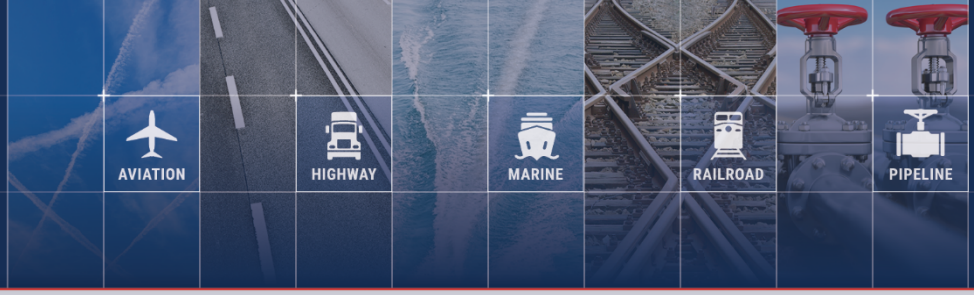

Aviation Investigation Final Report

Location:	Caldwell, Idaho	**Accident Number:**	WPR18LA050
Date & Time:	December 17, 2017, 13:00 Local	**Registration:**	N716JB
Aircraft:	GRAY JIM ROBERT EXEC	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was performing hover-taxi maneuvers in the experimental amateur-built helicopter when the engine lost all power, which resulted in a forced landing in a field during which the airplane landed hard. Postaccident examination revealed that the engine had seized due to oil exhaustion after the oil pressure gauge line had failed, causing most of the engine oil to be expelled overboard with an insufficient quantity of oil in the sump for engine operation.

The pilot, who was also the helicopter builder, had installed the oil pressure gauge line, which was made of automotive-grade nylon tubing, about 1 year before the accident. Because the helicopter had an experimental airworthiness certificate and was considered to be an amateur-built aircraft, the pilot could use non-aviation grade components. The pilot discarded the oil line before it could be examined, so its failure mode could not be determined.

Probable Cause and Findings

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

Failure of the oil pressure gauge line, which resulted in oil exhaustion and a total loss of engine power.

Findings

Aircraft	Engine oil indicating system - Failure
Aircraft	Oil - Fluid level

Factual Information

History of Flight

Maneuvering-hover	Powerplant sys/comp malf/fail (Defining event)
Maneuvering-hover	Loss of engine power (total)
Emergency descent	Off-field or emergency landing
Landing	Hard landing

On December 17, 2017, about 1300 mountain standard time, an experimental amateur-built Rotorway Exec-90 series helicopter, N716JB, landed hard following a loss of engine power at Caldwell Industrial Airport, Caldwell, Idaho. The private pilot/builder was not injured, and the helicopter sustained substantial damage to the lower fuselage structure. The helicopter was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed, and no flight plan had been filed. The local flight departed Caldwell about 1230.

The pilot stated that he planned to perform a series of hover-taxi and air-taxi maneuvers on taxiway A as practice, after a two-week period of bad weather. After taxiing around the airport for about 30 minutes, he heard an unusual sound and the engine began to lose power. He was initiating a turn at the time, and as the helicopter descended to 10 ft, the engine lost all power. He performed a forced landing, and the helicopter landed hard.

Examination of the helicopter revealed that oil was leaking from below the engine compartment, and a trail of oil was present on the ground in the areas that the helicopter had been taxing.

Following the accident, the pilot recovered the helicopter to his hangar and removed the body panels around the engine. He stated that the sump contained about 2 quarts of oil (capacity 5 quarts), and the engine appeared to have seized. An inspector from the Federal Aviation Administration (FAA) performed an external inspection and found that all the visible major oil lines were intact and tight at their fittings, and there did not appear to be any catastrophic breaches or damage to the engine crankcase.

A few months after the accident the pilot began to disassemble the helicopter for repair, and discovered that the oil pressure gauge line, which was attached to the oil filter housing by a brass compression fitting, had failed and separated from the fitting. He stated that the line was made of nylon tubing, which he purchased from a local automobile parts store.

He had installed the tubing about one year before the accident, after the original kit-supplied plastic line had degraded and was leaking oil into the cabin.

The pilot discarded the oil line before it could be examined by the FAA or NTSB.

According to FAA Advisory Circular AC 20-27G, Certification and Operation of Amateur-Built Aircraft, "Amateur builders are free to develop their own designs or build from existing designs. We do not approve these designs and it would be impractical to develop design standards for the wide variety of design configurations, created by designers, kit manufacturers, and amateur builders."

Photo 1 – Helicopter at Accident Site

Photo 2 – Oil on Ramp

Previous Accidents

The pilot was involved in three previous accidents in the accident helicopter, all involving a loss of power:

On October 19, 2016, the helicopter lost power during the initial takeoff climb (accident number: WPR17LA009). The NTSB determined the probable cause to be,

"The pilot's failure to properly tighten the tension bolts during the installation of the alternator belt, which resulted in inadequate voltage to sustain ignition and the subsequent partial loss of engine power."

On September 5, 2002, the helicopter lost power shortly after takeoff (accident number: FTW02LA250). The NTSB determined the probable cause to be,

"The pilot's failure to refuel the helicopter, which resulted in fuel exhaustion."

On October 1, 1999, the helicopter lost power while in the traffic pattern (accident number: DEN00LA001). The NTSB determined the probable cause to be,

"The pilot inadvertently allowing main rotor rpm to decay while avoiding obstacles during an emergency autorotation following a loss of power for reasons undetermined. Factors were houses and powerlines."

Pilot Information

Certificate:	Private	**Age:**	70,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 30, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 19, 2017
Flight Time:	691 hours (Total, all aircraft), 317 hours (Total, this make and model), 33.4 hours (Last 90 days, all aircraft), 11.1 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	GRAY JIM ROBERT	**Registration:**	N716JB
Model/Series:	EXEC 90	**Aircraft Category:**	Helicopter
Year of Manufacture:	1998	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	EXEC-3000
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	August 5, 2017 Condition	**Certified Max Gross Wt.:**	1350 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	317 Hrs at time of accident	**Engine Manufacturer:**	Rotorway
ELT:	Not installed	**Engine Model/Series:**	RW-152
Registered Owner:	On file	**Rated Power:**	152 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:	KEUL,2429 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	19:56 Local	**Direction from Accident Site:**	14°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.28 inches Hg	**Temperature/Dew Point:**	2°C / -5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Caldwell, ID (EUL)	**Type of Flight Plan Filed:**	None
Destination:	Caldwell, ID (EUL)	**Type of Clearance:**	None
Departure Time:	12:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	CALDWELL INDUSTRIAL EUL	**Runway Surface Type:**	
Airport Elevation:	2431 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	43.641944,-116.635833(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Edwin Lord; FAA FSDO; Boise, ID
Original Publish Date:	February 5, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96490