Aviation Investigation Final Report

Location:	Tuftonboro, New Hampshire	**Accident Number:**	ERA13LA327
Date & Time:	July 17, 2013, 15:50 Local	**Registration:**	N8721K
Aircraft:	UNIVAIR AIRCRAFT CORPORATION 108-1	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

About 7 minutes after takeoff and while leveling off the airplane at 1,800 ft, the pilot leaned the fuel-to-air mixture, and the engine immediately began to run roughly. The more experienced right-seat pilot took control of the airplane and attempted to restore power, but his attempts were unsuccessful. The propeller continued to rotate briefly but then stopped. The pilot maneuvered the airplane for a forced landing in a field, and the airplane subsequently impacted a raised concrete culvert.

Postaccident examination of the engine revealed that the crankshaft was fractured. Metallurgical examination of the crankshaft revealed evidence of fatigue cracking that had originated from circumferential gouges at the aft radius of the R2 rod journal. A review of engine records revealed that, about 45 years before the accident, the crankshaft was replaced during an engine overhaul and that the main and connecting rod bearing journals were ground 0.010-inch undersize. About 7 years before the accident, the engine was overhauled again, and the crankshaft main and connecting rod bearing journals were polished. The engine was installed in the accident airplane about 3 years before the accident; the engine failure occurred about 115 hours after the engine's last overhaul. It is likely that, if maintenance personnel had detected and removed the circumferential gouges at the aft radius of the R2 rod journal during the engine's last overhaul, the fatigue cracking would not have started and the crankshaft would not have failed.

Probable Cause and Findings

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

Maintenance personnel's failure to remove circumferential gouges in the aft radius of the R2 rod journal on the crankshaft during its last engine overhaul, which resulted in the fatigue failure of the crankshaft and a subsequent total loss of engine power.

Findings

Personnel issues	Lack of action - Maintenance personnel
Aircraft	Recip engine power section - Fatigue/wear/corrosion
Aircraft	Recip engine power section - Failure

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-landing roll	Collision with terr/obj (non-CFIT)

On July 17, 2013, about 1550 eastern daylight time, a Univair Aircraft Corporation (Stinson) 108-1, N8721K, registered to and operated by a private individual, was substantially damaged during a forced landing near Tuftonboro, New Hampshire. Visual meteorological conditions prevailed at the time and no flight plan was filed for the 14 Code of Federal Regulations (CFR) Part 91 personal flight from Moultonboro Airport (5M3), Moultonboro, New Hampshire, to Mountain View Field Airport (NH31), Wolfeboro, New Hampshire. The airline transport pilot and pilot-rated passenger sustained minor injuries. The flight originated about 1543, from 5M3.

The pilot-in-command (PIC) stated that he was in the right seat and his daughter (a recently licensed pilot) was in the left seat. She initiated the takeoff and climbed to 1,800 feet while proceeding towards the destination airport only 12 minutes away. After leveling off she began to lean the fuel to air ratio and the engine immediately began to run rough. He (PIC) took the controls and moved the mixture control to full rich, but the engine began to run really rough. He switched tanks, and manipulated the throttle control but the engine quit. The propeller continued to rotate about 6 times then the engine seized and the propeller stopped. He maneuvered the airplane for a forced landing in a field and just before touchdown he noticed a 1 foot high by 3 foot wide raised concrete item that was obscured by tall weeds. He banked left in an attempt to avoid it but the left wing contacted the ground and the gear hit the concrete. The airplane cartwheeled and came to rest upright. The airplane was recovered for further examination.

Following recovery of the airplane, the mechanic removed the top engine cowling, and noted the rear portion of the accessory case was cracked, and the right side of the engine crankcase was also cracked. A plate was removed from the engine, and the crankshaft was noted to be fractured. No connecting rods were separated. The crankshaft was removed from the engine and retained for further examination by the NTSB Materials Laboratory located in Washington, D.C.

According to the NTSB Materials Laboratory Factual Report, the crankshaft fractured through the cheek, between rod journals "R1" and "R2." The surface of the rod and main bearing journals whose dimensions were consistent with 0.010 inch undersize contained no evidence of blue or black tint. Bench binocular microscope examination of the crankshaft revealed crack arrest marks typical of fatigue cracking emanating from the aft radius of rod journal "R2". Fatigue crack propagation was aft and through the thickness of the crank cheek. Scanning electron microscope (SEM) examination of the excised origin of the fatigue crack revealed the surface of the aft relief radius in the area of the fatigue origin contained evidence of circumferential gouge marks that were more severe when compared to the circumferential marks in the adjoining flat portion of the rod journal. The relief radius showed no

evidence of ladder cracks. A copy of the NTSB Materials Laboratory Factual Report is contained in the NTSB public docket.

A review of the engine logbooks and records dating to October 1951, revealed an entry dated June 1, 1968, indicating a major overhaul of the engine was performed. The entry further indicated, "Crankshaft replaced (ground .010/.010 undersize)." The engine was installed in an airframe other than the accident airframe, and a maintenance release yellow tag associated with the crankshaft dated August 30, 2005, indicates non-destructive testing was performed and no cracks were detected. A subsequent entry dated August 28, 2006, indicated the engine was disassembled for inspection, and the crankshaft was polished, ".010 mains .010 rods." The entry further indicates all work was performed in accordance with the Franklin engine overhaul manual. No determination could be made as to what facility polished the crankshaft. The engine was installed in another airplane on September 30, 2006, and the next entry dated May 23, 2007, indicates performing engine "break-in ground runs." The engine remained installed in that airplane until April 22, 2010, when it was removed for installation into the accident airplane. The engine at that time had accrued approximately 56 hours since major overhaul. The engine was installed into the accident airplane, and routine inspection entries were noted. The engine had accrued approximately 115 hours since overhaul in 2006 at the time of the accident. Excerpts from the engine maintenance records are contained in the NTSB public docket.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	72
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Glider	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Glider; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 14, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	December 17, 2011
Flight Time:	11303 hours (Total, all aircraft), 90 hours (Total, this make and model), 8230 hours (Pilot In Command, all aircraft), 29 hours (Last 90 days, all aircraft), 22 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	43
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
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:**	June 28, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 24, 2012
Flight Time:	82 hours (Total, all aircraft), 26.7 hours (Total, this make and model), 27.8 hours (Pilot In Command, all aircraft), 4.4 hours (Last 90 days, all aircraft), 2.9 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	UNIVAIR AIRCRAFT CORPORATION	**Registration:**	N8721K
Model/Series:	108-1	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	108-1721
Landing Gear Type:	Tailwheel	**Seats:**	4
Date/Type of Last Inspection:	January 14, 2013 Annual	**Certified Max Gross Wt.:**	2230 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1523 Hrs at time of accident	**Engine Manufacturer:**	FRANKLIN
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	6A4150 SERIES
Registered Owner:	FAWCETT WALTER L	**Rated Power:**	165 Horsepower
Operator:	FAWCETT WALTER L	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LCI,545 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	15:55 Local	**Direction from Accident Site:**	222°
Lowest Cloud Condition:	Scattered / 7000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	33°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Moultonboro, NH (5M3)	**Type of Flight Plan Filed:**	None
Destination:	Wolfeboro, NH (NH31)	**Type of Clearance:**	None
Departure Time:	15:43 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	43.451957,-71.563491(est)

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Richard L Eilinger; FAA/FSDO; Portland, ME
Original Publish Date:	August 11, 2015
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=87519