Aviation Investigation Final Report

Location:	Las Cruces, New Mexico	**Accident Number:**	CEN15LA360
Date & Time:	August 14, 2015, 10:50 Local	**Registration:**	N14124
Aircraft:	North American T 28A	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

About 5 minutes after takeoff, the engine lost power and the pilot turned back toward the departure airport to make a forced landing. The airplane touched down about ½ mile short of the runway on uneven terrain, seriously injuring the pilot. The pilot was transported to a hospital via helicopter, but died four days later.

Examination of the engine revealed failure of the No. 6 cylinder connecting rod. The connecting rod was most likely initially damaged during ground operations when the propeller was improperly rotated when a cylinder was hydraulically locked. The investigation was not able to determine when the initial damage occurred.

Probable Cause and Findings

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

Failure of the No. 6 cylinder connecting rod, due to improper rotation of the propeller during a previous hydraulic lock.

Findings

Aircraft	(general) - Failure
Personnel issues	Incorrect action selection - Other
Personnel issues	Use of equip/system - Pilot

Factual Information

History of Flight

Standing-engine(s) not oper	Preflight or dispatch event
Initial climb	Loss of engine power (total) (Defining event)
Landing	Hard landing

On August 14, 2015, about 1050 mountain daylight time, a North American T-28A airplane, N14124, was substantially damaged during a forced landing near Las Cruces International Airport (LRU), Las Cruces, New Mexico. The pilot was fatally injured and the passenger sustained minor injuries. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed for the flight, with no flight plan filed. The flight departed from LRU about 1040 and was destined for El Paso International Airport (ELP), El Paso, Texas.

After refueling at LRU, the pilot had difficulty starting the radial engine and requested a ground power unit (GPU) from line personnel. The engine started on two occasions with the GPU connected, but stopped after the GPU was disconnected. On the third start with the GPU, the engine continued to run and the pilot taxied out and departed from runway 8.

The passenger stated that about 5 minutes after departure, the engine lost power and the pilot initiated a turn back to LRU. The pilot subsequently executed a forced landing into uneven terrain, touching down about one-half mile prior to the threshold of runway 30, which damaged both wings and the fuselage. The pilot was airlifted to a regional hospital, but died on August 18, 2015.

Pilot Information

Certificate:	Airline transport	**Age:**	64,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	February 26, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 31, 2014
Flight Time:	6185 hours (Total, all aircraft), 322 hours (Total, this make and model)		

Passenger Information

Certificate:		**Age:**	37
Airplane Rating(s):		**Seat Occupied:**	Rear
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Passenger Information

Certificate:		**Age:**	
Airplane Rating(s):		**Seat Occupied:**	Rear
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot, age 64, held an airline transport pilot certificate with airplane single engine land, multi-engine land, and instrument ratings. He reported 6,185 total flight hours and 60 hours in the preceding six months on his application for a medical certificate dated February 26, 2015. On his most recent insurance application dated October 8, 2014, the pilot reported 322 flight hours in the T-28A. His last biennial flight review was accomplished on January 31, 2014. Pilot logbooks were not available for the investigation.

The pilot had a medical history of hypertension, high cholesterol, and coronary artery disease, with a myocardial infarction (heart attack) in 2000. Since 2000, the pilot had been issued special issuance medical certificates, with regular stress testing and cardiology evaluations required by the Federal Aviation Administration (FAA). He was issued a special issuance first class medical certificate limited by a requirement for corrective lenses for near and distant vision and marked "Not valid for any class after August 31, 2015."

Aircraft and Owner/Operator Information

Aircraft Make:	North American	**Registration:**	N14124
Model/Series:	T 28A	**Aircraft Category:**	Airplane
Year of Manufacture:	1951	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	51-3693
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	July 1, 2015 Annual	**Certified Max Gross Wt.:**	8501 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5772 Hrs as of last inspection	**Engine Manufacturer:**	WRIGHT
ELT:	Not installed	**Engine Model/Series:**	1820F56
Registered Owner:	TOKOPH DAVID DBA	**Rated Power:**	1200 Horsepower
Operator:	TOKOPH DAVID DBA	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 1951 by North American as model T-28A, and was designated serial number 51-3693. At the time of the accident, it was powered by a Wright R1820-F56 9-cylinder radial engine rated at 1,200 horsepower and equipped with a Hamilton Standard 3-bladed constant speed propeller. Review of the maintenance records revealed the engine was installed onto the airplane January 17, 1998, at a total airframe time of 5,507 hours. The last recorded annual inspection was reported on July 1, 2015, at a total airframe time of 5,772 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KLRU,4456 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	10:55 Local	**Direction from Accident Site:**	297°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.26 inches Hg	**Temperature/Dew Point:**	30°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Las Cruces, NM (LRU)	**Type of Flight Plan Filed:**	None
Destination:	El Paso, TX (KELP)	**Type of Clearance:**	None
Departure Time:	10:40 Local	**Type of Airspace:**	Class G

At 1055, the weather observation station at LRU reported wind from 080 degrees at 3 knots, 10 miles visibility, clear skies, temperature 30 degrees C, dew point 12 degrees C, and altimeter setting 30.26 inches of mercury.

Airport Information

Airport:	LAS CRUCES INTL LRU	**Runway Surface Type:**	
Airport Elevation:	4456 ft msl	**Runway Surface Condition:**	Rough
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Minor	**Latitude, Longitude:**	32.278057,-106.905555(est)

The airplane touched down on uneven terrain and came to rest upright, with no post impact fire. The flaps and gear were in the up position. All three propeller blades had minimal bending, twisting, and abrasions.

The engine and airframe were examined at a recovery facility. The engine oil screen and forward engine oil sump were significantly contaminated with metallic debris, both ferrous and non-ferrous. The carburetor fuel inlet screen contained no contaminants, residue, or corrosion. The oil reservoir was nearly empty, with oil residue in the vicinity of the nose case. The oil shutoff valve was in the open position. No anomalies were noted with the spark plugs.

The No. 9 cylinder was removed to assess damage inside the engine and was pried off, due to damage to the cylinder skirt and piston. Viewing inside the engine revealed that metal fragments had damaged the other cylinder skirts, connecting rods, and piston bottoms. The No. 6 cylinder connecting rod was fractured in half, with a section of the rod located in the metal fragments.

All flight control cables from the cockpit (pitch, roll, and yaw) remained attached to their respective cockpit controls. The flight control surfaces remained attached to their respective airframe surfaces. No anomalies were noted with the flight control system.

Medical and Pathological Information

On August 19, 2015, an autopsy was performed on the pilot by the County of El Paso Office of the Medical Examiner and Forensic Laboratory in El Paso, Texas. The cause of death was multiple blunt force injuries. The FAA Civil Aeromedical Institute in Oklahoma City, Oklahoma performed toxicology tests on the pilot's specimens obtained during the pilot's hospitalization. Trace amounts of diphenhydramine, as well as lidocaine and lorazepam, were identified. Diphenhydramine is a sedating antihistamine found in many over the counter products intended to treat cold or allergy symptoms and insomnia. Lidocaine is a local anesthetic and is also used to prevent serious heart rhythm problems. Lorazepam is a sedating benzodiazepine. Hospital records indicated the administration of lidocaine and lorazepam during medical treatment.

Survival Aspects

During the forced landing, the pilot sustained serious head injuries when he impacted the instrument panel of his cockpit. The airplane's restraint system did not have an inertial reel to lock the shoulder harness. Instead, the restraint system utilized a manual lever to lock the shoulder harness in place. During airframe examination, no anomalies were noted with the restraint system.

Additional Information

According to the FAA Aviation Maintenance Technician Handbook (FAA-H-8083-30), Chapter 11: Safety, Ground Operations and Servicing:

Before starting a radial engine that has been shut down for more than 30 minutes, check the ignition switch for off; turn the propeller three or four complete revolutions by hand to detect a hydraulic lock, if one is present. Any liquid present in a cylinder is indicated by the abnormal effort required to rotate the propeller, or by the propeller stopping abruptly during rotation. Never use force to turn the propeller when a hydraulic lock is detected. Sufficient force can be exerted on the crankshaft to bend or break a connecting rod if a lock is present.

AVweb, an aviation news resource, published an article on October 9, 2000 describing the potential hazard of a hydraulic lock:

Hydraulic lock affects radial engines because the cylinders stick out around the central crankshaft in a star-like arrangement. When the engine is mounted so that the crankshaft is more or less horizontal, there are cylinders that point downwards. Radial engines use a great deal of oil for lubrication; you measure the amount in gallons, not quarts as we do in opposed engines. After shutdown, there is significant oil in the engine. By various routes some of this oil can and does find its way to the combustion chambers of the cylinders that are pointed downward.

A hydraulic lock is simply too much liquid in the combustion chamber. It leads to a bent connecting rod. Once the connecting rod is bent the engine is going to fail. That's a basic fact. It may run for a few months, or it may quit within minutes. It depends on the nature and degree of the damage to the rod.

If you detect a hydraulic lock on a radial engine the only certain way to cure it is to remove the lower cylinder spark plugs and let the oil drain out. Pulling the prop through forward WILL result in a bent connecting rod and/or expensive damage to the engine if it does not cause a catastrophic failure. Pulling the propeller through backwards only reduces the chance of a bent connecting rod; it does not eliminate the risk.

The full AVweb article is located in the docket for this investigation.

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Geary Monckton; Flight Standards District Office; Albuquerque, NM Daniel K Gilligan; Flight Standards District Office; Scottsdale, AZ
Original Publish Date:	September 12, 2016
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=91796