Aviation Investigation Final Report

Location:	Caldwell, Idaho	**Accident Number:**	WPR10LA319
Date & Time:	June 27, 2010, 18:00 Local	**Registration:**	N86PB
Aircraft:	PRIDMORE LANCAIR IV	**Aircraft Damage:**	Substantial
Defining Event:	Fire/smoke (non-impact)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation		

Analysis

Several minutes after starting the engine, the pilot noticed an odor in the cockpit, which he thought was similar to that of burning plastic. He could hear the hydraulic pump cycle once, which he thought was unusual. He pulled the hydraulic circuit breaker out and within 30 seconds he observed smoke emanating from the engine area. He shut down the airplane and noticed flames at the bottom of the engine cowl. According to the pilot, the last conditional inspection was completed 6 days prior to the accident, and the airplane accumulated 2 flight hours since that inspection. An examination of the firewall revealed that its right side had a white coloration, which turned to a black soot color on the left side, consistent with the fire originating on the right side of the engine. On the right side of the belly area, near the nose landing gear compartment, a red/pink hydraulic fluid stain started and continued down toward the tail. The stain became small beads of pooling liquid at the low point of the belly, indicating a hydraulic leak. Above the stain, on the right side of the engine firewall, were two hydraulic fittings where hoses connected to either side of the nose landing gear actuator. Based on this evidence, it is likely that the fitting on the lower hydraulic line was not properly tightened, which allowed it to back off due to normal engine vibration, resulting in the line loosening during engine start. Pressurized hydraulic fluid then sprayed onto the right exhaust shroud and ignited.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of maintenance personnel to ensure that a hydraulic line fitting was adequately secured during a conditional inspection, which resulted in a leak and subsequent on-ground fire.

Findings

Aircraft	Hydraulic fluid - Inadequate inspection
Aircraft	Hoses and tubes - Inadequate inspection
Personnel issues	Scheduled/routine maintenance - Maintenance personnel

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Standing-engine(s) operating	Fire/smoke (non-impact) (Defining event)

HISTORY OF FLIGHT

On June 27, 2010, about 1800 mountain daylight time, a Pridmore Lancair IV, N86PB, experienced an on-ground fire several minutes after the pilot started the engine at the Caldwell Industrial Airport, Caldwell, Idaho. The pilot, who was additionally the owner and builder, was operating the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The airline transport pilot (ATP) was not injured; the airplane sustained substantial damage. The cross-country business flight was to originate from Caldwell with a planned destination of La Grande, Oregon. Visual meteorological conditions prevailed, and no flight plan was filed.

In both a written statement and a telephone interview with a Safety Board investigator, the pilot reported that the airplane had flown three times earlier in the day. After parking the airplane for about 5 hours on the ramp, the pilot boarded the airplane with the intent of flying back to the airplane's home base in Oregon. The engine started normally and the cockpit gauge indications were normal. Several minutes after start, the pilot noticed an odor in the cockpit, which he thought was similar to that of burning plastic. He taxied the airplane about 50 feet ahead while making a 90-degree turn in an effort to determine if the odor was emitting from his airplane or elsewhere on the airport.

The pilot further stated that he could hear the hydraulic pump cycle once, which he thought was unusual. He pulled the hydraulic circuit breaker out and moved toward the parking area. Within 30 seconds of the hydraulic pump cycling, the pilot observed smoke emanating from the engine area. He shut down the airplane and after egressing, he noticed flames at the bottom of the engine cowl in the vicinity of the nose landing gear wheel well. Fire suppression units were dispatched to the site to extinguish the fire.

AIRCRAFT INFORMATION

The experimental Lancair IV single-engine airplane, serial number LIV-154, was built in 1998. The airplane was equipped with a Teledyne Continental Motors TSIO-550-E-1B. The pilot reported that the airframe and engine had accumulated 560 hours total time. The last conditional inspection was completed on June 21, 2010, or 6 days prior to the accident; the airplane had accrued approximately 2 hours since that inspection.

Hydraulic System Design

The airplane was equipped with an electrically powered hydraulic system used to operate the landing gear and wing flaps. With the landing gear in the "up" position, the hydraulic pump is activated to provide 1,000 psi to the up side of an actuator. The electric pump is disabled by a limit pressure switch, although the pressure is maintained and holds the gear in its retracted position. Upon selecting the “down” position, 1,000 psi is provided to the down side of the cylinder and the gear is extended and driven to the overcenter (locked) position for the nose gear and to down and locked for the main landing gear.

The kit manufacturer recommends that only MIL-H-5606 “red” hydraulic fluid be used in the system.

TESTS AND RESEARCH

Following recovery, a Safety Board investigator examined the airplane in a private hangar at the Caldwell Industrial Airport on July 01, 2010.

The airplane was intact and the only damage observed was to that incurred as a result of an on-ground fire. The engine had been washed of fire retardant the day prior to the examination in an effort to reduce the corrosive effects. The upper and lower engine cowling had been removed and the battery was disconnected.

Airframe

The center section near the pilot's right rudder petal had sustained thermal damage, which continued over to the passenger side left rudder petal. In these areas the carpet fragments partially burned and the composite material appeared to have melted in areas. The fuel selector was in the "off" position, and both the hydraulic and ground-power circuit breakers were out, which the pilot reported he had pulled after the fire transpired. The hydraulic reservoir, located just aft of the baggage compartment, was about 3/4 full.

Engine

The engine had sustained thermal damage, most of which occurred near the firewall area. The upper engine cowl was charred in the area near the firewall, with evidence of bubbled paint. A hole was present in the far left area, where the oil breather was positioned. The bottom side of the lower cowl burn concentration was on the right side, with the most damaged region near the firewall and the nose gear wheel well. The inside of the lower cowl displayed white coloration in the same area of concentrated damage.

The left side of the engine showed a black soot color around the area of the firewall. The right side of the engine revealed a predominantly white area near the firewall with black soot surrounding. In looking down the nose wheel compartment to the firewall there was evidence that the landing gear structure, doors, and hoses on the right side where lighter in appearance

(white) and had sustained more intensive thermal damage. On the right side of the belly area, near the nose landing gear compartment, a red/pink stain started and continued down toward the tail. The stain became small beads of pooling liquid at the low point of the belly and was thinly covering the leading edge of the bottom blade antenna. The liquid and stain coloration was consistent with that of MIL-L-5606 hydraulic fluid. Above the stain, on the right side of the engine firewall, were two hydraulic fittings where hoses connected to either side of the nose landing gear actuator.

The upper fitting and hose were charred to a white coloration, with the steel braiding observed underneath. The lower fitting was surrounded in a black residue that was sticky to the touch; the firewall area around the fitting was additionally sticky, with a rubber consistency. The lower hose was charred black around its black rubber surface, but had suffered considerably less damage than the surrounding hoses. The distance from the exhaust shroud to the hydraulic fittings was about 9 inches.

Removal of the hoses surrounding the hydraulic fittings and the gascolator shroud revealed that the gascolator body was white on the side closest to the fittings. The firewall around the fittings was additionally white.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	42,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; 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 1 With waivers/limitations	**Last FAA Medical Exam:**	May 21, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 16, 2010
Flight Time:	14737 hours (Total, all aircraft), 510 hours (Total, this make and model), 7500 hours (Pilot In Command, all aircraft), 204 hours (Last 90 days, all aircraft), 74 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PRIDMORE	**Registration:**	N86PB
Model/Series:	LANCAIR IV	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	LIV 154
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 21, 2010 Condition	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	560 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	IO-550 SERIES
Registered Owner:	PRIDMORE-BROWN JULIAN N	**Rated Power:**	300 Horsepower
Operator:	PRIDMORE-BROWN JULIAN N	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	EUL,2432 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	17:35 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	40°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.94 inches Hg	**Temperature/Dew Point:**	31°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Caldwell, ID (KEUL)	**Type of Flight Plan Filed:**	None
Destination:	La Grande, OR (KLGD)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Caldwell Industrial KEUL	**Runway Surface Type:**	
Airport Elevation:	2432 ft msl	**Runway Surface Condition:**	
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:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	43.641666,-116.635559(est)

Administrative Information

Investigator In Charge (IIC):	Keliher, Zoe
Additional Participating Persons:	Nick Weber; Federal Aviation Administration; Boise, ID
Original Publish Date:	April 7, 2011
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=76488