Aviation Investigation Final Report

Location:	Prineville, Oregon	**Accident Number:**	WPR12LA023
Date & Time:	October 28, 2011, 13:50 Local	**Registration:**	N520YH
Aircraft:	Cessna 185	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During the descent to the destination airport, when the airplane was about 10 miles out and descending through about 6,500 feet, the engine experienced a total loss of power. In response to the power loss, the pilot manipulated the throttle, mixture, and propeller controls, but the engine did not regain power. When the pilot recognized that the airplane would not be able to reach the destination airport, he conducted a forced landing on an unpaved road. During the landing roll at a groundspeed of about 10 mph, the airplane struck some vegetation, and it then nosed over onto its back.

The pilot reported that, at the time of the engine power loss, the electronic fuel flow instrument indicated that 16 gallons of usable fuel was remaining, which he believed was sufficient fuel for about 1 more hour of flight and to reach the destination airport. During recovery, the fuel tanks were observed to contain about 16 gallons of total fuel, and the fuel selector handle was found set to the left tank. However, it was determined that some fuel had migrated from the fuller right tank to the nearly empty left tank via the tank vent line while the airplane was inverted. The pilot stated that his typical habit was to operate the airplane with the fuel selector set to the "both" position, but that, at some point during the flight, he had moved the fuel selector to the left tank to correct a fuel imbalance with the intention of resetting it to the "both" position once the imbalance had been corrected. The pilot reported that he realized that he had forgotten to reset the fuel selector to the "both" position and that this caused the power loss. The pilot reported that he did not manipulate the fuel selector handle after the power loss because he did not believe that he had a fuel problem and that he did not refer to any emergency checklists. The Pilot's Operating Handbook contained an engine failure during flight checklist, which included the step to place the fuel selector valve in the "both" position, which the pilot did not do.

Probable Cause and Findings

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

A total loss of engine power due to fuel starvation, which resulted from the pilot inadvertently leaving the fuel selector set to the left tank. Contributing to the accident was the pilot's deviation from his normal habit pattern and his failure to refer to the in-flight engine failure checklist after the engine power loss.

Findings

Aircraft	Fuel - Incorrect use/operation
Personnel issues	Use of equip/system - Pilot
Personnel issues	Use of checklist - Pilot
Personnel issues	Use of policy/procedure - Pilot
Aircraft	Fuel - Fluid level

Factual Information

History of Flight

Enroute-descent	Loss of engine power (total) (Defining event)
Enroute-descent	Off-field or emergency landing

On October 28, 2011, about 1350 Pacific daylight time, a Cessna 185, N520YH, was substantially damaged during an off-airport forced landing near Prineville, Oregon, following a complete loss of engine power. The owner/pilot and the two passengers were not injured. The personal flight was operated under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the flight.

According to the pilot, the flight originated from a private airstrip in central Idaho, and was destined for Bend Municipal Airport (BDN), Bend, Oregon. The pilot estimated that the departure fuel quantity was 57 gallons. The cruise portion of the flight was conducted at an altitude of 10,500 feet, in accordance with visual flight rules, without air traffic control services.

About 2.5 hours after takeoff, the pilot began a cruise descent for BDN by reducing power to 20 inches of manifold pressure, and adjusting mixture as required to keep the engine temperature values within the desired ranges. When the airplane was approximately 10 miles from BDN, and descending through about 6,500 feet, the engine suddenly ceased developing power. At the time of the engine power loss, the electronic fuel flow instrument indicated that there was sufficient fuel for about one more hour of flight.

In response to the power loss, the pilot manipulated the throttle, mixture, and propeller controls, but the engine did not resume developing power. The pilot did not manipulate the fuel selector handle, or activate the fuel boost pump. The pilot decided that he was committed to a forced landing off-airport, and selected an unpaved road in a wilderness area for the landing. The landing was uneventful until the airplane was nearly stopped. During the rollout, at a speed that the pilot estimated to be 10 mph, the airplane struck some vegetation, and it nosed over onto its back. The pilot shut down the airplane, and he and the two passengers exited through the pilot's door. The pilot telephoned for assistance using his mobile phone.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	37
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):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 14, 2011
Flight Time:	(Estimated) 3820 hours (Total, all aircraft), 838 hours (Total, this make and model), 3396 hours (Pilot In Command, all aircraft), 30 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft)		

The pilot held an airline transport pilot certificate with instrument airplane and single- and multi-engine land ratings. He reported a total flight experience of about 3,800 hours, including about 830 hours in the accident airplane make and model. His most recent FAA third-class medical certificate was issued in July 2008, and his most recent flight review was completed in October 2011.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N520YH
Model/Series:	185	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	18503619
Landing Gear Type:	Tailwheel	**Seats:**	4
Date/Type of Last Inspection:	November 2, 2010 Annual	**Certified Max Gross Wt.:**	3350 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	8131 Hrs as of last inspection	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-550
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA information, the airplane was manufactured in 2006, and was equipped with a Teledyne Continental Motors IO-550 series engine. Pilot-provided information indicated that as of its most recent annual inspection in November 2010, the airplane had accrued a total time in service of

8,131 hours. The pilot estimated that the engine had accumulated about 200 hours in service since it had been overhauled.

The airplane was equipped with an electric fuel boost pump that was to be used for starting the engine, and was normally kept off for cruise flight. It was also equipped with a JPI-brand fuel flow indicator and JPI engine monitor.

The engine monitor was extracted from the airplane, and was sent to the NTSB Recorders Laboratory in Washington, DC, for data download. The accident flight data was successfully downloaded, and review of the data did not indicate any operational abnormalities. Review of the data revealed that about 2 minutes and 10 seconds before the end of the data, the exhaust gas temperature (EGT) values rose temporarily, and then the EGT and cylinder head temperature values began rapid, smooth, and continuous decreases. The temporary EGT rise preceding the decrease was consistent with engine shutdown by fuel starvation.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BDN	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	13:50 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	17°C / -12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Riggins, ID	**Type of Flight Plan Filed:**	None
Destination:	Bend, OR (BDN)	**Type of Clearance:**	None
Departure Time:	12:30 Local	**Type of Airspace:**	

The 1355 automated weather observation at an airport located about 10 miles west-southwest of the accident location included winds from 210 degrees at 9 knots; visibility 10 miles; clear skies; temperature 17 degrees C; dew point minus 12 degrees C; and an altimeter setting of 30.07 inches of mercury.

Airport Information

Airport:	Bend Municipal Airport BDN	**Runway Surface Type:**	
Airport Elevation:	3460 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	44.145278,-120.973052

The airplane came to rest inverted on the unpaved two-track road that was used for the forced landing. The cowl, right wing strut, vertical stabilizer, and rudder were damaged by the nose-over. No fuel leaks were observed on site. The four-position (LEFT, RIGHT, BOTH, OFF) fuel selector handle was found set to the left tank. When the airplane was righted the day after the accident, the left fuel tank was found to contain about 6 gallons, and the right tank contained about 10 gallons. The two wing tanks were interconnected with a vent line located near the top of the tanks, which could permit fuel to migrate from the fuller tank to the other tank when the airplane was inverted.

Additional Information

According to the pilot's written statement regarding the accident, just prior to the engine power loss, the fuel flow device indicated that 58 gallons had been consumed since the previous refueling, which left about 16 gallons of usable fuel remaining. At that time, the pilot estimated that the airplane was about 5 minutes from its destination, and therefore he had more than sufficient fuel to reach the destination. When the engine quit, the pilot was of the mindset that he "did not have a fuel problem." He did not refer to any emergency procedures checklists subsequent to the power loss.

The third entry in the "Engine Failure During Flight" checklist in the Emergency Procedures section of the airplane manufacturer's Pilot's Operating Handbook was "Fuel Selector Valve – BOTH."

The pilot stated that it was his habit pattern to operate the airplane with the fuel selector set to the BOTH position. When the airplane was righted the day after the accident, and the pilot saw that the fuel selector was set to the left tank, he recalled that at some point during the flight, he had moved the fuel selector from BOTH to LEFT in order to correct a fuel imbalance, with the intention of resetting it to BOTH once the imbalance had been corrected. The post-accident sight of the selector handle, coupled with the engine failure, prompted the pilot to realize that he had likely forgotten to reset the selector to the BOTH position, and that that was the likely cause for the power loss.

Administrative Information

Investigator In Charge (IIC):	Huhn, Michael
Additional Participating Persons:	Jarvis Cochran; FAA FSDO; Portland, OR
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