Aviation Investigation Final Report

Location:	Okmulgee, Oklahoma	**Accident Number:**	FTW01LA143
Date & Time:	June 14, 2001, 13:15 Local	**Registration:**	N114BW
Aircraft:	Commander 114-B	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The flight had been airborne for three hours when the pilot heard a "loud bang" and the engine lost total power. He executed a forced landing to a field, during which the airplane contacted dirt mounds that were 4 feet high, before it came to a stop upright. Postaccident examination of the airplane revealed that fresh engine oil was adhering to the left side of the fuselage from the engine cowling extending back to the empennage. The oil dipstick was removed and indicated only 2 quarts (8 quart capacity). The oil was black and smelled as though it had been exposed to heat. The engine crankcase displayed a 2.5-inch diameter hole between the #5 and #6 cylinders. The engine was disassembled and it was noted that the connecting rod for the #6 cylinder had separated from its piston and the crankshaft. The #6 connecting rod journal displayed evidence of thermal damage and metal transfer. Metallurgical examination of the #6 connecting rod end cap and bolt revealed fractures indicative of overstress at extreme temperatures. Additionally, the rod end cap bearing surface displayed fretting and metal transfer. No other anomalies with the engine were noted.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure of the #6 cylinder's connecting rod, which resulted in a complete loss of engine power. A contributing factor to the accident was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings
1. ENGINE ASSEMBLY,CONNECTING ROD - FAILURE,TOTAL

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings
2. TERRAIN CONDITION - DIRT BANK/RISING EMBANKMENT
3. (F) TERRAIN CONDITION - NONE SUITABLE

Factual Information

On June 14, 2001, at 1315 central daylight time, a Commander 114-B airplane, N114BW, was substantially damaged when it impacted the ground during a forced landing following a complete loss of engine power near Okmulgee, Oklahoma. The airplane was registered to a private individual and operated by the pilot. The commercial pilot, sole occupant of the airplane, sustained minor injuries. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the 14 Code of Federal Regulations Part 91 personal flight. The cross-country flight originated from the Kyle-Oakley Field Airport, Murray, Kentucky, at 1000, and was destined for the Wiley Post Airport, Oklahoma City, Oklahoma.

The pilot reported that after three hours of normal flight, he detected a change in the sound of the engine. The oil pressure gauge needle dropped to zero; however, the cylinder head temperature and oil temperature gauge needles remained in their green arcs. The pilot contacted the local flight service station and requested vectors to the nearest airport, which was in Okmulgee. The pilot noticed an increasing vibration and reduced the throttle. Subsequently, he heard a "loud bang" and the engine lost total power. He executed a forced landing to a field, located 2.5 miles northeast of the Okmulgee Airport. During the landing roll, the airplane contacted dirt mounds that were 4 feet high, before it came to a stop upright.

The FAA inspector, who examined the aircraft at the accident site, reported that both wings, the engine firewall, and landing gear were structurally damaged. He observed a film of oil extending from the engine cowling along the fuselage to empennage. He removed the engine oil dipstick and it indicated 2 quarts out of an 8 quart capacity.

The Textron-Lycoming IO-540-T4B5 engine was examined in Oklahoma by an NTSB investigator and a representative from Textron-Lycoming. The oil sump plug was removed and only two drops of oil could be drained. The oil appeared black and smelled as though it had been exposed to heat. The engine's oil system was examined and no evidence of a leak was noted. A hole, that was 2.5 inches in diameter, was observed on the top of the engine crankcase, between the #5 and #6 cylinders. A rod end cap and bolt from the #6 cylinder's connecting rod were extracted from the hole. The connecting rod end cap and bolt were sent to the NTSB Materials Laboratory in Washington, D.C. for further examination. The bolt displayed features typical of bending and torsion overstress while heated. The rod end cap displayed features typical of bending overstress while heated. Additionally, the bearing surface of the rod end cap exhibited fretting and metal transfer, which are signatures consistent with relative movement and looseness in the joint.

The engine was transported to Air Salvage of Dallas, Lancaster, Texas, and examined by the NTSB investigator and the representative from Textron Lycoming. The #1 through #5 cylinders were removed; the #6 cylinder was internally damaged and could not be removed. The

crankcase was separated, and the #6 cylinder's connecting rod was observed to be separated from its piston and the crankshaft. The #1 through #5 connecting rod cap bolts were torque tested using a flexible beam torque wrench. According to the Textron-Lycoming representative, all of the bolts were within acceptable tolerances. The connecting rods were removed from the #1 through the #5 positions on the crankshaft. The #1 through #5 connecting rod journals on the crankshaft were not scored and there was no apparent thermal damage. The #6 connecting rod journal displayed thermal damage and metal transfer. Ferrous debris was found in the oil filter, at the oil suction screen, and in the oil sump. The oil pump was disassembled and no anomalies were noted.

At the time of the accident, the engine and airframe had accumulated a total of 1743.9 hours, and the airplane had flown 150.0 hours since the last annual inspection on January 5, 2001.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 9, 2000
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 17, 2001
Flight Time:	2110 hours (Total, all aircraft), 69 hours (Total, this make and model), 1833 hours (Pilot In Command, all aircraft), 57 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Commander	**Registration:**	N114BW
Model/Series:	114-B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	14541
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	May 5, 2001 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	105 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1743.4 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-540-T4B5
Registered Owner:	Robert T. Williams	**Rated Power:**	260 Horsepower
Operator:	Gary A. Gallo	**Operating Certificate(s) Held:**	None
Operator Does Business As:	N/A	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TUL,677 ft msl	**Distance from Accident Site:**	30 Nautical Miles
Observation Time:	12:53 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	3400 ft AGL	**Visibility**	9 miles
Lowest Ceiling:	Broken / 3400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	16 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.73 inches Hg	**Temperature/Dew Point:**	29°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Murray, KY (CEY)	**Type of Flight Plan Filed:**	IFR
Destination:	Oklahoma City, OK (PWA)	**Type of Clearance:**	IFR
Departure Time:	10:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Okmulgee Municipal Airport OKM	**Runway Surface Type:**	
Airport Elevation:	720 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	Unknown
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	35.630348,-95.950531(est)

Administrative Information

Investigator In Charge (IIC):	Ragogna, Jason
Additional Participating Persons:	Cary E Wilcox; Federal Aviation Administration; Oklahoma City, OK John B Butler; Textron Lycoming; Arlington, TX
Original Publish Date:	July 1, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=52485