



National Transportation Safety Board Aviation Accident Final Report

Location:	Akron, CO	Accident Number:	DEN03FA025
Date & Time:	12/25/2002, 1006 MST	Registration:	N421D
Aircraft:	Cessna 421	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot reported to Denver Air Route Traffic Control Center (ZDV) that his left engine had an oil leak and he requested to land at the nearest airport. ZDV informed the pilot that Akron (AKO) was the closest airport and subsequently cleared the pilot to AKO. On reporting having the airport in sight ZDV terminated radar service, told the pilot to change to the advisory frequency, and reminded him to close his flight plan. Approximately 17 minutes later, ZDV contacted Denver FSS to inquire if the airplane had landed at AKO. Flight Service had not heard from the pilot, and began a search. Approximately 13 minutes later, the local sheriff found the airplane off of the airport. Witnesses on the ground reported seeing the airplane flying westbound. They then saw the airplane suddenly pitch nose down, "spiral two times, and crash." The airplane exploded on impact and was consumed by fire. An examination of the airplane's left engine showed the number 2 and 3 rods were fractured at the journals. The number 2 and 3 pistons were heavily spalded. The engine case halves were fretted at the seam and through bolts. All 6 cylinders showed fretting between the bases and the case at the connecting bolts. The outside of the engine case showed heat and oil discoloration. The airplane's right engine showed similar fretting at the case halves and cylinder bases, and evidence of oil seepage around the seals. It also showed heat and oil discoloration. An examination of the propellers showed that both propellers were at or near low pitch at the time of the accident. The examination also showed evidence the right propeller was being operated under power at impact, and the left propeller was operating under conditions of low or no power at impact. According to the propeller manufacturer, in a sudden engine seizure event, the propeller is below the propeller lock latch rpm. In this situation, the propeller cannot be feathered. Repair station records showed the airplane had been brought in several times for left engine oil leaks. One record showed a 3/4 inch crack found at one of the case half bolts beneath the induction manifold, was repaired by retorquing the case halves and sealing the seam with an unapproved resin. Records also showed the station washed the engine and cowling as the repair action for another oil leak.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The fractured connecting rods and the pilot not maintaining aircraft control following the engine failure. Factors contributing to the accident were the low altitude, the pilot not maintaining minimum controllable airspeed following the engine failure, the pilot's inability to feather the propeller following the engine failure, oil exhaustion, the seized pistons, and the repair station's improper maintenance on the airplane's engines.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings

1. (C) ENGINE ASSEMBLY,CONNECTING ROD - FRACTURED
 2. (F) MAINTENANCE,MAJOR REPAIR - IMPROPER - COMPANY MAINTENANCE PERSONNEL
 3. (F) FLUID,OIL - EXHAUSTION
 4. (F) ENGINE ASSEMBLY,PISTON - SEIZED
 5. MAINTENANCE,OVERHAUL - OVERDUE
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Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

Findings

6. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
 7. (F) ALTITUDE - LOW
 8. EMERGENCY PROCEDURE - ATTEMPTED - PILOT IN COMMAND
 9. (F) PROPELLER FEATHERING - NOT POSSIBLE - PILOT IN COMMAND
 10. (F) AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND
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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

11. TERRAIN CONDITION - OPEN FIELD

Factual Information

HISTORY OF FLIGHT

On December 25, 2002, at 1006 mountain standard time, a Cessna 421, N421D, piloted by a private pilot, was destroyed when it impacted terrain 1/8 mile west of the Akron/Washington County Airport (AKO), Akron, Colorado. A post crash fire ensued. Visual meteorological conditions prevailed at the time of the accident. The personal cross-country flight was operating on an instrument flight rules flight plan from Englewood, Colorado, to Mitchell, South Dakota, under the provisions of Title 14 CFR Part 91. The pilot and passenger on board sustained fatal injuries. The flight originated at 0933.

At 0959, the pilot reported to the Denver Air Route Traffic Control Center (ZDV) that his left engine had an oil leak and requested to land at the nearest airport. ZDV informed the pilot that AKO was the closest airport and subsequently cleared the pilot direct to AKO.

At 1001, the pilot reported having the airport in sight. ZDV radar showed the airplane in a 3,000 foot per minute descent passing through 17,000 feet mean sea level.

At 1003, ZDV terminated radar service, told the pilot to change to the advisory frequency, and reminded him to close his flight plan.

At approximately 1004, ZDV radar lost contact with the airplane. When contact was lost, the airplane was approximately 3.5 miles southwest of the Akron VOR and 5 miles south of the airport.

At 1016, ZDV contacted Denver Flight Service to ensure the airplane had landed at AKO and the pilot had closed his flight plan. Flight Service said they had not heard from the pilot, but would look into it. At 1023, Flight Service contacted the Washington County, Colorado Sheriff and asked if they could send a car to AKO to see if the pilot was there. At 1029, Flight Service informed ZDV that the sheriff's department said "he ran off the runway and thundered it up a little bit ..."

A witness on the ground observed the airplane come from the north toward the airport. He said the airplane made a sharp right hand turn over a football field and flew west over the old runway. The witness said he saw a vapor trail coming from the right side tail. He said he could hear what sounded like one engine. The witness estimated the airplane was 1,000 feet above the ground.

Two witnesses driving eastbound toward the airport reported seeing the airplane flying westbound. The airplane was then observed to suddenly pitch nose down, "spiral two times, and crash."

PERSONNEL INFORMATION

The pilot held a private pilot certificate with single and multiengine land, and instrument ratings. The pilot's logbooks sustained fire damage in the accident. The information derived from the logbook indicated that the pilot had 1,230.2 total flying hours. The logbook showed the pilot had 1,068.8 hours as pilot-in-command and 252.7 hours in multiengine land airplanes. The logbook also showed the pilot having 21.6 hours in the accident airplane. This time was logged between June 24, 2002, and November 19, 2002. The logbook also showed the pilot completed a flight review and instrument competency check on June 21, 2002.

Aircraft insurance records indicate the pilot completed an initial flight training course for the Cessna 421 at Champaign, Illinois, on June 21, 2002. The training course consisted of 8.0 hours of classroom instruction and 9.5 hours of simulator flight training.

AIRCRAFT INFORMATION

The airplane was manufactured in 1967, was owned and operated by the pilot, and used for pleasure. The airplane's current registration was dated June 4, 2002. According to repair station records, an annual inspection was performed in Tulsa, Oklahoma, on April 10, 2002. A pre-purchase evaluation was done on the airplane on May 6, 2002. At the time of that evaluation, the total airframe time was 3,532 hours. The airplane's Hobbs meter and tachometer were destroyed by impact and fire in the accident; however, pilot records indicate the airplane was flown at least an additional 21.6 hours.

WRECKAGE AND IMPACT INFORMATION

The National Transportation Safety Board on-scene investigation began at 1550.

The accident site was located in a pasture approximately 150 feet west of Washington County Road AA5, a north-south running gravel road, and at geographical coordinates 40 degrees 11.001 minutes north latitude, and 103 degrees 14.315 minutes west longitude.

An area of burned grassland encompassed the accident site. The accident site covered an area approximately 205 feet north to south and 163 feet east to west. The accident site began with two impact craters located at the site's north edge, running along an east-west line. The western-most crater was 2 feet long, 4 feet wide and 18 inches deep. The airplane's left propeller hub, spinner cone, and two blades rested upright in the crater. The left propeller was oriented on a 360-degree magnetic heading. The second crater was 14 feet east of the west crater. It was approximately 3 feet long, 20 inches wide, and 20 inches deep. The airplane's right propeller and spinner were embedded in the crater at a 54-degree down angle from horizontal. Both propellers were broken off at the flanges.

The left propeller hub was broken where the third of a 3-bladed propeller was seated. The third propeller blade rested just south of the left propeller and west crater. The spinner cone was crushed aft around the propeller cylinder and hub. The two blades with the hub were at the low pitch position and showed charred and slight aft bending. There were chordwise scratches on the front-facing sides of the two blades near the blade tips, beginning at the blades' leading edges. The third blade was bent rearward and charred.

The right propeller's spinner cone was crushed aft around the hub cylinder and hub. The propeller hub was broken. The three propeller blades were at the low pitch position. All three blades showed torsional bending, chordwise scratches, and leading and trailing edge nicks and gouges.

In the area between the two propellers, running northward of the east-west line the propellers lay along, were numerous pieces of clear Plexiglas. The pieces ran northward of the east-west line for approximately 21 feet. The pieces were fragmented, charred and melted. The airplane's VHF antennae rested upside down on the ground 12 feet north of the left propeller. It was broken off at the base. Approximately 35 feet north-northeast of the left propeller rested a piece of the left wing tank and fuel cap.

Approximately 3 feet to the right of the east crater and right propeller was a 3-foot by 3-foot piece of the front cabin wall. At 8 feet east-southeast of the right propeller were a nose baggage

door and the front portion of the right wing tip fuel tank. The baggage door was broken out at the hinges and latches. The latches were flush with the door and the latch bayonets were extended. The inner side of the door was charred and melted. The right wing tip fuel tank was crushed aft and broken open. The tank portion was also charred and melted.

Approximately 14 feet west of the west crater and left propeller was the front portion of the left wing tip fuel tank. It was crushed aft, broken open, charred and melted.

In an area beginning at the east-west line described by the two craters and the left and right propellers, and running south for approximately 28 feet was a debris field. The debris field contained pieces of fragmented instrument panel, flight instruments, a main landing gear door, pieces of wing skin, cowling doors, and engine components.

At 28 feet south of the propellers and impact craters were the remains of the airplane's nose section, instrument panel, cabin, wings, right engine and nacelle, and main and nose landing gear. The airplane's wings and fuselage were oriented on a 180-degree magnetic heading. The nose section of the airplane, to include the baggage compartment, nose gear, nose gear wheel well, and avionics, was crushed aft to the cabin area, broken open, fragmented, melted and consumed by fire. The forward fuselage, including the pilot and front passenger seats, instrument panel, control yokes, rudder pedals, center control console, interior walls and floor, was crushed aft, fragmented, charred, melted, and consumed by fire. The aft cabin section to the pressure bulkhead was broken open, crushed downward, charred and melted. The roof of the cabin and left side cabin wall, passenger windows, passenger seats, and cabin door were melted and consumed by fire.

Approximately 9 feet of the airplane's left wing beginning at the root and running outward remained attached with the fuselage. The inboard wing skin was charred melted and consumed. The left engine nacelle was crushed aft and broken open, fragmented, melted, and consumed by fire. The airplane's left engine was broken out from the mounts. A 7-foot long section of leading edge skin from the left outboard wing section rested south of the remaining left wing spar. It was crushed aft, charred, and melted. The airplane's left flap was melted and consumed by fire. The left main landing gear was extended, charred and melted. The left main tire was consumed by fire. The left aileron was broken out and found resting beneath the section of forward leading edge skin. It was charred and melted. Flight control continuity to the left aileron was confirmed. The remainder of the outboard wing section and left main auxiliary (wing) fuel tank were broken aft and consumed by fire.

The majority of the right wing was present with the center fuselage and remaining left wing section. The majority of the right wing was crushed aft starting at the wing root and running outward to where the right tip tank attached. The right wing was charred and melted from the root to the right engine nacelle. The right nacelle was broken aft and bent right. The right engine was with the nacelle. It was charred and melted. The right wing outboard of the engine nacelle was crushed aft, charred, melted and consumed by fire. The right flap was melted and consumed by fire. The right main landing gear was broken aft, charred, and melted. The right main landing gear tire was consumed by fire. The right aileron was broken out. The left aileron was found resting 14 feet east of the remains of the airplane's left wing. It was charred and melted. Flight control continuity to the right aileron was confirmed. The right wing tip fuel tank was broken aft longitudinally.

At 8 feet southeast of the wings and fuselage remains was the aft fuselage, part of the left wing

tip fuel tank, and the empennage. The empennage was resting upright and was oriented on a 225-degree magnetic heading. The aft fuselage was broken downward at a 55-degree crush angle. The dorsal fin leading to the vertical stabilizer was crushed downward, fragmented, and melted. The leading edge of the vertical stabilizer, from the fin (root) to the tip was crushed aft approximately 8 to 10 inches. The top of the vertical stabilizer was crushed downward approximately 6 inches. The right side of the vertical stabilizer and rudder were charred and melted. The top of the vertical stabilizer and rotating beacon were melted. The left side of the vertical stabilizer and rudder showed heat damage. The rudder was intact. The trailing edge tip of the rudder was crushed downward and melted.

The right horizontal stabilizer and right elevator were intact. The top skin was charred and melted. The bottom skin showed charring and paint blisters. The tip of the right elevator was crushed aft. The left horizontal stabilizer was intact. The bottom skin showed charring and paint blistering. The inboard two feet of the left elevator was crushed inward. The trailing edge tip of the left elevator was bent upward. The outer two feet of the leading edge and bottom of the left horizontal stabilizer was covered with oil. Oil was found spattered along the bottom inboard skin of the left horizontal stabilizer and rudder. Flight control continuity to the rudder and elevators was confirmed.

The airplane's left engine rested upright beneath the left horizontal stabilizer. The engine showed minor charring due to fire. The bottom oil sump was crushed upward. Two holes, approximately 2-3 inches in diameter were found in the top of the crankcase, just aft of the center of the engine. An epoxy-type resin was observed covering the top crankcase seam beginning beneath the induction manifold and running aft to the back of the engine.

From the airplane fuselage and wings running south for 55 feet was a second debris field. The debris field contained pieces of wing and fuselage skin, pieces of nacelles, engine components, and the aft portion of the left wing tip fuel tank. The extent of the burned grassland area ended at the south edge of the second debris field.

An examination of the surviving airplane systems showed no anomalies. The airplane's engines and propellers were retained for further examination.

FIRE

At 1006, the Washington County Sheriff Office received a 9-1-1 emergency call that an airplane was down 1-1/2 mile north of AKO. Units from the Akron Fire Department and Emergency Medical Services were dispatched at 1007. The units were on scene by 1012. By 1116, the fire was out.

A burned area of pasture grassland surrounded the majority of the main aircraft wreckage. The area extended from the two craters east-northeast for approximately 70 feet, west for approximately 90 feet, and south-southwest for approximately 200 feet.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was conducted by the Washington County Coroner at Loveland, Colorado, on December 27, 2002.

The results of FAA toxicology testing of specimens taken from the pilot were negative for all tests conducted.

TESTS AND RESEARCH

The engines were examined at Teledyne Continental Motors, Mobile, Alabama, February 19-20, 2003.

An examination of the airplane's left engine (GTSIO-520D, serial number 219418) showed two holes in the top of the engine case. The first hole was located 1-1/2 inches right of the top seam of the case approximately 11 inches from the rear of the engine. The hole was approximately 2-1/2 inches long and 2 inches wide. The second hole was located 1/2 inch left of the top seam of the case and approximately 11 inches from the rear of the engine. This hole was 1-1/2 inches long and 1 inch wide. The engine was disassembled and examined. The oil sump showed metal fragments resembling bearing material and push rod material. A push rod bolt and a bolt neck were found among the metal debris in the sump. The number 2 rod was broken at the journal. The bottom of the number 2 piston and the broken rod end were heavily spalled. The number 3 rod was broken at the journal. The bottom of the number 3 piston showed heavy spalding. The case halves showed fretting at the seam and through bolts. All 6 cylinders showed fretting between the bases and the case where the connecting bolts went through. The bearings showed rubs indicative of slippage. The outside of the engine case showed heat and oil discoloration.

The right engine (GTSIO-520D, serial number 601065) was disassembled and examined. The case halves showed fretting at the seam and through bolts. All 6 cylinders showed fretting between the bases and the case where the connecting bolts went through. The bearings showed rubbing through to the copper material. The outside of the engine case showed signs of oil seepage around the seals. The outside case also showed heat and oil discoloration.

The right engine examination showed indications that the engine had major work performed. The cylinder rims had been topped. The examination also showed the cylinders, crankshaft, pistons, and piston pins used were not from the manufacturer. Tracking the parts' numbers revealed the cylinders were manufactured in October 1977. Many of the other parts' numbers reflected manufacturing dates close to that of the cylinders.

The propellers were examined at McCauley Propeller Systems, Vandalia, Ohio, on April 9-10, 2003. The examination showed the propeller blades positions consistent with both propellers being at or near low pitch. The examination also showed evidence that the right propeller was being operated under conditions of power at impact, and the left propeller was operating under conditions of low or no power at impact.

According to the propeller manufacturer, with this model propeller, if a sudden engine seizure occurs, the propeller is below the propeller lock latch rpm. In this situation, the pilot cannot feather the propeller.

Repair station maintenance work orders and records provided by the pilot's sister showed that on May 17, 2002, the airplane was brought in for a left engine oil leak. Records showed that a 3/4 inch crack was found at one of the case half bolts beneath the induction manifold. The records indicate the case was retorqued and the case halves were sealed with "Lock O Seals." On June 4, 2002, the airplane was brought back for another left engine oil leak. The records indicate the repair station found minor seepage at the oil filler neck, number 4 push rod seals, and the front seam of the oil sump. The records showed the engine and cowling were washed and the cowling was reinstalled. The repair station recommendation was that the engine be washed down at each oil change. On July 9, 2002, the airplane was brought back to have the oil changed on the left and right engines.

The May 6, 2002 pre-purchase inspection report reflected a review of the airplane's logbooks and indicated the following:

The left engine was a factory rebuild. It was installed on April 9, 1984. At the pre-purchase inspection, the engine had 1,548.7 hours since rebuild.

The right engine was a factory new engine. It was installed in May 15, 1992. At the pre-purchase inspection, the engine had 1,078.0 hours.

Both propellers were overhauled on October 6, 1994. At the pre-purchase inspection, the propellers had 907.2 hours.

The inspection noted that manufacturer's recommended overhaul period for the propellers was 60 months and 1,200 hours, whichever occurs first. The manufacturer's recommended overhaul period for the model engines was 12 years and 1,600 hours, whichever occurs first.

ADDITIONAL INFORMATION

Parties to the investigation were the FAA Flight Standards District Office, Denver, Colorado, the Cessna Aircraft Company, Teledyne Continental Motors, and McCauley Propeller Systems.

The airplane wreckage and all tested components were returned and released to Beegles Aircraft Services, Greeley, Colorado, on June 6, 2003.

Pilot Information

Certificate:	Private	Age:	50, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 None	Last FAA Medical Exam:	08/12/2002
Occupational Pilot:		Last Flight Review or Equivalent:	06/21/2002
Flight Time:	1230 hours (Total, all aircraft), 22 hours (Total, this make and model), 1069 hours (Pilot In Command, all aircraft), 3 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N421D
Model/Series:	421	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	421-0045
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	04/10/2002, Annual	Certified Max Gross Wt.:	6500 lbs
Time Since Last Inspection:	22.1 Hours	Engines:	2 Reciprocating
Airframe Total Time:	3564.1 Hours at time of accident	Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	GTSIO-520-D
Registered Owner:	Robert A. Rumachik	Rated Power:	375 hp
Operator:	Robert A. Rumachik	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	AKO, 4714 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	0953 MST	Direction from Accident Site:	90°
Lowest Cloud Condition:	Clear	Visibility	5 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	310°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	-6° C / -8° C
Precipitation and Obscuration:			
Departure Point:	Englewood, CO (APA)	Type of Flight Plan Filed:	IFR
Destination:	Mitchell, SD (MHE)	Type of Clearance:	IFR
Departure Time:	0933 MST	Type of Airspace:	Class E

Airport Information

Airport:	Akron/Washington County (AKO)	Runway Surface Type:	Asphalt
Airport Elevation:	4714 ft	Runway Surface Condition:	Dry
Runway Used:	11	IFR Approach:	None
Runway Length/Width:	7000 ft / 100 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	2 Fatal	Latitude, Longitude:	40.183333, -103.238611

Administrative Information

Investigator In Charge (IIC):	David C Bowling	Report Date:	11/25/2003
Additional Participating Persons:	Thomas J Forchtner; Federal Aviation Administration; Denver, CO Tom Moody; Cessna Aircraft Company; Wichita, KS Scott Boyle; Teledyne Continental Motors; Arvada, CO Tom Knopp; McCauley Propeller Systems; Vandalia, OH		
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.nts.gov/pubdms/ .		

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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](#).