Aviation Investigation Final Report

Location:	Fallon, Nevada	**Accident Number:**	WPR13LA321
Date & Time:	July 10, 2013, 04:45 Local	**Registration:**	N517DJ
Aircraft:	RAYTHEON AIRCRAFT COMPANY A36	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	4 Minor
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot reported that, during climbout, when the airplane was about 1,000 ft above ground level, the engine lost power. The pilot subsequently maneuvered the airplane to attempt to land on the departure runway. The airplane touched down short of the runway in rough, desert terrain, which resulted in substantial damage to the wings, fuselage, and empennage.

A postaccident engine examination revealed that the No. 5 connecting rod cap and one of its two bolts had fractured midlength; the opposite bolt was intact with the nut still fastened. Metallurgical examination revealed that the No. 5 connecting rod had failed due to a fatigue crack that had initiated on the outer surface of the nut-facing boss. The crack propagated inward until the final cross-section of the connecting rod yoke failed in overstress, which then catastrophically breeched the left side of the engine case. The fatigue crack did not show any material imperfections; however, the surface finish of the boss where the fatigue crack initiated was consistent with it having been shot peened. Although shot peening is performed to impart compressive stresses to prevent fatigue crack initiation, excessive peening times may sufficiently alter the surface to create stress concentrators. However, the configuration of the fractured rod yoke precluded any accurate surface roughness measurements and, therefore, it could not be determined if improper surface modification had occurred.

Probable Cause and Findings

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

A fatigue failure of the No. 5 connecting rod, which resulted in a catastrophic engine failure during the initial climb and a subsequent forced landing.

Findings

Aircraft	Recip engine power section - Fatigue/wear/corrosion
Aircraft	Recip engine power section - Failure
Environmental issues	Rough terrain - Contributed to outcome

Factual Information

History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)
Landing	Collision with terr/obj (non-CFIT)

On July 10, 2013, about 0445 Pacific daylight time (PDT), a Raytheon Aircraft Company, A36, N517DJ, experienced a catastrophic engine failure during initial climb out, resulting in an off airport landing near Fallon Municipal Airport (FLX), Fallon, Nevada. Silver Sage Aviation was operating the airplane under the provisions of 14 *Code of Federal Regulations* (CFR) Part 135. The commercial pilot and three passengers sustained minor injuries; the airplane sustained substantial damage. The cross-country business flight was departing Fallon, with a planned destination of Dixie Valley, Nevada. Night visual meteorological conditions prevailed, and a visual flight rules (VFR) flight plan had been filed.

The pilot reported that during climb out about 1,000 feet above ground level the airplane engine lost power, and he attempted to return to FLX. He was unable to make it, and made a forced landing in the desert adjacent to FLX.

The airplane sustained substantial damage to the wings, fuselage, and empennage.

Pilot Information

Certificate:	Commercial	**Age:**	65
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):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	January 10, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 1, 2012
Flight Time:	10000 hours (Total, all aircraft), 9000 hours (Total, this make and model), 116 hours (Last 90 days, all aircraft), 33 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	RAYTHEON AIRCRAFT COMPANY	**Registration:**	N517DJ
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-3075
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 26, 2013 100 hour	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1294 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	IO-550 SERIES
Registered Owner:	Dan Urquhart	**Rated Power:**	300 Horsepower
Operator:	Dan Urquhart	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	Silver Sage Aviation	**Operator Designator Code:**	UQ8A

The airplane was a Beech A36, serial number E-3075. The operator reported that at the time of the accident, the airplane had a total airframe time of 1,294 hours. The logbooks contained an entry for an annual inspection dated June 26, 2013. The tachometer read 1,280.1 hours at the last inspection. The tachometer read 1,298.7 hours at the accident scene.

The engine was a Continental Motors IO-550, serial number 281690-R. Total time recorded on the engine at the last 100-hour inspection was 5,364.9 hours, and time since major overhaul was 282.3 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	NFL,3934 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	04:56 Local	**Direction from Accident Site:**	300°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	16°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fallon, NV (FLX)	**Type of Flight Plan Filed:**	VFR
Destination:	Dixie Vally, NV (NV30)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Fallon Municipal Airport FLX	**Runway Surface Type:**	Asphalt
Airport Elevation:	3966 ft msl	**Runway Surface Condition:**	Dry;Rough
Runway Used:	03	**IFR Approach:**	None
Runway Length/Width:	5703 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Minor	**Latitude, Longitude:**	39.499168,-118.748886(est)

The airplane came to rest approximately 600 feet from the departure end of runway 03. The accident site was flat desert terrain.

The wreckage was documented at the accident site and recovered.

During recovery of the airplane, it was noted that there was a breach of the engine case adjacent to the

number five cylinder.

Tests and Research

Investigators examined the wreckage at Air Transport, Phoenix, Arizona, on July 30, 2013.

The airframe was examined with no mechanical anomalies identified.

The engine examination revealed that the number five connecting rod cap and one of the bolts had fractured at midlength, whereas, the opposite bolt was intact with the nut still fastened. The resulting failure continued with a catastrophic breech to the left side of the engine case between the number six and four cylinders.

There were no indications of any oil starvation in the engine.

There was no assembly discrepancies noted during the examination.

The engine was able to be rotated, and continuity was established from the front of the engine to the rear.

The airplane was equipped with a JPI 800 engine monitoring system. The unit was removed from the airplane to be sent to the NTSB laboratory for download. The report indicated no abnormalities noted prior to the engine failure.

The number five and number six connecting rods, rod end caps, and bolts were sent to the NTSB materials laboratory for further examination.

The factual report of the NTSB materials laboratory examination of the engine components is in the accident docket.

Examination revealed that the fracture surfaces were a result of fatigue failure of the number five connecting rod.

Administrative Information

Investigator In Charge (IIC):	Jones, Patrick
Additional Participating Persons:	Larry Zloczewski; Federal Aviation Adminstration; Reno, CA Mike Council; Continental Motors, Inc.; Mobile, AL
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