Aviation Investigation Final Report

Location:	Waterloo, Iowa	**Accident Number:**	CEN11LA048
Date & Time:	October 29, 2010, 15:15 Local	**Registration:**	N8370L
Aircraft:	Piper PA-32R-301T	**Aircraft Damage:**	Substantial
Defining Event:	Flight control sys malf/fail	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During takeoff, the airplane did not respond to stabilator control inputs, and the pilot aborted the takeoff. During the aborted takeoff, the airplane went off the end of the runway and through a ditch, striking an embankment. A postaccident examination revealed that a stabilator control cable had failed at a turnbuckle fitting as a result of stress corrosion cracking, which resulted in a lack of up-stabilator control. The airplane was within the maintenance inspection requirements at the time of the accident, with the most recent annual inspection being completed about 1 year before the accident. The airplane service manual included a special control cable fitting inspection for airplanes in service 15 years or more. According to the service manual, any evidence of corrosion or cracking was cause for replacement.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The separation of a stabilator control cable turnbuckle due to stress corrosion cracking, which resulted in a loss of airplane control during takeoff.

Findings

Aircraft	Elevator control system - Fatigue/wear/corrosion
Aircraft	Elevator control system - Failure
Aircraft	(general) - Attain/maintain not possible

Factual Information

History of Flight

Takeoff	Flight control sys malf/fail (Defining event)
Takeoff-rejected takeoff	Collision with terr/obj (non-CFIT)

On October 29, 2010, about 1515 Central Daylight time, a Piper PA-32R-301T, N8370L, sustained substantial damage when it overran the end of the runway during an aborted takeoff. The airplane traveled through a ditch and struck a road embankment. The private pilot and his passenger were not injured. The airplane was owned and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. The airplane was operated in visual meteorological conditions without a flight plan. The flight was originating at the time of the accident and the intended destination was the Olwein Municipal Airport, Olwein, Iowa.

The pilot reported that he performed a pre-flight examination of the airplane prior to the flight. He said that during the takeoff roll, he applied back pressure to the yoke but the airplane did not rotate. He reduced the throttle and attempted to stop the airplane. During the attempted aborted takeoff, the airplane traveled off the end of the runway and struck a road embankment.

A postaccident examination of the airplane revealed that the "up" stabilator control cable had fractured at the threaded portion of the turnbuckle. National Transportation Safety Board Materials Laboratory examination of that portion of the cable revealed that the turnbuckle fractured in the shank region about 0.15 inch from the wrench flats. Areas of the turnbuckle including the shank were covered with salt crystals and the shank exhibited areas of corrosion. Examination of the fractured region with a 5X to 50X binocular zoom stereomicroscope, revealed that the fracture was highly branched consistent with stress corrosion cracking. The turnbuckle fitting was constructed using SAE-AISI 303 SE stainless steel.

The most recent annual inspection had been completed on November 1, 2009. The airplane had accumulated about 1 hour of flight time since the previous annual inspection.

The airplane manufacturer had previously issued a maintenance alert service letter (dated March 31, 2003). The service letter noted that corrosion may be found on control cable attachment fittings; especially in aircraft which have been in service for 15 years or more. The service letter recommended inspection of cable terminals, turnbuckles, and fittings for corrosion or cracking within the next 100 hours time in service, or to coincide with the next scheduled maintenance event. For airplanes in service for 15 years or more, the letter suggested the use of a 10X magnifier. Any evidence of corrosion or cracking is cause for replacement according to the service letter. The current revision of the airplane service manual (dated July 15, 2006) included the special control cable fitting inspection for airplanes in

service 15 years or more, as outlined in the prior service letter.

The FAA issued Special Airworthiness Information Bulletins (SAIB) related to corrosion and subsequent failure of control cables. The first, released in November 2001, advised operators of corrosion and cracking being experienced with control cable terminals fabricated from 303SE stainless steel. The bulletin recommended inspection of flight control cables and replacement of any cables showing signs of corrosion or cracking. A revision to that SAIB was released in January 2004, to include the use a magnifying glass for the corrosion inspections.

An additional FAA SAIB, dated October 4, 2010, advised operators of specific failures related to the horizontal stabilator turnbuckle/control cable assembly on Piper airplanes. This SAIB recommended that operators incorporate the previously issued Piper service letter into their inspection procedures. It also noted that any evidence of corrosion or cracking is cause for replacement of the cable assembly.

The NTSB issued safety recommendations A-01-6 through A-01-8 in April 2001. The recommendations noted the previous failure of control cable turnbuckles and recommended issuance of an airworthiness directive to require inspections of affected aircraft. In response, the FAA issued the November 2001 SAIB recommending the inspections in all aircraft with 303SE stainless steel turnbuckles installed. The recommendations were subsequently closed noting acceptable alternate action.

FAA regulations (91.409) require that an annual inspection be completed within the preceding 12 calendar months. Accordingly, the annual inspection completed in November 2009 was valid through the last day of November 2010.

Pilot Information

Certificate:	Commercial	**Age:**	85,Male
Airplane Rating(s):	Single-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:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 26, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	9000 hours (Total, all aircraft), 8800 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N8370L
Model/Series:	PA-32R-301T	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32R-8129060
Landing Gear Type:	Tricycle	**Seats:**	7
Date/Type of Last Inspection:	November 1, 2009 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	1 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	TIO-540-S1AD
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ALO,873 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	14:54 Local	**Direction from Accident Site:**	348°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	13°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Waterloo, IA	**Type of Flight Plan Filed:**	None
Destination:	Olwein, IA (OLZ)	**Type of Clearance:**	None
Departure Time:	15:15 Local	**Type of Airspace:**	

Airport Information

Airport:	Private Airstrip	**Runway Surface Type:**	Grass/turf
Airport Elevation:		**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	2000 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	42.549751,-92.289855(est)

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	Dan Michaelson; FAA-Des Moines FSDO; Des Moines, IA
Original Publish Date:	February 23, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=77707