

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR25LA030

WRECKAGE EXAMINATION REPORT

January 17, 2025

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. ATTENDEES TO ENGINE EXAMINATION.....	3
C. SUMMARY.....	3
D. DETAILS OF THE EXAMINATION.....	4
1.0 ENGINE EXAMINATION	4
2.0 FUEL SYSTEM	9
3.0 OIL SYSTEM	10
4.0 IGNITION SYSTEM	11
5.0 PROPELLER OBSERVATIONS	11
6.0 ENGINE INFORMATION	11
7.0 AIRFRAME EXAMINATION.....	12

A. ACCIDENT

Location: Prescott Valley, Arizona
Date: October 31, 2025
Time: 1620 Mountain Standard Time
Airplane: N154DC

B. ATTENDEES TO ENGINE EXAMINATION

Investigator Eleazar Nepomuceno
National Transportation Safety Board
Federal Way, Washington

C. SUMMARY

On October 31, 2024, at 1620 mountain standard time, a Piper PA-32-300, N154DC, was substantially damaged when it was involved in an accident near Prescott Valley, Arizona. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot he was about 2,000 ft above the ground when he heard two loud "booms" followed by a loss of engine power. Shortly after, smoke and flames appeared inside the cabin near the forward right-side floorboard area. The pilot successfully extinguished the fire with a fire extinguisher and performed a forced landing to an open field. The forward right-side area of the fuselage was substantially damaged. Preliminary examination of the engine revealed that the No. 3 cylinder was separated from the crankcase.

The airplane was removed from the site and transported to Prescott Municipal Airport, where a subsequent examination was conducted in a secured hangar on January 13-20, 2025 (figure 1).

Summary of Engine Examination

The no. 3 cylinder had separated from the engine case; the no. 3 connecting rod had fractured and mechanical damage was found to the engine case, camshaft, and crankshaft. Five of the eight no. 3 cylinder base nuts were not located. The examination revealed signs of engine case fretting and fretting on each of the six cylinder's hold down plates, consistent with a loss of torque of engine case nuts/bolts and cylinder base nuts.



Figure 1. View of accident airplane in secured hangar.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

Engine Manufacturer: Lycoming Engines

Engine Model: IO-540-K1A5

Engine Serial Number: L-6782-48



Figure 2. Top view of accident engine.

The engine remained attached to the airframe via the engine mounts (figure 2). The three-bladed propeller remained attached to the propeller hub and flange, which remained connected to the crankshaft; all were found unremarkable. The accessory case was unremarkable, and each accessory remained secured to its respective mounting pad.

All cylinders, except no. 3 cylinder, remained attached to the engine case. The no. 3 cylinder was found liberated from the engine case and resting against the engine cowling. The cylinder was retrieved to include the following liberated parts: connecting rod, connecting rod cap, a connecting rod nut, a connecting rod bearing, the no. 3 piston, the no. 3 wrist pin, and various pieces of the engine case (figure3).



Figure 3. View of No. 3 cylinder and recovered parts.

The rocker box covers were removed. It was noted that the no. 4 upper rocker box cover bolt (located at the 12 o'clock position) was finger tight. The intake and exhaust rocker arms were intact. All intake and exhaust valve springs were in place and visually appeared to be undamaged. The upper spark plugs were removed, and all six cylinders were examined internally using a lighted borescope. Hard carbon consistent with combustion deposits were observed on each piston face, consistent with normal operation. All the intake and exhaust valves had hard deposits around the visible sections of the stem; each valve head was intact.

The crankshaft was manually rotated by hand using the propeller. Rotational continuity was established throughout the engine and valve train. The no. 4 cylinder had no valve train movement due to the mechanical damage to the internal section of the case preventing movement of the hydraulic tappet body. Thumb compression was obtained on cylinders no. 1, 2, 5, and 6.

Each angled valve cylinder was further removed from its respective mounting pad. Cylinder no. 6 upper right and lower right base nuts were loosened with minimal resistance once the cylinder wrench was attached. Cylinder no. 5 upper left base nut

was also loosened with minimal resistance. Internal inspection of each cylinder revealed no signs of pre-ignition or detonation.

The accessory case was unremarkable (figure 4). All accessories remained secured to its mounting pad. The accessory case was disassembled; all internal gears were unremarkable and was manually rotated by hand, which revealed movement that was smooth with no binding.



Figure 4. Internal view of accessory gearbox.

The engine case was then removed from the engine truss and disassembled. The mating surface of the engine case with no. 3 cylinder collar showed mechanical damage consistent with the no. 3 piston head articulating up and down as the crankshaft rotated, followed by a subsequent secondary failure of the connecting rod (figure 5). Internal scoring marks within the engine case were consistent with the no. 3 connecting rod end cap separating from the connecting rod. The crankshaft surface with which the connecting rod mated was found with minimal mechanical damage. The bearing saddles did not display any signs of thermal damage. The crankshaft oil galleries remained free of obstructions.



Figure 5. View of engine case highlighting damage to No. 3 cylinder mating surface and studs. Upper left and lower left photo: view of damage to No. 3 piston; Upper right photo: view of damaged connecting rod.

The mating surfaces of each left and right engine case revealed signs of fretting (figure 6). There were no signs of oil deprivation or main bearing shift.

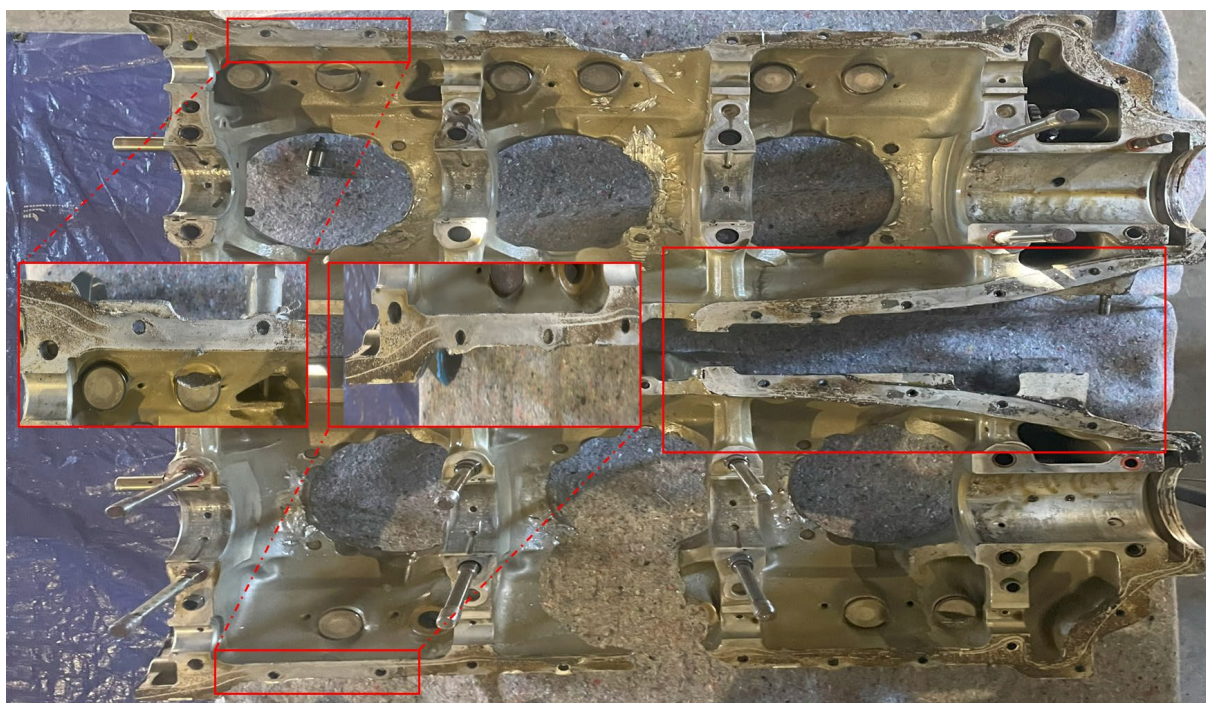


Figure 6. Main photo: internal view of left and right engine case halves, highlighting fretting to forward section of each case half; left photo: view of fretting to upper surface of left case half; center photo: view of fretting to upper surface to right case half.

Further examination of each cylinder hold down plate (both top and bottom for each cylinder) revealed signs of fretting on the mating surface where they interfaced with the cylinder base nuts (figure 7).



Figure 7. Six photos showing fretting to each cylinder hold down plate.

2.0 Fuel System

The fuel servo remained secured to its mounting. When removed from its mounting pad (figure 8), fluid consistent with aviation gas was observed in both the input and output fuel lines. About 5 oz of fuel was recovered from the fuel servo and tested for water contamination using Sargel; testing revealed that water was not present in the tested fuel.



Figure 8. Multiple views of removed fuel servo.

3.0 Oil System

The oil sump was removed and metal particulates from the oil pan were recovered. Metal particulates were consistent with metal from the engine case. The oil screen was also removed and found to be filled with metal particulates (figure 9). The oil filter was removed and opened. A fine mist of metal shavings was found throughout the folds of the oil filter paper element (figure 9).



Figure 9. Left photo: view of oil case screen; right photo: view of removed oil filter.

4.0 Ignition System

Both left and right magnetos remained secured on its mounting pad. All wires leading to the spark plugs remained secured and was unremarkable. The magnetos were manually rotated with a power drill and found to be operational. All spark plugs exhibited signatures consistent with NORMAL when compared to the Champion Check-A-Plug comparison chart.

5.0 Propeller Observations

The three bladed constant speed propeller remained attached at the crankshaft flange (figure 10). The spinner remained attached and was unremarkable. The propeller governor remained secure at its respective mounting pad and was unremarkable. The governor control arm was secured and unremarkable.



Figure 10. View of propeller mounted to accident engine.

6.0 Engine Information

At the time of the accident, the engine had a total time of 1168.83 hours since last overhaul. Engine logbook records revealed that the last overhaul was completed in

October 9, 1997, in which internal engine components were replaced with Parts Manufacturer Approval (PMA) parts (figure 11).

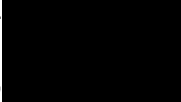
TE	TOTAL TIME IN SERVICE	TOTAL TIME SINCE OVERHAUL	RECORDING METER TIME	DESCRIPTION OF WORK PERFORMED— SIGNATURE & CERTIFICATE NO. OF PERSON PERFORMING WORK
				TOTALS brought forward from previous page
				LYCOMING ENGINE MODEL: IO-540-K1A5 SERIAL: L6782-48 10.9/97' PIPER PA32-300 S/N: 32-40599 N154LG TACH: 1455.4
				Accomplished major overhaul of this engine. Disassembled, cleaned, inspected, and overhauled engine in accordance with factory recommended procedures, specifications and pertinent Federal Air Regulations.
				All internal steel parts were magnafluxed and all non-ferrous materials were dye checked.
				The following new parts were installed: (6) SL10207 piston, (6) CN203 piston ring set, (6) PA17XV exhaust valve, (12) SL11796 valve spring, (12) SL11797 valve spring, (12) 72050 valve keeper, (12) MS13997-3 valve keeper, (6) SL13444-1 piston pin, (2) SL13885 main bearing, (6) SL11575 main bearing, (12) 74309 rod bearing, (12) LW12596 rod bolt, (12) SL12186 rod bolt nut, (1) 78528 oil pump body, (1) SL18109-AS oil pump gear set, (2) 67542 magneto drive bearing, (1) 13S19647 crank gear, (6) 1102 plug, (1) 1028B oil pressure ball, (1) 61084 oil pressure spring, (2) SL76788 roller, (2) 73648 roller, (8) 71907A plate, (8) SL14820 snap ring, (1) STD2209 crank gear bolt, (1) LW25-0.75 bolt, (1) 77756 bracket, (1) QH48110 oil filter, (1) SL73185-1 gasket & seal set, (4) LW12136 magneto drive cushion, (6) SDD1821 oil return hose. (12) Aeroshell 100 mineral oil.
				(6) Ceminil cylinders, P/N LW13531CN, overhauled by J & J Air Parts, FAA Repair Station #JE2R921K. ***** CONTINUED ON NEXT PAGE *****
				LYCOMING ENGINE MODEL IO-540K1A5 SERIAL L6782-48 (CONTINUED)
				(2) counterweights, P/N 73644 certified by Aircraft Engine & Accessory, FAA Repair Station #U11R533K.
				(12) tappet bodies, P/N 72877, (6) connecting rods, P/N LW10646, (6) rocker arms, P/N 67112, (6) rocker arms, P/N 67113, & camshaft, P/N 76148, reconditioned & certified by Aircraft Engine & Accessory, FAA Repair Station #U11R533K.
				Engine driven fuel pump, P/N RG17980D, S/N B-8974-3402 overhauled by Approved Aircraft Accessories, FAA Repair Station #US2R225L.
				Vacuum pump, P/N 211CC, S/N 02234, overhauled by Aero Accessories, FAA Repair Station #YV4R688M.
				Complied with AD75-08-09 & 96-09-10 by installing P/N SL18109-AS.
				Complied with AD91-14-22 by inspection & installing P/N 13S19647.
				Complied with AD93-02-05 by inspection & proper clamping of lines.
				Engine ground run on a test stand.
				 SCHMIDT AVIATION INC. Ft. Lauderdale, FL. 33309

Figure 11. View of engine overhaul logbook entry.

7.0 Airframe Examination

Outward deformation of both the upper and lower right side engine cowlings was evident, consistent with impact from the separated no. 3 engine cylinder. Fire and heat damage was visible to the lower, right side engine cowling, forward right-side fuselage, and the underside of the forward fuselage (figures 1 and 12).



Figure 12 - View of underside fuselage fire and heat damage

Submitted by:

Eleazar Nepomuceno
Aviation Accident Investigator