



# Aviation Investigation Final Report

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<b>Location:</b>	Spokane, Washington	<b>Accident Number:</b>	WPR15FA158
<b>Date &amp; Time:</b>	May 7, 2015, 16:04 Local	<b>Registration:</b>	N962DA
<b>Aircraft:</b>	Piper PA 46 350P	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Flight test		

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## Analysis

The commercial pilot was departing on a local post-maintenance test flight in the single-engine airplane; Four aileron cables had been replaced during the maintenance. Shortly after takeoff, the airplane began to roll right. As the climb progressed, the roll became more pronounced, and the airplane entered a spiraling dive. The pilot was able to maintain partial control after losing about 700 ft of altitude; he guided the airplane away from the airport and then gradually back for a landing approach. During this period, he reported to air traffic control personnel that the airplane had a "heavy right aileron." As the airplane passed over the runway threshold, it rolled right and crashed into a river adjacent to the runway.

Postaccident examination of the airplane revealed that the aileron balance and drive cables in the right wing had been misrouted and interchanged at the wing root. Under this condition, both the left and right ailerons would have deflected in the same direction rather than differentially. Therefore, once airborne, the pilot was effectively operating with minimal and most likely unpredictable lateral control, which would have been exacerbated by wind gusts and propeller torque and airflow effects.

The sections of the two interchanged cables within the wing were about equal lengths, used the same style and size of termination swages, and were installed into two same-shape and -size receptacles in the aileron sector wheel. In combination, this design most likely permitted the inadvertent interchange of the cables, without any obvious visual cues to maintenance personnel to suggest a misrouting. The maintenance manual contained specific and bold warnings concerning the potential for cable reversal.

Although the misrouting error should have been obvious during the required post-maintenance aileron rigging or function checks, the error was not detected by the installing mechanic. Although the installing mechanic reported that he had another mechanic verify the aileron functionality, that other mechanic denied that he was asked or that he conducted such a check. The mechanic who performed the work also signed off on the inspection; this is allowed per Federal regulations, which do not require an independent inspection by someone who did not perform the maintenance.

The pilot did perform a preflight check; the preflight checklist included confirmation of "proper operation" of the primary flight controls from within the cockpit. Although the low-wing airplane did not easily allow for a differential check of the ailerons during the walk-around, both ailerons could be seen from the pilot's seat; therefore, the pilot should have been able to recognize that the ailerons were not operating differentially.

The accident occurred at the end of the business day, and the airplane had been undergoing maintenance for a longer-than-anticipated period. The airplane's owner was flying in from another part of the country via a commercial airline to pick up the airplane the following morning. The accident pilot, who was an engineer at the company and typically flew post-maintenance test flights, was assisting with returning the airplane to service. He also had an appointment with an FAA medical examiner the next morning (Friday), and he typically did not work on Fridays. It is likely that the mechanic and pilot felt some pressure to be finished that day so the owner could depart in the morning and the pilot could attend his appointment.

## **Probable Cause and Findings**

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

The mechanic's incorrect installation of two aileron cables and the subsequent inadequate functional checks of the aileron system before flight by both the mechanic and the pilot, which prevented proper roll control from the cockpit, resulting in the pilot's subsequent loss of control during flight. Contributing to the accident was the mechanic's and the pilot's self-induced pressure to complete the work that day.

## Findings

<b>Personnel issues</b>	Repair - Maintenance personnel
<b>Aircraft</b>	Lateral/bank control - Attain/maintain not possible
<b>Personnel issues</b>	Aircraft control - Pilot
<b>Personnel issues</b>	Post maintenance inspection - Maintenance personnel
<b>Personnel issues</b>	Preflight inspection - Pilot
<b>Environmental issues</b>	Time/schedule pressure - Effect on personnel
<b>Organizational issues</b>	Oversight of maintenance - Maintenance provider

## Factual Information

### History of Flight

<b>Prior to flight</b>	Aircraft maintenance event
<b>Prior to flight</b>	Sys/Comp malf/fail (non-power)
<b>Takeoff</b>	Loss of control in flight (Defining event)
<b>Initial climb</b>	Attempted remediation/recovery
<b>Landing</b>	Loss of control in flight
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

### HISTORY OF FLIGHT

On May 7, 2015, at 1604 Pacific daylight time, a Piper PA 46-350P, N962DA, struck the Spokane River following an attempted landing at Felts Field Airport, Spokane, Washington. The airplane was owned by Flying Colors Aviation LLC, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The commercial pilot and pilot rated passenger sustained fatal injuries and the airplane was destroyed during the impact sequence. The local flight departed Felts Field at 1553. Visual meteorological conditions prevailed and no flight plan had been filed.

The airplane had just undergone an annual inspection at the facilities of Rocket Engineering, and the accident flight was to be a post-maintenance test flight. Both the pilot and passenger were employees of Rocket Engineering, and the planned flight time was about 40 minutes.

Audio and radar data provided by the Federal Aviation Administration (FAA) captured the entire flight sequence. The accident was also observed by multiple witnesses at the airport, along with air traffic control personnel in the control tower.

The pilot specifically requested to depart from the longer Runway 4L, and 11 minutes after making the initial call, the airplane began the takeoff roll. Radar data indicated that almost immediately after takeoff it began a climbing turn, 10 degrees to the right. After flying on that heading for about 1.5 miles, the airplane began a more aggressive turn to the right, reaching 1,000 ft above ground level (agl) while on a southbound heading. The sound of labored breathing was then transmitted over the traffic advisory frequency, and the tower controller asked if everything was ok, to which the pilot responded, "That's negative". The airplane's turn radius then tightened to about 700 ft, and within about 45 seconds it completed almost two spiraling turns, while descending about 700 ft. Control tower personnel stated that during this period the airplane was banking about 90 degrees to the right and descending, and they assumed that it was about to crash. A short time later the bank angle began to reduce, and the airplane appeared to recover.

The airplane then began a meandering climb to the east, and about 2 1/2 minutes later the pilot reported, "We are trying to get under control here, be back with you".

The airplane eventually reached the town of Newman Lake, about 11 miles east of the airport, having climbed to about 5,600 ft mean sea level (4,000 ft agl), and the pilot reported, "things seem to be stabilizing", and when asked his intentions by the tower controller he replied, "We are going to stay out here for a little while and play with things a little bit, and see if we can get back."

The airplane began a gradual left turn, and the pilot requested and was approved for a straight-in landing for runway 22R. The airplane became aligned with the runway about 7 miles east of the airport, and a short time later the controller asked the pilot the nature of the emergency, to which he responded, "We have a control emergency there, a hard right aileron". The flight progressed, and a few minutes later the pilot reported that the airplane was on a 3 mile final. The airplane remained closely aligned with the runway centerline throughout the remaining descent, and control tower personnel stated that when the airplane neared the runway threshold it appeared to be flying in a 20-degree, right-wing-low, attitude.

A tower controller reported that as the still-airborne airplane passed taxiway D, the engine sound changed, as if it was attempting to perform a go-around, and the airplane began a sharp roll to the right. It subsequently collided with the river just north of the airport.

#### PERSONNEL INFORMATION

The pilot-in-command, who was seated in the left front seat, held a commercial pilot certificate with ratings for airplane single engine land, multiengine land, rotorcraft-helicopter, and instrument airplane and helicopter, along with a flight instructor certificate for airplane single engine land. He also held a repairman, experimental builder certificate, and was rated in the Bell 212 helicopter, and Lockheed L-382 (C-130 Hercules) airplane.

His most recent FAA medical certificate was second class, and dated May 17, 2013, with the limitation that he must have available glasses for near vision. He was 64 years old. Representatives from Rocket Engineering stated the pilot had an appointment for his FAA medical examination at 0800 on the morning following the accident (Friday), and therefore chose to do the flight test that evening instead of the following day. The pilot's wife also stated that he typically did not work on Fridays, but would do so if work schedule required it.

The pilot had accumulated about 5,800 hours of total pilot-in-command flight time, 950 of which were in the accident make and model. He had flown about 20 hours in the accident make and model during the 30 day period leading up to the accident.

He was a retired Air Force Lieutenant Colonel, with 20 years of active service in the capacity of a test pilot, instructor, and search and rescue pilot.

The pilot was employed as an Engineer for Rocket Engineering, and was the primary liaison with the FAA's Flight Standards and Certification divisions. He also typically performed post-conversion, post-maintenance, and customer familiarization flights for the company.

The pilot-rated-passenger held a private pilot certificate with an airplane single engine land rating, issued in 2010. He had accumulated a total of about 122 hour's pilot-in-command flight experience.

He was employed at Rocket Engineering as a customer service and sales representative.

## AIRCRAFT INFORMATION

The six-seat, low-wing, pressurized airplane was originally manufactured by Piper in 1996 as a PA-46-350P. At that time it was equipped with a Lycoming TIO-540-AE2A, 350 horsepower turbocharged piston engine. In 2007 it was modified by Rocket Engineering under the JetProp LLC supplemental type certificate ST00541SE, which included the installation of a 560 horsepower Pratt and Whitney PT6A-35 turboprop engine.

The airplane was brought to the facilities of Rocket Engineering on April 17 for an annual inspection. During the period leading up to the accident, routine maintenance was performed, along with the replacement of the four aileron cables in the wings, and an aft elevator cable. The mechanic who performed the work stated that the aileron and elevator cables were replaced during the 3 day period leading up to the accident.

The airplane's owner arranged for another maintenance facility on the field to perform an avionics upgrade concurrent with the inspection, while the airplane was still at the Rocket Engineering facilities. The president of the company that performed the avionics upgrade informed the owner that it would take about 40 to 45 hours to complete, over the course of about 18 days. The upgrade included the addition of several new avionics units, and according to the mechanic who performed the work, most was performed in the rear avionics bay, and required the removal of the aft headliner, along with the middle and rear seats on the right side in order to accommodate new electrical cable runs. The avionics shop president stated that as the upgrade progressed, the owner made multiple requests to add additional items to the work scope, and due to time constraints, not all of his requests could be accommodated.

The airplane's owner reported that he had made arrangements to pick up the airplane on May 5th, however as the work progressed, he was informed that the airplane would not be ready in time, and the date was pushed back to May 7 (accident day) and then May 8. He had made plans to travel up from Los Angeles the afternoon of May 7, and was enroute via a commercial airline when the accident happened.

## METEOROLOGICAL INFORMATION

The weather conditions reported at Spokane at 1553 were winds from 020 degrees at 7 knots, 10 miles visibility with few clouds at 7,000 ft. The temperature was 71 degrees F, the dew point was 26 degrees F, and the altimeter pressure was 29.93 inHg.

## WRECKAGE AND IMPACT INFORMATION

The river was about 25 ft deep at the accident site, and all major airframe components sank within a few minutes of impact. The airplane was recovered by a diving team from the Spokane County Sheriff's department over a 2 day period during the week following the accident.

The fuselage sustained crush damage and fragmentation from the firewall through to the right-side emergency exit door. The engine remained attached to the firewall, and the propeller hub with all four blades remained attached to the engine gearbox. All blades were bent about 90 degrees aft, 8 to 12 inches from their roots. Both wings had separated from the airframe at their roots, with the right wing separating into two sections outboard of the main landing gear. The horizontal stabilizer had detached from the tailcone.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Spokane County Office of the Medical Examiner performed an autopsy on both pilots. The deaths were both attributed to the effects of multiple blunt force injuries.

Toxicological tests on specimens recovered from both occupants were performed by the FAA Civil Aerospace Medical Institute (CAMI). Analysis revealed negative findings for ingested ethanol, with the following positive drug findings:

Pilot:

- >> 10 (ug/ml, ug/g) Acetaminophen detected in Urine
- >> Ranitidine detected in Urine
- >> Ranitidine detected in Blood (Cavity)

Acetaminophen is a common-over-the-counter analgesic/antipyretic, and Ranitidine is an anti-histamine used in the treatment of gastric acid secretion. According to CAMI, neither of the drugs detected would have been considered hazardous to flight safety.

Pilot Rated Passenger:

- >> Dextromethorphan detected in Urine
- >> Dextromethorphan NOT detected in Blood (Cavity)
- >> Dextrophan detected in Urine
- >> Dextrophan NOT detected in Blood (Cavity)
- >> Famotidine detected in Urine
- >> Famotidine detected in Blood (Cavity)
- >> Salicylate detected in Urine

Dextromethorphan, is a cough suppressant, commonly used in over the counter preparations. It is metabolized into dextrophan, which also has cough suppressant property.

Famotidine (INN) is a histamine H<sub>2</sub>-receptor antagonist that inhibits stomach acid production, it is commonly marketed under the trade names Pepcidine and Pepcid.

Salicylate is an over the counter analgesic used in the treatment of mild pain.

## TESTS AND RESEARCH

### Flight Control System Design

The airplane's primary flight controls are conventional, and operated by dual control wheels and rudder pedals through a closed circuit cable system. The ailerons and rudder are interconnected through a spring system located under the main cabin.

An aileron is mounted on the outboard trailing-edge section of each wing via a series of hinges. Movement of each aileron is controlled through a yoke and pin assembly which interfaces with a sector wheel mounted in each wing, just forward of each aileron. Each sector wheel is connected to, and driven

by, one aileron drive cable and one balance cable. In each wing, both the balance and drive cables are terminated with identical ball swage fittings, and each swage fitting inserts into one of two identically-sized receptacles in the sector wheel. Both cables are approximately the same length outboard of the pressure vessel seals, which are located about 1 inch apart vertically at the wing root.

In each wing, both cables are routed to the fuselage along the wing trailing edge, and pass through their respective pressure vessel seals in the wing root. Inboard of the pressure vessel seals, the left and right balance cables connect to one another after passing through a center pulley, while the drive cables are routed forward via pulleys to the control wheel assembly in the cockpit. The balance and drive cables are aligned vertically at the pressure vessel seals, and diverge about 3 inches laterally at their respective pulley positions.

The sector wheel design is unique within the Piper fleet to the PA-46.

### Control System Examination

The airplane was subject to a series of Piper Aircraft Service Bulletins and Service Letters related to the aileron flight controls.

The aileron control system was examined and found to be in compliance with Piper Service Bulletins 921 and 1190B, which require the installation of cable guards and doublers, respectively"

Piper Service Letter 1131 described cleaning and lubrication procedures for the self-aligning and needle bearings of the outboard aileron sector wheel. Both bearings for the left and right sector wheels appeared intact, and moved freely without any indication of binding.

The outboard section of the right wing had separated, but retained its aileron. A cable remained attached to the lower balance cable attach point of the aileron sector wheel. However, a tag on the cable identified it as part number "5038", which according to Piper maintenance instructions, was the aileron drive cable. The cable was routed over the outboard balance cable pulley, and then through the balance cable pass-through holes along the trailing edge. That cable continued after passing into the fuselage at the balance cable pressure vessel seal. Inboard of the seal, the cable was found to be routed around the right side drive pulley, and forward to the aileron quadrant assembly in the cockpit. Therefore, while the cable tag identified it as a drive cable, and it was properly routed and connected as a drive cable inside the pressure vessel, once it reached the pressure vessel seals, it was incorrectly routed and followed the balance cable path through the wings.

No cable was found attached to the drive section of the right aileron sector wheel. Examination of the remaining cable sections found in the wing revealed that a cable marked with the part number "5036" (right hand aileron balance cable) was routed through the drive cable pressure vessel seal. Inboard of the seal, the cable was connected to the left wing balance cable.

With the as-discovered cable routing, movement of the control wheel would result in the right aileron deflecting in the same direction as the left aileron, rather than in the opposite (per design) direction. No post-accident testing in this configuration was performed, so the extent of the deflection could not be determined.



The rudder trim wheel indicator in the cabin was found in the full left position. Examination of the remaining flight controls did not reveal any anomalies which would have precluded normal operation. A full examination report is contained in the public docket.

#### Maintenance Procedures

The mechanic who performed and signed off on the annual inspection, along with the subsequent maintenance including the control cable replacement, held an FAA airframe and powerplant certificate (A&P), with inspection authorization (IA). He had been an A&P mechanic for 22 years, and attained his IA rating 17 years prior. He reported replacing aileron cables in the PA-46 series about five prior times in his career.

He stated that he worked exclusively on the accident airplane during the weeks leading up to the accident, and that he replaced the left and right aileron balance cables, along with the two aft aileron drive cables on May 5, 6 and 7. He reported replacing the cables in accordance with the procedures outlined in the maintenance manual, and that he removed and replaced each cable one-at-a-time to prevent inadvertent misrouting. Following completion, he checked aileron operation from both inside and outside the airplane, confirming smooth and full deflection. As part of the test procedures, he checked the neutral position on both ailerons, and then he used a protractor for angular aileron deflection measurements.

The installing mechanic reported that once the work was completed, he asked another mechanic to check his work, asking him specifically to confirm the operation of the ailerons. In a subsequent interview, the other mechanic stated that he assisted with reattaching the ailerons, along with checking security and installation of safety wire, but he was never asked to, nor did he, confirm the correct operation of the ailerons.

The installing mechanic stated that he was called multiple times by the airplanes owner for update checks during the weeks leading up to the accident. Each time additional items were discovered which needed to be repaired, further pushing back the completion date. He eventually referred the owner to the sales representative (pilot rated passenger).

#### Maintenance Manual

The Piper Maintenance Manual utilized by the mechanic, and applicable to the accident aircraft, was examined at the facilities of Rocket Engineering. The Aileron Control Cables, Rigging and Adjustment section, dated December 23, 1998 included the following warning:

#### CAUTION:

VERIFY FREE AND CORRECT MOVEMENT OF AILERONS. WHILE IT WOULD SEEM SELF-EVIDENT, FIELD EXPERIENCE HAS SHOWN THAT THIS CHECK IS FREQUENTLY MISINTERPRETED OR NOT PERFORMED AT ALL. ACCORDINGLY, UPON COMPLETION OF AILERON RIGGING AND ADJUSTMENT, VERIFY THAT THE RIGHT AILERON MOVES UP AND THE LEFT AILERON MOVES DOWN WHEN THE CONTROL WHEEL IS TURNED RIGHT, AND THAT THE LEFT AILERON MOVES UP AND THE RIGHT AILERON MOVES DOWN WHEN THE CONTROL WHEEL IS TURNED LEFT.

## Pilot Operating Handbook

The preflight checklist outlined in the normal procedures section of the pilot's operating handbook, includes a check to confirm "proper operation" of the primary flight controls from within the cockpit, along with a check of the ailerons and hinges during the walk-around. According to the mechanic, the pilot performed the preflight inspection while the mechanic was still reinstalling the seats and readying the cabin.

The location of the pilot's seat within the cockpit allows for a clear view of both ailerons through the cabin windows.

### ADDITIONAL INFORMATION

At the time of the accident, Rocket Engineering had a set of inspection criteria in place for aircraft that had undergone heavy modifications such as the application of the JetProp STC. However, no formal procedures were established requiring that the work performed by a mechanic following an annual inspection be independently inspected. Furthermore, although 14 Code of Federal Regulations Part 121 and 135 (air carrier, commuter, or on-demand operations) state, in part that, "No person may perform a required inspection if that person performed the item of work required to be inspected," there is no equivalent requirement for aircraft operated under Part 91 regulations.

No PA-46 accidents attributed to the reversal of the aileron cables were found in the NTSB accident database, nor did a search of FAA service difficulty reports (SDR's) reveal any events.

### Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	64, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	May 17, 2013
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	September 1, 2013
<b>Flight Time:</b>	(Estimated) 5800 hours (Total, all aircraft), 950 hours (Total, this make and model), 5800 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

## Pilot-rated passenger Information

<b>Certificate:</b>	Private	<b>Age:</b>	60, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	May 1, 2014
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	May 22, 2014
<b>Flight Time:</b>	(Estimated) 122 hours (Total, all aircraft), 0 hours (Total, this make and model), 122 hours (Pilot In Command, all aircraft), 1 hours (Last 90 days, all aircraft), 1 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N962DA
<b>Model/Series:</b>	PA 46 350P	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1996	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	46-36031
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	
<b>Date/Type of Last Inspection:</b>	May 7, 2015 Annual	<b>Certified Max Gross Wt.:</b>	4299 lbs
<b>Time Since Last Inspection:</b>	0 Hrs	<b>Engines:</b>	1 Turbo prop
<b>Airframe Total Time:</b>	1170.6 Hrs at time of accident	<b>Engine Manufacturer:</b>	Pratt and Whitney
<b>ELT:</b>	C126 installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	PT6-35A
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	560 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KSFF, 1968 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	22:53 Local	<b>Direction from Accident Site:</b>	125°
<b>Lowest Cloud Condition:</b>	Few / 7000 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	20°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.93 inches Hg	<b>Temperature/Dew Point:</b>	22°C / -3°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Spokane, WA (SFF)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Spokane, WA (SFF)	<b>Type of Clearance:</b>	VFR
<b>Departure Time:</b>	15:53 Local	<b>Type of Airspace:</b>	Class D

## Airport Information

<b>Airport:</b>	FELTS FIELD SFF	<b>Runway Surface Type:</b>	Concrete
<b>Airport Elevation:</b>	1957 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	22R	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	4499 ft / 150 ft	<b>VFR Approach/Landing:</b>	Forced landing; Straight-in

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	1 Fatal	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	47.685832,-117.326942

## Preventing Similar Accidents

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### Prevent Misrigging Mistakes (SA-042)

#### The Problem

Incorrect rigging of flight control and trim systems has led to in-flight emergencies, accidents, and even deaths. Maintenance personnel who serviced or checked the systems did not recognize that the control or trim surfaces were moving in the wrong direction. Pilots who flew the airplanes did not notice the control anomalies during their preflight checks. Anyone can make mistakes. In some cases, the mechanics who performed the work incorrectly were highly experienced.

#### What can you do?

- Become familiar with the normal directional movement of the controls and surfaces before disassembling the systems. It is easier to recognize “abnormal” if you are very familiar with what “normal” looks like.
- Carefully follow manufacturers’ instructions to ensure that the work is completed as specified. Always refer to up-to-date instructions and manuals—including airworthiness directives, maintenance alerts, special airworthiness information bulletins, and unapproved parts notifications—when performing a task.
- Be aware that some maintenance information, especially for older airplanes, may be nonspecific. Ask questions of another qualified person if something is unfamiliar.
- Remember that well-meaning, motivated, experienced technicians can make mistakes: fatigue, distraction, stress, complacency, and pressure to get the job done are some common factors that can lead to human errors. Learn about and adhere to sound risk management practices to help prevent common errors.
- Ensure that the aircraft owner or pilot is thoroughly briefed about the work that has been performed. This may prompt them to thoroughly check the system during preflight or help them successfully troubleshoot if an in-flight problem occurs.

See <https://www.nts.gov/Advocacy/safety-alerts/Documents/SA-042.pdf> for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Simpson, Elliott
<b>Additional Participating Persons:</b>	Colby Barron; Federal Aviation Administration FSDO; Spokane, WA Mike McClure; Piper Aircraft; Vero Beach, FL
<b>Original Publish Date:</b>	September 22, 2016
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=91148">https://data.ntsb.gov/Docket?ProjectID=91148</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).