a few minutes.

At 1954:54, the airplane entered a cruise-descent that continued until the end of available radar data at 2001:59. At 1959:41, the pilot reported being 10 miles to the south inbound for landing with Automatic Terminal Information Service (ATIS) information Delta. The tower controller told the pilot to enter a left base for runway 27 and to report being 2 miles from the airport. At 2000:01, the pilot acknowledged the clearance to make a left base for runway 27.

At 2000:11, the pilot asked if runway 9 was available. The tower controller replied that runway 9 was unavailable because runway 27 was the airport's designated calm-wind runway. At 2000:28, the pilot replied that he would "overfly the airport then and do a left base for... no, no, I'll do a left base for [runway] 27." The tower controller confirmed that from the southeast it would be a left base for runway 27.

At 2000:43, the pilot stated "I'm spotting some other traffic on here, I assume you are tracking them also?" The tower controller asked the pilot to ident his airplane's transponder. At 2001:05, the tower controller confirmed that he observed the accident flight's transponder ident at 1,800 ft msl and that the only observed traffic was ahead of and to the east of the flight's position was at 5,000 ft msl or higher. At 2001:16, the pilot replied "37 echo." No additional radio communications were received from the accident flight. A postaccident review of radar track data confirmed that there was no traffic that would have conflicted with the accident flight.

The final radar return was recorded at 2001:59, about 0.4 miles southwest of the accident site, at 900 ft msl (about 250 ft above ground level). According to radar data, the airplane maintained a ground speed of about 150 knots and an average descent rate of 1,050 ft/min

during the final two minutes of the flight. Additionally, the available radar data established that the pilot did not attempt to slow the airplane's descent before impact.

Pilot Information

| | | | |
|----------------------------------|---|--|------------|
| Certificate: | Private | Age: | 80, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | Lap Only |
| Instrument Rating(s): | None | Second Pilot Present: | No |
| Instructor Rating(s): | None | Toxicology Performed: | Yes |
| Medical Certification: | Class 3 Waiver Time Limited Special | Last FAA Medical Exam: | 10/03/2012 |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | 10/10/2012 |
| Flight Time: | 1654.8 hours (Total, all aircraft), 1525.8 hours (Pilot In Command, all aircraft), 6.8 hours (Last 90 days, all aircraft), 2.2 hours (Last 30 days, all aircraft) | | |

According to Federal Aviation Administration (FAA) records, the 80-year-old pilot held a private pilot certificate with a single engine land and multiengine airplane ratings. The multiengine rating was limited to airplanes equipped with centerline thrust. The pilot did not have an instrument rating. The pilot's last aviation medical examination was completed on October 3, 2012, when he was issued a third-class medical certificate with a limitation for corrective lenses. A search of FAA records showed no previous accidents, incidents, or enforcement proceedings. His last flight review, as required by FAA regulation 61.56, was completed on October 10, 2012, in the accident airplane. The pilot's flight history was reconstructed using his pilot logbook and an airplane utilization logbook that was recovered from the wreckage. The pilot's most recent flight was completed on September 8, 2014, at which time he had accumulated 1,654.8 hours total flight time, of which 1,525.8 hours were listed as pilot-in-command. He had accumulated 195.0 hours in single engine airplanes and 1,407.2 hours in multi-engine airplanes. Additionally, he had logged 7.6 hours in actual instrument meteorological conditions, 88.2 hours in simulated instrument meteorological conditions, and 478.4 hours at night. According to available logbook information, the pilot had completed three flights, totaling 6.8 hours, during the previous 12 months. The three flights were completed in the accident airplane on July 20, 2014, August 14, 2014, and September 8, 2014. The pilot accumulated a total of 2.5 hours of night experience during the July 20th and August 14th flights.

Aircraft and Owner/Operator Information

| | | | |
|-------------------------------|--|--------------------------------|-----------------|
| Aircraft Make: | CESSNA | Registration: | N37E |
| Model/Series: | T337G | Aircraft Category: | Airplane |
| Year of Manufacture: | 1973 | Amateur Built: | No |
| Airworthiness Certificate: | Normal | Serial Number: | P3370127 |
| Landing Gear Type: | Retractable - Tricycle | Seats: | 6 |
| Date/Type of Last Inspection: | 05/20/2014, Annual | Certified Max Gross Wt.: | 4700 lbs |
| Time Since Last Inspection: | 18 Hours | Engines: | 2 Reciprocating |
| Airframe Total Time: | 5389.3 Hours as of last inspection | Engine Manufacturer: | Continental |
| ELT: | C91 installed, activated, did not aid in locating accident | Engine Model/Series: | TSIO-360-DCC |
| Registered Owner: | On file | Rated Power: | 225 hp |
| Operator: | On file | Operating Certificate(s) Held: | None |

The accident airplane was a 1973 Cessna model T337G, serial number (s/n) P3370127. Two 225-horsepower Continental model TSIO-360 reciprocating engines powered the airplane through controllable-pitch, full feathering, two blade, McCauley propellers. The pressurized airplane had a retractable tricycle landing gear and a certified maximum gross weight of 4,700 pounds. The airplane was issued a standard airworthiness certificate on July 23, 1973.

The last annual inspection of the airplane was completed on May 20, 2014, at 5,389.3 total airframe hours. The hour meter indicated 3,372.0 hours at the annual inspection. According to an airplane utilization logbook, the airplane's hour meter indicated 3,389.6 hours before the previous flight leg (ARR to 3LF), which was completed earlier on the day of the accident. The airplane's hour meter was not located at the accident site. Based on utilization records, the airplane had accrued 17.6 hours since the annual inspection. The static system, altimeter system, automatic pressure altitude reporting system, and transponder were last tested on May 7, 2012.

The front engine, a Continental model TSIO-360-DCC, s/n 50R420, was installed on the accident airplane on June 29, 1992, following a field overhaul. At the last annual inspection, the engine had accumulated 1,393 hours since overhaul. The front propeller was a McCauley model D2AF34C303-A, s/n 733999. At the last annual inspection, the propeller had accumulated 772 hours since the last overhaul completed on April 11, 1997.

The rear engine, a Continental model TSIO-360-CB6B, s/n 236274-R, was installed on the accident airplane on April 1, 2000, after being rebuilt by the manufacturer. At the last annual inspection, the engine had accumulated 616.6 hours since being rebuilt by the manufacturer. The rear propeller was a McCauley model D2AF34C305-A, s/n 783238. At the last annual inspection, the propeller had accumulated 772 hours since the last overhaul completed on April 11, 1997.

A postaccident review of the maintenance records found no history of unresolved airworthiness issues.

The airplane had a total fuel capacity of 125 gallons (123 gallons usable) distributed between two wing fuel tanks. The cockpit fuel flow indicator showed that there was 67 gallons of fuel remaining at the time of the accident.

Meteorological Information and Flight Plan

| | | | |
|---|----------------------------------|---|------------------|
| Conditions at Accident Site: | Visual Conditions | Condition of Light: | Night |
| Observation Facility, Elevation: | ARR, 712 ft msl | Distance from Accident Site: | 9 Nautical Miles |
| Observation Time: | 1952 CDT | Direction from Accident Site: | 23° |
| Lowest Cloud Condition: | Clear | Visibility | 10 Miles |
| Lowest Ceiling: | None | Visibility (RVR): | |
| Wind Speed/Gusts: | Calm / | Turbulence Type Forecast/Actual: | / None |
| Wind Direction: | | Turbulence Severity Forecast/Actual: | / N/A |
| Altimeter Setting: | 30.08 inches Hg | Temperature/Dew Point: | 18° C / 12° C |
| Precipitation and Obscuration: | No Obscuration; No Precipitation | | |
| Departure Point: | Litchfield, IL (3LF) | Type of Flight Plan Filed: | None |
| Destination: | Sugar Grove, IL (ARR) | Type of Clearance: | VFR |
| Departure Time: | 1855 CDT | Type of Airspace: | Class G |

At 1952, the automated surface observing system (ASOS) located at Aurora Municipal Airport (ARR), about 10 miles north-northeast of the accident site, reported: calm wind, clear sky, 10 mile surface visibility, temperature 18 degrees Celsius, dew point 12 degrees Celsius, and an altimeter setting of 30.08 inches of mercury.

The United States Naval Observatory data indicated that the sunset and end of civil twilight at the accident site were at 1841 and 1909, respectively. Moon transit, the time at which the moon is highest in the sky, occurred at 1615 and the moonset was at 2121. The moon was in a waxing crescent phase, with 19-percent of the moon's visible disk illuminated. Additionally, the accident site was located in a sparsely populated area with minimal illumination from ground light sources. As such, dark nighttime conditions likely existed at the time of the accident.

Airport Information

| | | | |
|-----------------------------|--------------------------------|----------------------------------|----------|
| Airport: | Aurora Municipal Airport (ARR) | Runway Surface Type: | Concrete |
| Airport Elevation: | 712 ft | Runway Surface Condition: | Dry |
| Runway Used: | 27 | IFR Approach: | None |
| Runway Length/Width: | 6501 ft / 100 ft | VFR Approach/Landing: | None |

The Aurora Municipal Airport (ARR), located about 1 mile northwest of Sugar Grove, Illinois, was served by three runways: 9/27 (6,501 ft by 100 ft, concrete); 15/33 (5,503 ft by 100 ft, concrete); and 18/36 (3,198 ft by 75 ft, asphalt). The airport elevation was 712 ft mean sea level msl.

Wreckage and Impact Information

| | | | |
|----------------------------|---------|-----------------------------|-----------------------|
| Crew Injuries: | 1 Fatal | Aircraft Damage: | Substantial |
| Passenger Injuries: | N/A | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 1 Fatal | Latitude, Longitude: | 41.638889, -88.547778 |

The airplane collided with several 30-foot tall trees located along a ridgeline at 645 ft msl. All airframe structural components and flight control surfaces were located along the wreckage debris path. Both wings and tailbooms separated from the fuselage during the collision with the trees. The right wing had a large semicircular crush region, located about midspan, which was consistent with the average tree diameter near the initial point of impact. The fuselage was located 475 ft northeast of the ridgeline in a cornfield. All observed structural component failures were consistent with overstress separation and there was no evidence of an inflight or postimpact fire. Flight control continuity could not be established due to the extent of the damage; however, all observed flight control system discontinuities were consistent with overstress. The elevator trim position could not be determined due to impact damage. The wing flaps were fully retracted. The nose and main landing gear were fully retracted. The fuel control valves and their control lever positions were compromised during the impact sequence. Both electric fuel pump switches were in the OFF position. The altimeter's Kollsman window was centered on 30.06 inches of mercury. The altimeter sustained impact-related damage during the accident and could not be bench tested. The postaccident airframe examination revealed no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.

The front engine separated from the fuselage and was located about 90 ft northeast of the main wreckage. The engine sustained significant impact-related damage that resulted in the fracture of the crankcase, crankshaft, and the No. 5 cylinder head, as well as the separation of the

turbocharger, fuel pump, and both magnetos. One of the magnetos and the mechanical fuel pump were not located during the on-scene investigation. The impact damage sustained during the accident precluded a functional test of the engine. The crankshaft fractured in an area that coincided with the No. 4 main bearing oil galley. The crankshaft fracture displayed 45-degree shear lips and a cupped appearance. Crankshaft continuity was confirmed from the aft end of the engine to the crankshaft fracture area and to each of the connecting rods. Camshaft continuity was confirmed from the aft end of the engine, to the bevel gear. A borescope inspection revealed no preimpact anomalies with the cylinders, valves, or pistons. The oil pickup screen was intact and covered in oil with no obstructions observed. The oil filter element was free of visible metal contaminants. The recovered magneto provided spark from each ignition tower when the drive shaft was rotated by hand. The spark plugs exhibited features consistent with normal engine operation. Fuel was observed in the lines leading from the fuel metering unit to the fuel manifold valve. Disassembly of the vacuum pump showed no evidence of preimpact failure or malfunction. The turbocharger flange around the impeller was distorted. The impeller was impinged against one side of the impeller shroud and circumferential scoring was observed on the shroud. No pre-accident anomalies were noted that would have prevented normal operation of the front engine or its ability to produce rated power.

The rear engine remained partially attached within the nacelle of the airframe. The engine exhibited impact-related damage that precluded a functional test of the engine. The crankshaft was fractured where it entered the crankcase at the prop seal. The fracture surfaces displayed 45-degree shear lips. The crankshaft was continuous from the fracture face aft to the accessory section as noted during crankshaft rotation. The crankshaft remained attached to each connecting rod. Camshaft continuity was confirmed in conjunction with crankshaft rotation. A borescope inspection revealed no preimpact anomalies with the cylinders, valves, or pistons. Both magnetos provided spark from each ignition tower when their respective drive shaft was rotated by hand. The spark plugs exhibited features consistent with normal engine operation. The oil pickup screen was intact and covered in oil with no obstructions observed. The oil filter element was free of visible metal contaminants. The fuel pump exhibited impact-related damage that precluded a functional test. The fuel pump drive coupling was intact. Fuel was observed in the lines leading from the fuel metering unit to the manifold. Disassembly of the vacuum pump showed no evidence of preimpact failure or malfunction. The turbocharger remained attached to the rear engine and the exhaust system. The impeller shroud contained vegetation and other organic material. The impeller would rotate by hand with a corresponding rotation of the turbine. No pre-accident anomalies were noted that would have prevented normal operation of the rear engine or its ability to produce rated power.

The front propeller remained attached to the crankshaft's propeller flange; however, the hub had fractured and one of the two blades was separated from the hub. The separated blade was curled forward more than 180 degrees and the outboard six inches had separated from the blade. The other blade remained with the propeller flange and exhibited a forward bend about mid-span. Both blades exhibited leading edge damage and chordwise scratches.

The rear propeller hub remained secured to the crankshaft prop flange. Both blades remained with the hub, but they had rotated 180 degrees in the hub. One blade displayed a large leading edge gouge at the tip and the blade was bent forward along its span. The other blade sustained

minor leading edge gouging, slight chordwise scratches, and was twisted slightly toward low pitch.

The postaccident wreckage examination did not reveal any anomalies that would have precluded normal operation of the airplane during the accident flight.

Communications

A review of available air traffic control (ATC) information indicated that the accident flight had received normal services and handling. A summary of the voice communications recorded between the accident pilot and the Aurora tower controller is included with the docket materials associated with the investigation.

Medical And Pathological Information

On September 30, 2014, the Kendall County Coroner Office, located in Yorkville, Illinois, performed an autopsy on the pilot. The cause of death was attributed to multiple blunt-force injuries sustained during the accident. The autopsy also indicated that caffeine and diphenhydramine (.076 ug/ml) were identified in cavity blood. The FAA's Civil Aerospace Medical Institute located in Oklahoma City, Oklahoma, performed toxicology tests on samples obtained during the autopsy. The toxicological test results were negative for carbon monoxide and ethanol. The testing identified atenolol and diphenhydramine in urine and cavity blood, and salicylate in urine. The test results indicated 0.136 ug/ml of diphenhydramine was identified in blood. Cavity blood levels may vary widely from dilution by other fluids or because of post mortem redistribution where drug may leech out from storage sites (like liver) into adjacent pooled blood.

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. Blood levels between 0.0250 and 0.1120 ug/ml are considered therapeutic. Diphenhydramine carries the following Food and Drug Administration warning: May impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery). Compared to other antihistamines, diphenhydramine also causes marked sedation, and as a central nervous system depressant, is often used as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed in conjunction with the use of diphenhydramine.

Atenolol is prescription medication that lowers blood pressure and decreases the likelihood of a recurrent heart attack. Salicylate is a metabolite of aspirin, which is commonly used by patients with coronary artery disease to prevent a heart attack.

The 80-year-old pilot had a history of coronary artery disease that required angioplasty and stenting of the left anterior descending artery in 2007, along with hypertension. He was on a

number of medications to control his blood pressure and limit the progression of his coronary artery disease. However, the autopsy identified moderate to severe new stenosis in the portion of the left anterior descending coronary artery distal to the stent, and evidence of hypertensive cardiovascular disease in his heart and kidneys.

In addition, the pilot had longstanding open angle glaucoma (since 1985) which had required a series of medical and surgical treatment over the years, and cataracts in both eyes. The cataract in the left eye had been removed in 2008 but the one in the right eye was increasing in size before the accident. An ophthalmology evaluation in the weeks before the accident noted a significant increase in the size of a central scotoma (blind spot) related to longstanding glaucoma in the left eye and declining corrected distant visual acuity bilaterally, although the pilot met the FAA standard of 20/40 vision.

Tests And Research

The airplane's Insight Avionics GEMINI 1200 graphic engine monitor, s/n 1535, was downloaded at the National Transportation Safety Board (NTSB) Vehicle Recorders Laboratory in Washington D.C. The accident flight included 806 lines of data for both engines. The engine parameter data was recorded once every six seconds. The engine monitor recorded exhaust gas temperature, cylinder head temperature, and turbine inlet temperature. A review of the recovered engine parameter data revealed consistent readings throughout the accident flight and no anomalies with engine operation. The data stopped recording abruptly after 1 hour 20 minutes 30 seconds, consistent with a loss of electrical power during the impact sequence.

The Shadin electronic fuel flow indicator, s/n 8430, was examined at the NTSB Vehicle Recorders Laboratory. All fuel readings were based on fuel flow to the engine. The fuel flow indicator contained non-volatile memory for fuel remaining and the amount of fuel used since the device was last reset. The device was powered-up and indicated that 55.9 gallons of fuel had been used and that there was 67 gallons of fuel remaining.

Additional Information

According to the FAA Airplane Flying Handbook (FAA-H-8083-3B), "Night flying is very different from day flying and demands more attention of the pilot. The most noticeable difference is the limited availability of outside visual references. Therefore, flight instruments should be used to a greater degree in controlling the airplane." The handbook further states, "Distance may be deceptive at night due to limited lighting conditions. A lack of intervening references on the ground and the inability to compare the size and location of different ground objects cause this. This also applies to the estimation of altitude and speed. Consequently, more dependence must be placed on flight instruments, particularly the altimeter and the airspeed indicator."

Administrative Information

| | | | |
|--|---|---------------------|------------|
| Investigator In Charge (IIC): | Andrew T Fox | Report Date: | 03/06/2017 |
| Additional Participating Persons: | Spencer Cull; Federal Aviation Administration, DuPage FSDO; West Chicago, IL Steven Miller; Textron Aviation (Cessna); Wichita, KS Nicole Channon; Continental Motors, Inc.; Mobile, AL | | |
| Publish Date: | 03/06/2017 | | |
| Note: | The NTSB traveled to the scene of this accident. | | |
| Investigation Docket: | http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=90169 | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).