Aviation Investigation Final Report

Location:	Phoenix, Arizona	**Accident Number:**	WPR17LA004
Date & Time:	October 12, 2016, 10:11 Local	**Registration:**	N509CA
Aircraft:	ROCKWELL INTERNATIONAL 112A	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to air traffic control transcripts, about 17 minutes after the private pilot departed for a personal, cross-country flight and immediately after being cleared to climb to 10,500 ft mean sea level (msl), the pilot advised an air traffic controller that the engine oil temperature was "running a little hot" and that he needed to level off at 7,500 ft msl to "cool off." About 7 minutes later, the pilot repeated that the engine temperature was running high and requested a return to the departure airport but stated that he did not want to declare an emergency. The controller provided the pilot with information for an airport closer to the airplane's position for a diversionary landing. Although a controller at that airport issued the pilot a straight-in approach, the pilot responded that the engine had lost power and that he was going to have to land because the airplane could not reach the airport. Subsequently, the pilot attempted to conduct a forced landing on a nearby road, but the airplane impacted terrain in a train yard and came to rest between trees and a wooden structure substantially damaging the airframe and wings.

During a postaccident examination of the engine, a hole was found in the engine case at the No. 4 cylinder, and metal debris was found throughout the engine, indicative of a catastrophic engine failure. The No. 4 connecting rod bearing had extruded and exhibited signatures consistent with a lack of lubrication, which likely led to the catastrophic engine failure.

The Nos 2 and 4 piston cooling nozzles were absent from their respective threaded bore in the crankcase; they were identified in the oil sump and had sustained destructive damage as a result of passage through the engines internal rotating components. The threaded nozzle bores for the Nos 2 and 4 piston cooling nozzles were not damaged. The No. 1 cooling nozzle remained tight and in place, and the No. 3 cooling nozzle remained in place, but was loose and rotated a quarter of a turn before it became tight. It is likely that the absence of the Nos 2 and 4 piston cooling nozzles would have an effect on the engine lubricating oil effectiveness to the internal rotating components of the engine during operation.

Probable Cause and Findings

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

A catastrophic engine failure due to lack of lubrication due to the absence of 2 piston cooling nozzles that backed out of their respective threaded bores, which resulted in a forced landing on unsuitable terrain.

Findings

Aircraft	(general) - Failure
Aircraft	Oil - Fluid level

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (partial) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On October 12, 2016, about 1011 mountain standard time, a Rockwell International 112A airplane, N509CA, was substantially damaged when it was involved in an accident near Deer Valley Airport (DVT), Phoenix, Arizona. The pilot and passenger were seriously injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

According to air traffic control transcripts provided by the Federal Aviation Administration, the airplane departed from Falcon Field Airport (FFZ), Mesa, Arizona, about 0942 destined for Lake Havasu City Airport (HII), Lake Havasu City, Arizona. About 0955, a Phoenix Terminal Radar Approach Control Facility controller cleared the pilot to climb to his requested altitude of 10,500 ft mean sea level (msl). About 0959, the pilot advised the controller that the engine oil temperature was "running a little hot" and that he needed to level off at 7,500 ft msl to "cool off." About 3 minutes later, the controller told the pilot his altitude was showing 7,200 ft msl and then asked him if he was going to be "okay," and the pilot replied that he would be but that the oil temperature was still high and that he was going to monitor it a little longer.

About 1006, the pilot repeated that he was having trouble with the oil temperature and stated that he wanted to land at FFZ. The controller advised the pilot that he was about 8 miles from Phoenix Deer Valley Airport (DVT), Phoenix, Arizona, and the pilot stated that he would fly close to DVT in case he had to land there and repeated that he was not declaring an emergency. About 1007, the controller switched the flight to the DVT air traffic control tower and advised a controller of the flight's issues. About 1008, the DVT tower controller issued the pilot a straight-in approach for runway 7R, but the pilot responded that his engine had lost power and that he was going to have to land because the airplane would not be able to reach DVT. The controller then gave the pilot his location and told him that there was a freeway to his right. The pilot replied that he would not be able to reach the freeway and was going to attempt to land on a nearby road. The airplane subsequently impacted terrain in a train yard about 3 miles west of DVT.

The airplane came to rest between a tree and a wood-frame structure. The wings and airframe were substantially damaged.

The engine remained attached to the engine mount, which had separated from the firewall during the impact sequence. During examination of the engine, a hole was found at the top of the engine crankcase at the No. 4 cylinder. No evidence of preimpact fire was found. The No. 4 connecting rod bearing had extruded and exhibited signatures consistent with a lack of oil lubrication. The connecting rod had separated from its respective crankshaft journal and

exhibited localized heat distress signatures. Connecting rod bearing material was found in the engine crankcase and in the oil suction screen.

The combustion chambers were undamaged, and no evidence of foreign object ingestion was found. The valves were intact and undamaged, and no valve-to-piston contact was observed. No oil residue was observed in the exhaust system gas path.

The magnetos remained secured to their respective mounting pads, and the ignition harness remained secured at each magneto. Both magnetos produced spark at the end of their respective spark plug leads during hand rotation.

The fuel flow divider remained secured at its mounting bracket at the top of the engine. No evidence of internal mechanical malfunction or obstruction to the fuel flow was found. The fuel nozzles remained secured at each cylinder. The fuel injection servo remained secured at its mounting pad, and the throttle and mixture controls remained secured at their respective control arm at the servo.

The spark plugs remained secured at each position with their respective leads attached. The spark plug electrodes remained undamaged. The top spark plugs were removed, and they exhibited coloration consistent with normal operation. The starter, alternator, and vacuum pump remained secured at their respective mounting pads. The accessory gears remained undamaged; however, flecks of metal were embedded in the case. The normalizing turbocharger and associated system components remained secured at their respective mountings. The turbocharger was not damaged, and the turbine was free to rotate.

The numbers 2 and 4 piston cooling nozzles were absent from their respective threaded bore at the crankcase. Both nozzles were in the oil sump and had sustained damage due to their meshing with the engines internal rotating components. The threaded bores for the Nos 2 and 4 nozzles were not damaged. The No 1 piston cooling nozzle remained secure in its position, and the No 3 piston cooling nozzle was in its position; however, it was loose and could be rotated a quarter of a turn before it became tight. Lycoming SSSP 1776-1, Table of Limits, Section V, page 1-35 required each piston cooling nozzle be torqued to 100 in/lb during assembly.

The three-bladed propeller assembly remained attached to the engine crankshaft. One of the propeller blades was bent rearward. The propeller governor drive was intact and free to rotate. The propeller governor gasket screen contained metal debris.

An engine logbook entry dated September 7, 2016, indicated that the manifold pressure (MAP) indicator was inaccurate and that a mechanic had to troubleshoot it. A logbook entry dated September 30, 2016, indicated that the engine vernatherm, which is a thermostatic bypass valve that controls the flow of oil to the oil cooler, was replaced with a serviceable unit. The oil filter was replaced, and the left and right magneto ignition timing was verified. A run-up and leak check were performed, and the pilot was to conduct a test flight to observe the engine oil operating temperature.

Pilot Information

Certificate:	Private	**Age:**	45,Male
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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	January 1, 2016
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 275 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	ROCKWELL INTERNATIONAL	**Registration:**	N509CA
Model/Series:	112A A	**Aircraft Category:**	Airplane
Year of Manufacture:	1975	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	409
Landing Gear Type:	Tricycle	**Seats:**	
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	2950 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:		**Engine Model/Series:**	I0360 SER
Registered Owner:	SHO CO KIDS LLC	**Rated Power:**	0 Horsepower
Operator:	SHO CO KIDS LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	DVT,1478 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	27°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	MESA, AZ (FFZ)	**Type of Flight Plan Filed:**	None
Destination:	LAKE HAVASU CITY, AZ (HII)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	PHOENIX DEER VALLEY DVT	**Runway Surface Type:**	
Airport Elevation:	1478 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	33.697776,-112.152778(est)

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	Mike Moyer; Federal Aviation Administration; Scottsdale, AZ Mark Platt; Lycoming Engines; Williamsport, PA
Original Publish Date:	December 14, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94195