



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Burns, Oregon	<b>Accident Number:</b>	WPR10FA397
<b>Date &amp; Time:</b>	August 11, 2010, 08:55 Local	<b>Registration:</b>	N500FV
<b>Aircraft:</b>	Aero Commander 500-B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	VFR encounter with IMC	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The evening prior to the accident, the pilot acquired a computer generated text weather briefing. On the day of the accident, the pilot acquired another computer generated text weather briefing, and then contacted the Flight Service Station (FSS) for an interactive telephonic weather briefing. The information provided in all three briefings indicated that a flight on a direct route between the pilot's point of departure and his planned destination would take him through an area of forecast rain showers, thunderstorms, and cloud tops significantly higher than his intended en route altitude. Although the FSS briefer recommended an alternate route, for which he provided weather information, after departure the pilot flew directly toward his destination airport. While en route, the pilot, who was not instrument rated, encountered instrument meteorological conditions, within which there was an 80 percent probability of icing. After entering the area of instrument meteorological conditions, the airplane was seen exiting the bottom of an overcast cloud layer with a significant portion of its left wing missing. It then made a high velocity steep descent into the terrain. A postaccident inspection of the airplane's structure did not find any evidence of an anomaly that would contribute to the separation of the wing structure, and it is most likely that the wing section separated as a result of the airplane exceeding its structural limitations after the pilot lost control in the instrument meteorological conditions.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The non-instrument rated pilot's improper decision to continue flight into an area of known instrument meteorological conditions and his failure to maintain control of the airplane after entering those conditions.

## Findings

<b>Aircraft</b>	Airspeed - Capability exceeded
<b>Aircraft</b>	(general) - Capability exceeded
<b>Personnel issues</b>	Decision making/judgment - Pilot
<b>Environmental issues</b>	Clouds - Contributed to outcome
<b>Environmental issues</b>	Conducive to structural icing - Effect on equipment
<b>Personnel issues</b>	Aircraft control - Pilot
<b>Aircraft</b>	(general) - Not attained/maintained

## Factual Information

### HISTORY OF FLIGHT

On August 11, 2010, about 0855 pacific daylight time, a Rockwell Aero Commander 500-B, N500FV, impacted the terrain about 80 miles south of Burns, Oregon. The private pilot and his passenger were killed, and the airplane sustained substantial damage. The 14 Code of Federal Regulations Part 91 visual flight rules (VFR) cross-country flight, which departed Redding Municipal Airport, Redding California, about 0725, was en route to Butte, Montana. The accident took place in an area where visual meteorological conditions were present from the surface up to about 4,000 feet above the terrain, but where overcast clouds, occasional thunderstorms, lightning, and rain were reported by individuals on the ground both before and after the accident. No flight plan had been filed, and there was no report of a transmission from an Emergency Locator Transmitter (ELT).

At 2014 on the day before the accident, the pilot logged onto the Direct User Access Terminal System (DUATS) to obtain a computer generated text weather briefing. He logged onto DUATS again at 0625 on the morning of the accident for another text weather briefing. Around that same time, he had Redding Jet Center top off the airplane's fuel system with 100LL (low lead) aviation fuel, and also had the airplane's supplemental oxygen system filled. At 0701 he contacted Lockheed Martin Flight Service for a telephonic weather briefing, which lasted about ten minutes. He then departed Redding for Butte just prior to the time the control tower began operation at 0730. At 0753 he contacted Seattle Air Route Traffic Control Center (ARTCC), and advised the controller that he would like "flight following," that he was 36 miles south of Klamath VOR at 11,500 feet, and that he was en route to Bert Mooney Airport (Butte, Montana). The controller assigned the pilot a transponder code, and soon thereafter provided the Klamath Falls altimeter setting and said that he had radar contact 35 miles south of Klamath Falls. Approximately 32 minutes later the controller gave the pilot an updated altimeter setting, and about 2 minutes after that, the pilot advised the controller that he was climbing to 13,500 feet in order to "...get over some clouds." About 13 minutes later, the controller gave the pilot another updated altimeter setting, and after acknowledging the setting, the pilot stated that he was going to "...go up to 15,500 feet." The pilot did not give a reason for that climb.

At 0843 the controller contacted the pilot and advised him that Salt Lake Center (the next ARTCC that the flight would be handed off to along the route) was not picking the airplane up on radar, and he therefore was going to have to terminate flight following for a little while. The controller then terminated flight following, advised the pilot to set his transponder to the 1200 VFR code, and told him to contact Salt Lake Center in about 30 miles on frequency 128.05. He advised the pilot that Salt Lake Center may be able to pick him up on radar by then. The controller then advised the pilot that his radar screen indicated that there was some moderate to heavy precipitation in the pilot's 12 o'clock position about 50 miles ahead. The controller then stated that the precipitation was more like 60 miles ahead, and that it was a "... weather band that extends about 60 miles." The pilot acknowledged the controllers transmission, which was the last known transmission from the pilot prior to the accident. From the time the pilot began flight following until the airplane was no longer seen on radar the airplane was on what

appeared to be a direct route from Redding to Butte.

Between 0845 and 0850 individuals camping or working around the South Steens Campground, which is located about one mile east of where the airplane impacted the terrain, began to hear the sound of the airplane's engines. The initial sound was described as a normal dron, but soon thereafter the sounds began to change. One witness, who was a pilot with 3,500 hours of flying time, described the sounds as indicating, "... full power settings, frequent attitude changes, and high angles of attack, typical of what you would hear during an aerobatic demonstration at an airshow." During this period of time, which he estimated as lasting between 30 to 40 seconds, the airplane was higher than the bottom of the overcast cloud layer, and therefore could not be seen.

The airplane then broke out of the bottom of the clouds, and was seen doing between two and four rolls, which were described by the witnesses as either barrel rolls or snap rolls. It then descended nearly straight down into the ground, while still continuing to roll. According to the pilot-rated witness, it appeared that during the initial rolling sequence and during the steep descent, an outboard portion of one of the wings was missing. The airplane hit the ground at what the witnesses described as a very high rate of speed, and then somewhere between 20 and 40 seconds later one or two pieces of the airplane's structure came floating down out of the sky.

#### PERSONNEL INFORMATION

The pilot was a 58 year old male, who possessed an FAA Private Pilot's Certificate, with both single-engine and multi-engine land ratings. He was not instrument rated. His last airman's medical, a Third Class, was issued on July 8, 2010, with the limitation, "Must wear corrective lenses." A review of his historical airman's medical applications revealed no current or previous diagnosis of the conditions listed in section 18 (Medical History) of the application. The pilot stated on the medical application that his total civilian pilot time was 1,350 hours, and that he had flown 25 hours in the previous six months. His last flight review, which was performed in the accident airplane, was completed on May 14, 2009.

#### AIRCRAFT INFORMATION

The airplane was a 1962 Rockwell Aero Commander 500B, with two Lycoming IO-540-E1A5 engines, and two Hartzell HC-A3VK-2A propellers. Its last annual inspection was signed off on July 12, 2010, at which time the log book indicated an airframe total time of 5,359.6 hours. Its last recorded Aviation Engine Oil Sample was completed on May 14, 2009, at which time all values were reported as appearing normal. The last airframe log book entry was the replacement of the left engine alternator on August 2, 2010, at which time the airframe total time was 5,371.3 hours.

#### METEOROLOGICAL INFORMATION

When the pilot called Lockheed Martin Flight Service on the morning of the flight, he stated that he wanted a weather briefing for a VFR flight at 9,500 feet from Redding, California, to Butte, Montana. He was then advised by the briefer that a direct route between Redding and

Butte would take him through an area where there were broken clouds at 10,000 feet, with tops to 22,000 feet, along with rain showers, and thunderstorms were expected. In addition this route would take him through an area for which an Airmen's Meteorological Information (AIRMET) had been issued. That AIRMET indicated there would be a wide spread area of mountain obscuration from clouds, and that VFR flight was not recommended through the mountains within the area of the AIRMET. This information was consistent with the text data that made up the pilot's previous DUATS briefings. The briefer further advised him that satellite images showed that the clouds were "pretty solid" along that route. The briefer also told him that although the current conditions in Redding were clear skies and 10 miles visibility, that the current conditions in southeast Oregon and southwest Idaho was broken ceilings of 9,000 to 10,000 feet mean sea level (MSL), with forecast cloud tops at flight level 220. He further commented that he was, "... showing some pretty good showers over around Baker and just west of Boise."

The pilot indicated that he was aware of the area of clouds and precipitation, and stated that he did not want to get trapped on top of an extensive area of cloud cover. The briefer then suggested that instead of a direct route that the pilot take a route toward the Idaho Falls/Pocatello area, and then head north from there because, "...it would take you east of all the precipitation and keep the last half of your route at least out of most of the cloud cover. He advised the pilot that around the Twin Falls/Burley/Pocatello area that it would be "all clear" below 12,000 feet, and that the worst weather forecast for the Idaho Falls/Rexburg area was 15,000 scattered. The pilot responded to that suggestion by asking, "Okay, then drop down toward Pocatello and then up?" To which the briefer responded, "Yeah, it would be the best way, yeah." To which the pilot's responded, "Yeah, alright." The briefer then covered the winds aloft and checked the Notice to Airmen (NOTAMs) before ending the briefing.

According to witnesses who had been in the area of the South Steens Campground the night before the accident, the overnight weather consisted of frequent rain showers with varying degrees of intensity, with a total rainfall estimated to be about one-half inch based on accumulations. All witnesses reported that after sunrise the sky was almost completely covered with an overcast layer of clouds that was estimated to be 3,000 to 4,000 feet above ground level (AGL). One pilot-rated witness reported a few breaks in the overcast, through which he could see cumulonimbus cloud buildups that he estimated reached an altitude of about 20,000 feet. Although none of the witnesses reported rain showers, lightning or thunder at the time of the accident, one stated that there had been several rain showers earlier in the day, and that he had seen lightning and heard thunder about two hours prior to the crash. Another witness reported that at the time of the accident there was one "dark cumulonimbus cloud" south of where the airplane hit, and that he heard thunder in the direction of that cloud about one hour after the accident. A couple of the witnesses commented that several rain showers, with lightning and thunder, moved through the area throughout the rest of the day.

A postaccident weather study performed by a National Transportation Safety Board Senior Meteorological Specialist determined that although the pilot had not yet reached the southern boundary of the AIRMET, he was in an area affected by a low pressure system with a stationary front that extended from Idaho southwestward into southeastern Oregon and extreme northeastern California. The accident site was north of the frontal boundary in an area of low to mid-altitude clouds, with cloud tops in the range of 19,000 feet. The GOES-11 satellite

imagery further defined the area as one with thickening clouds with an overcast layer of altostratus to nimbostratus type clouds. The accident site was also within an area where the National Weather Service Current Icing Product (CIP) depicted a high probability of icing conditions, with an 80 percent probability of icing conditions at 15,000 feet. The area was also depicted on the Supercooled Large Droplet (SLD) Icing Potential Diagnostic Chart as having an 80 percent probability of SLD conditions. The closest surface observation weather reporting location was at Rome State Airport (KREO), which was approximately 37 miles east of the accident site. The 0952 report from the airport's limited Automated Weather Observing System (AWOS) indicated a 2 degree Celsius temperature-dew point spread and a one-hour precipitation amount of 0.22 inches. The Satellite radar imagery surrounding the period indicated that overcast clouds and rain were occurring at KERO at the time of the accident.

## WRECKAGE AND IMPACT INFORMATION

The airplane impacted flat terrain about nine miles west of Steens Mountain at an altitude of 5,240 feet above sea level. The point of impact, which was covered almost entirely with various sizes of broken lava rock, was located at 42 degrees 39 minutes 31.94 seconds north by 118 degrees 44 minutes 39.90 seconds west. Except for the portion of the left wing outboard of the center aileron pivot hinge, and the outboard portions of the horizontal stabilizers/elevators, which were located within 250 feet of the primary wreckage, the majority of the airplane's structure was located at the point of initial impact. Due to the hardness of the impact surface, there was no impact crater, and due to the high terminal velocity and the steepness of the impact angle, the airplane's entire fuselage was crushed nearly straight forward onto itself. Due to the extent of the crushing force, the distance from what could be identified as cockpit structure to the aft end of the empennage was approximately nine feet. Except for the very aft end of the empennage, no portion of the fuselage retained a shape consistent with its pre-impact form. The degree to which both the fuselage and the wings were damaged precluded any flight control continuity checks. None of the cockpit instrumentation survived the crash intact.

The entire right wing, and all but the separated portion of the left wing, had also been crushed nearly straight forward into the terrain. Although the right wing retained an identifiable form, its entire structure was torn, twisted, or crushed. The portion of the left wing that remained with the fuselage until impact did not retain an identifiable form, and portions of its structure had been thrown up to 100 feet to the northeast of the primary wreckage. The right engine, which had suffered massive impact damage, came to rest just forward of the right wing. The crankcase, except for a small portion of its accessory section and a small section near the nose of the engine, had been shattered into numerous small and medium size pieces, thus totally exposing the internal components. The crankshaft had been bent at about a 30 degree angle at the aft end of the number two throw, and the number two cylinder assembly, to include the connecting rod and the piston, had separated. The camshaft was intact. The other five cylinder assemblies were still attached, but they all were significantly damaged. The entire left engine crankcase had broken into small pieces and the internal components were scattered up to 50 feet northeast of the remains of the left wing. The cam shaft, which was intact, but bent in a slight bow, showed no signs of unusual wear on its journals or lobes. The crankshaft had broken in half at the throw for the number two cylinder, and the aft four connecting rods and pistons (still inside the remaining portion of their respective cylinder assemblies) were still

attached to the crankshaft. The portion of the crankshaft forward of the number two throw was still attached to the propeller hub. None of the internal components of either engine showed any signs of abnormal wear, lack of lubrication, or preimpact anomalies.

One blade from the left propeller remained in the hub, but the other two had been torn loose. The outboard one-third of the blade that remained in the hub had been torn off, and the leading edge of the remaining inboard portion contained numerous deep indentations and gouges, including one that was about five inches long and up to two inches deep. The second blade had separated from the hub, and the outboard half of its span had been torn off. The inboard half was bent forward about 80 degrees about one foot from its root end. The third blade had been torn from the hub and was fractured into numerous pieces. Two blades from the right propeller remained in the hub. One had rotated about 90 degrees in the hub, was bent aft about 30 degrees at about one third of its span, and then bent forward about 20 degrees starting at about two-thirds of its span. The most outboard three inches of the leading edge had been pushed aft and up. The most outboard inch of the tip itself had been curled forward from leading to trailing edge. The other remaining blade was bent aft at about one-half of its span and showed numerous indentations along its leading edge. The third blade, which had been thrown about 100 feet northeast of the primary wreckage, was bent aft about 30 degrees at about half its span, and its most outboard two inches had been torn off from leading edge to trailing edge.

The outboard left wing section that separated in flight came to rest about two-tenths of a mile from the primary wreckage on a track of 248 degrees. The upper spar cap of its forward spar had fractured 32 inches inboard of the center aileron pivot hinge. The upper spar cap was bent negatively (downward) at about 15 degrees from a point 24 inches inboard of the center aileron pivot point to its point of fracture at 32 inches inboard of the aileron center pivot hinge. There was a compression buckle on the vertical face of the upper spar cap 24 inches inboard of the center aileron pivot hinge. From that location to a location adjacent to the fractured end of the upper spar cap there was a crease in the spar web at about a 45 degree angle to the spar caps. The crease ran inboard and down from its point of origin at the compression buckle in the upper spar cap, and was consistent with the spar web being crushed as the upper spar cap was bent in the negative direction. The lower spar cap did not bend, but had fractured at a point about 29 inches inboard of the center aileron pivot hinge. The aft wing spar had fractured at a point about 55 inches inboard of the center aileron pivot hinge, and had twisted about 90 degrees clockwise from a point 29 inches inboard of the center aileron pivot hinge to its point of fracture. A section of upper wing skin, which extended further inboard than either of the spar fractures, and was no longer riveted to either spar cap at any point more than 24 inches inboard of the center aileron pivot hinge, had been bent upward at nearly a 90 degree angle.

Prior to recovery from the accident site, the spar fractures and metal in the built-up area around them were inspected by the NTSB Investigator-In-Charge (IIC) and by an FAA Airworthiness inspector. After the airplane was recovered to Specialty Aircraft in Redmond, Oregon, the IIC and an Aircraft Structures National Resource Specialist from the NTSB's Aviation Engineering Division inspected the wing structure a second time. The wing was then sent to the NTSB's Aviation Engineering Division in Washington D.C., for a final inspection and analysis. At the conclusion of these activities, no evidence had been found of any corrosion, fatigue crack propagation, loose rivets, or unusual wear in or around the area of the fractures.

All metallurgical indications were consistent with an overload failure of the wing structure.

## MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed by an Oregon State Deputy Medical Examiner. Due to the extent and severity of the injuries to both occupants of the airplane, the examiner found it necessary to perform the autopsy on the commingled remains without the ability to assign much of the remains to a specific individual. He determined the cause of death of both occupants to be severe massive trauma, and he determined the manner of death to be accidental.

Although an FAA toxicology specimen's kit was provided to the medical examiner, no toxicological samples were provided to the FAA's Civil Aerospace Medical Institute (CAMI).

## ADDITIONAL INFORMATION

The airplane was released to Specialty Aircraft in Redmond, Oregon, on June 14, 2011.

### History of Flight

Enroute-cruise	VFR encounter with IMC (Defining event)
Enroute-cruise	Loss of control in flight
Uncontrolled descent	Aircraft structural failure
Uncontrolled descent	Collision with terr/obj (non-CFIT)

### Pilot Information

Certificate:	Private	Age:	58, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	July 8, 2010
Occupational Pilot:	No	Last Flight Review or Equivalent:	May 14, 2009
Flight Time:	(Estimated) 1360 hours (Total, all aircraft)		



## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Aero Commander	<b>Registration:</b>	N500FV
<b>Model/Series:</b>	500-B	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	500A-1248-73
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	7
<b>Date/Type of Last Inspection:</b>	July 12, 2010 Annual	<b>Certified Max Gross Wt.:</b>	6750 lbs
<b>Time Since Last Inspection:</b>	12 Hrs	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	5375 Hrs at time of accident	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO-470 SERIES
<b>Registered Owner:</b>		<b>Rated Power:</b>	260 Horsepower
<b>Operator:</b>		<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>		<b>Distance from Accident Site:</b>	
<b>Observation Time:</b>		<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Overcast / 4000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>		<b>Temperature/Dew Point:</b>	
<b>Precipitation and Obscuration:</b>	Moderate - Thunderstorm - Rain		
<b>Departure Point:</b>	Redding, WA (KRDD)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Butte, MT (KBTM)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	00:00 Local	<b>Type of Airspace:</b>	

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<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>	42.658611,-118.74472(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Anderson, Orrin
<b>Additional Participating Persons:</b>	Michael Mizneck; FAA FSDO; Boise, ID
<b>Original Publish Date:</b>	November 22, 2011
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=76933">https://data.nts.gov/Docket?ProjectID=76933</a>

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](#).