National Transportation Safety Board
Aviation Accident Final Report

Location:	Roanoke, Virginia	**Accident Number:**	ERA10FA195
Date & Time:	March 30, 2010, 13:10 Local	**Registration:**	N6913Z
Aircraft:	Piper PA46	**Aircraft Damage:**	Destroyed
Defining Event:	Flight control sys malf/fail	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

About one minute after takeoff, the pilot reported to the air traffic controller that the airplane's control wheels were locked. The controller subsequently cleared the pilot to land on any runway. No further transmissions were received from the pilot and the airplane continued straight ahead. Witnesses observed the airplane in a slow, level descent, until it impacted wires and then the ground. During a postaccident examination of the airplane, flight control continuity was confirmed to all the flight controls. Due to the impact and post-crash fire damage, a cause for the flight control anomaly, as reported by the pilot, could not be determined; however, several unsecured cannon plugs and numerous unsecured heat damaged wire bundles were found lying across the control columns forward of the firewall. Examination of the airplane logbooks revealed the most recent maintenance to the flight controls was performed about four months prior to the accident. The airplane had flown 91 hours since then.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A malfunction of the flight controls for undetermined reasons.

Findings

Aircraft	(general) - Malfunction
Not determined	(general) - Unknown/Not determined

Factual Information

HISTORY OF FLIGHT

On March 30, 2010, at 1310 eastern daylight time, N6913Z, a Piper PA-46-310P, was destroyed when it impacted terrain shortly after takeoff from Roanoke Regional Airport (ROA), Roanoke, Virginia. The certificated private pilot was fatally injured and the passenger was seriously injured. Visual meteorological conditions prevailed for the personal flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the manager of a fixed base operator (FBO) at ROA, the pilot and passenger arrived at ROA around 0930 on the morning of the accident. They had flown into ROA from Charlottesville-Albemarle Airport (CHO), Charlottesville, Virginia, for a meeting with the manager of the FBO. They completed their meeting, had lunch, and then prepared for the return flight to CHO.

The passenger was interviewed in the hospital after the accident. He stated the takeoff seemed normal; however, he was seated in a rearward facing seat in the back of the airplane. The passenger reported at some point after takeoff, the airplane made a "flat" right turn and the pilot stated, "I have a problem." The passenger remembered hearing a "clunk" from the right side during the flight but could not recall when. He did not remember the impact, but was conscious afterward and was able to exit the airplane through the passenger door.

Several employees of the FBO were inside at the time the airplane departed, and were monitoring the air traffic control tower radio frequency. They heard the pilot announce over the radio, "my controls are locked," and they subsequently went outside to observe the airplane.

They observed the airplane above runway 24, near the intersection of runway 33. They estimated the airplane was at an altitude of 150-300 feet. They observed the airplane then begin a "slight right turn" and described the airplane traveling slowly. They lost sight of the airplane behind terrain as it continued to descend. Seconds later they observed smoke in the vicinity of where the airplane was descending.

One of these witnesses from the FBO, who was also a pilot, reported the airplane's attitude as a shallow, "flat," right bank. He stated the airplane was moving slowly with a "minimal sink rate." The witness also stated that although the airplane was turning to the right, he did not observe the airplane's wings "dip" at all. The descent remained relatively "flat," until he lost site of the airplane behind terrain.

Another witness was driving on a road near the airport when he observed the airplane in a level attitude (not climbing or descending) as it passed overhead. As the airplane passed his position, it was "rocking a little left and right" and then began to bank to the right. The witness stated the airplane was moving "relatively slow...just fast enough to maintain its level attitude." Shortly after, the witness observed the airplane strike a wire with its right wing and then "cartwheel" before it impacted the ground near a building.

According to air traffic control information provided by the Federal Aviation Administration (FAA), the pilot was cleared for takeoff from runway 24. About 1 minute later, the pilot reported, "I got a problem…the ah control wheels are locked." The controller subsequently cleared the pilot to "land on any runway." No further transmissions were received from the pilot.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with ratings for airplane single-engine land, multiengine land and instrument airplane. His most recent FAA third class medical certificate was issued on December 3, 2008. At that time, he reported 3,000 hours of total flight experience.

According to paperwork provided by the pilot's family, his most recent flight review and instrument proficiency check were completed on May 24, 2009.

The pilot's family also provided a printout of the pilot's computerized logbook, with entries from November 21, 2008 to February 28, 2010. The total flight time accumulated during that period was 110.5 hours, in the accident airplane and another PA46-310P.

The pilot also attended "Factory JetPROP DLX ground school of 8 hours and flight training program of 5 hours, including pre-flight and post flight training, flight training, landings, emergency procedures and night flight."

AIRCRAFT INFORMATION

The accident airplane was a low-wing, single engine airplane, manufactured in 1985. The airplane was powered by a Teledyne Continental TSIO-520 engine. According to the co-owner of the airplane, he and the accident pilot had owned the airplane for about 7 years.

Examination of the airplane and engine logbooks revealed the most recent annual inspection was completed on May 20, 2009 at a recorded time of 855 hours. Examination of the hobbs meter at the accident site revealed a time of 956 hours.

The aircraft logbook (labeled "logbook #2) contained entries from August 6, 1999 to November 25, 2009. Examination of the entries in the aircraft logbook and maintenance paperwork revealed the following entries regarding the flight controls:

March 14, 2007, (annual inspection) "…left hand aileron pulleys aft of pitot tube frozen/forward cable off pulley…removed cable guard, lubed and freed pulleys, installed cables on pulleys, reinstalled guard and ops checked, no defects noted at this time.."

March 31, 2008, (annual inspection) "…pilots and co-pilots yoke shafts require lube…lubed pilots and copilots yoke shafts with LPS #2….pilots forward elevator stop not hitting…adjusted secondary elevator stop in accordance with PA-46-310 AMM."

July 17, 2008: "…found and fixed broken wires at pilot yoke under instrument panel."

September 18, 2009: "…left aileron damaged while towing…removed damaged aileron and installed loaner aileron…"

November 25, 2009: "…removed loaner aileron and installed factory new aileron balanced and painted…" The Hobbs time on this date was recorded as 864.7 hours.

The Hobbs meter at the accident site indicated 956.3 hours.

METEOROLOGICAL INFORMATION

The weather recorded at ROA, at 1309, included wind from 290 degrees at 15 knots, gusting to 23 knots, visibility 10 miles, clear skies, temperature 15 degrees C, dew point -3 degrees C, and altimeter setting 29.83 inches mercury.

WRECKAGE AND IMPACT INFORMATION

The initial impact point (IIP) was a wire which was approximately 50 feet tall, and stretched from two posts. Located under the wire was a small piece of aircraft fuselage skin. Approximately 37 feet from the IIP, three ground scars were observed that corresponded with the dimensions of the three propeller blades from the airplane. One of the propeller blades was buried in the ground scar. The remaining two propeller blades were lying adjacent to the ground scars.

All three propeller blades were separated from their respective hub sockets at the root of the blade. Two of the three blades displayed chordwise scratching on the leading edges of the blades.

The wreckage path was oriented 340 degrees magnetic, and extended approximately 62 feet to the main wreckage. The main wreckage came to rest about 25 feet from the propeller ground scars, upright, at the corner of an industrial building. All components of the airplane were accounted for in the vicinity of the main wreckage, and the airplane was oriented 230 degrees magnetic. The airplane was consumed by a post-crash fire, with the exception of the left aileron.

The right wing was separated at the wing root; however, it remained attached to the fuselage through the flight control cables. The right aileron and flap were present in their respective positions on the wing; however, they were completely consumed by the post-crash fire.

The left wing remained attached to the fuselage at the wing root. The inboard section of the wing was twisted and came to rest at a 90 degree angle to the root, with the leading edge resting on the ground. The outboard section came to rest upright. The left flap remained attached to the wing; however, it was completely consumed by the post-crash fire. The left aileron was separated from the wing and located about 15 feet in front of the main wreckage. The aileron was intact and did not sustain any fire damage.

The tail section was separated from the fuselage; however it remained attached through flight control cables. The left and right horizontal stabilizers sustained severe post-crash fire damage.

The elevator and rudder flight control cables remained attached to the respective flight controls and were traced through the floorboard to their appropriate attachments on the control column and rudder pedals. No obstructions were noted on the flight control cables. The left and right side aileron cables were connected to the control column and traced to the wing roots where they were separated. Examination of the control cable ends revealed overstress separation.

The pilot and co-pilot control yokes were initially unable to be rotated on scene, due to a misalignment of the stop bracket, which was damaged during the impact. Examination of the area around the pilot and co-pilot control columns on the forward side of the firewall, revealed several unsecured cannon plugs in the vicinity of the control yokes. One cannon plug connector half was noted to be dangling across the co-pilot's control column. Additionally, numerous heat damaged wire bundles were lying across the control columns.

The engine was separated from the airplane and came to rest underneath it. After removal from the accident site, a 24-volt battery was directly attached to the starter, and valve train continuity and thumb compression was confirmed on all cylinders. The cylinders were examined with a lighted borescope, and no anomalies were noted. The top spark plugs were removed and they exhibited "normal" wear when compared to the Champion Check-A-Plug comparison card.

The fuel pump was removed from the engine and the drive shaft was free to rotate. Disassembly of the fuel pump revealed no internal damage. Fuel was observed in the fuel pump and fuel manifold. All of the fuel injection nozzles were undamaged, and clear of debris. The oil pump was disassembled and the housing displayed no evidence of hard particle passage.

MEDICAL AND PATHOLOGICAL INFORMATION

The Commonwealth of Virginia, Office of the Chief Medical Examiner, performed an autopsy on the pilot on March 31, 2010.

The FAA Toxicology and Accident Research Laboratory, Oklahoma City, Oklahoma conducted toxicological testing on the pilot. Following were the results of the toxicological testing:

0.125 (ug/mL, ug/g) Hydromorphone detected in Urine
Hydromorphone NOT detected in Blood
Lidocaine detected in Urine
Lidocaine detected in Blood
0.023 (ug/mL, ug/g) Midazolam detected in Blood
Midazolam detected in Urine
Quinine detected in Blood

The lidocaine, midazolam, and hydromorphone were consistent with post-accident treatment administered to the pilot.

TESTS AND RESEARCH

The Engine Data Monitor (EDM) device was sent to the NTSB Vehicle Recorder Laboratory for examination. According to the Specialist's Factual Report, the device was significantly damaged by fire during the accident; however the device's non-volatile memory was able to be extracted.

The data extracted included flights from December 30, 2009 to March 30, 2010. Examination of 13 engine parameters downloaded from the unit, for two flights on the day of the accident, revealed no pre-impact mechanical anomalies.

A section of the pilot's control column was retained and sent to the NTSB Material's Laboratory for examination. According to the Investigator's Factual Report, the section of control column was severely damaged by fire. The bearing which provides for the rotational capability of the control column was found to be difficult to rotate and felt rough when it was rotated. The bearing was removed from the control column and was initially examined externally and then internally by sectioning the bearing's body and races. The external examination revealed that the bearing had become contaminated with debris such as soot, resolidified molten plastic, and other particulates consistent with fire debris. When the bearing was sectioned and examined under the stereo microscope it was determined that the bearing balls were all intact with no obvious deformation. The bearing balls had become oxidized and some had thermal discoloration consistent with a high temperature exposure. The bearing races had an overall appearance of high temperature exposure exhibited by thermal discoloration of the metal. There was no evidence to suggest that the bearing was not functioning properly prior to the high temperature exposure.

ADDITIONAL INFORMATION

Fueling information

The airplane was last fueled on the morning of the accident, with 25 gallons of 100LL aviation fuel in each fuel tank, prior to departing CHO.

Previous accident

The accident airplane was involved in a previous accident on November 11, 2008 (NTSB Accident ID: ERA09CA065). According to the co-owner of the airplane, during takeoff he was “correcting to the right, when the airplane departed the runway and ran into a ditch.” The co-owner reported no mechanical anomalies with the airplane and there was “nothing wrong with the flight controls.” The NTSB determined the probable cause of the accident was, “the pilot’s failure to maintain directional control during takeoff. Contributing to the accident were gusting crosswinds.”

Industry Flight Control Anomaly Reports

A search of the FAA Service Difficulty Report (SDR) database revealed no relevant reports of

flight control anomalies with the PA-46-310P.

Additionally, a query of the airplane manufacturer revealed only one type of flight control anomaly report for the PA-46-310 series. The report described a 2006 model PA 46-350P, which experienced aileron stiffness and the autopilot failed to disengage in-flight. Examination of the subject airplane revealed the left aileron sector was frozen, due to corrosion in the needle bearing.

As a result of the submitted field report, Piper issued a Maintenance Alert to PA-46 owners and operators, which clarified the lubrication requirements of the aileron sector.

The aileron sectors in the accident airplane were examined for evidence of this anomaly, but none was observed.

History of Flight

Initial climb	Flight control sys malf/fail (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	**Age:**	59,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	December 3, 2008
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 3000 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N6913Z
Model/Series:	PA46 310P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	46-8508073
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 20, 2009 Annual	**Certified Max Gross Wt.:**	4340 lbs
Time Since Last Inspection:	101 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	956 Hrs at time of accident	**Engine Manufacturer:**	CONTINENTAL
ELT:	C91 installed, not activated	**Engine Model/Series:**	TSIO520
Registered Owner:		**Rated Power:**	
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ROA,1175 ft msl	**Distance from Accident Site:**	
Observation Time:	13:09 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.82 inches Hg	**Temperature/Dew Point:**	15°C / -3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Roanoke, VA (ROA)	**Type of Flight Plan Filed:**	None
Destination:	Charlottesville, VA (CHO)	**Type of Clearance:**	
Departure Time:	13:05 Local	**Type of Airspace:**	

Airport Information

Airport:	Roanoke Regional/Woodrum Field ROA	**Runway Surface Type:**	Asphalt
Airport Elevation:		**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	6800 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	37.329723,-79.98722

Administrative Information

Investigator In Charge (IIC):	Andrews, Jill
Additional Participating Persons:	Morley English; FAA/FSDO; Richmond, VA Jason Lukasik; Teledyne Continental Motors; Mobile, AL Ron Maynard; Piper Aircraft Company; Vero Beach, FL
Original Publish Date:	June 13, 2011
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=75611

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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.