

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN25LA077

FIELD NOTES

March 19, 2025

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A. ACCIDENT

Location: Addison, Texas
Date: January 14, 2025
Time: 1830 Central Standard Time
Airplane: Piper Aircraft, PA28-181, N504AF

B. FIELD NOTES

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C. SUMMARY

On January 14, 2025, about 1830 central standard time, a Piper PA-28-181 airplane, N504AF, was substantially damaged when it was involved in an accident near Addison, Texas. The pilot was not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight. The pilot reported that during the initial climb, about 150 ft above ground level, the engine lost partial power. Unable to continue the climb, the pilot declared an emergency and attempted to land on the remaining usable runway. The airplane landed hard, collapsed the right main landing gear, and came to a stop. The right wing sustained substantial damage.

D. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

Both wings, the horizontal stabilator, and the tail cone were removed for recovery. The left wing and fuel lines were reattached in preparation for the engine examination. The fuselage remained intact and sustained impact buckling aft of the left wing rear attachment point. The right wing was present and resting on a repair stand.

The right wing sustained substantial impact damage. There was a puncture through the upper wing skin from the right main landing gear. The right main landing gear was present during the examination.

The fuel selector left position was tested during the engine function test run; no anomalies or blockages were noted during any of the 9 engine test runs.

During the post-engine test run, the fuel selector was tested in the "right" and "off" positions, using pressurized air from the selector engine supply fitting to the right wing tank fuel lines. No obstructions or anomalies were noted from the fuel selector to the right wing root, where the fuel lines were disconnected.

The pilot did not report any flight control malfunctions during the forced landing; therefore, the flight control system was not examined in depth.

1.1 Engine Examination

The engine remained attached to the fuselage via the engine mount and was observed undamaged. The mount remained intact with no notable impact damage. No oil leaking from the engine was noted, and all oil and fuel lines appeared tight during the examination. The oil dipstick indicated 6 quarts of oil in the engine.

The firewall-mounted fuel strainer was drained, and no debris was present. When water-detecting paste was used, no water was observed in the sample.

Both magnetos remained installed and undamaged. The ignition leads were attached from the magnetos to the spark plugs and were not damaged. All top spark plugs were removed and checked against a Champion Check-A-Plug chart, and coloration and wear patterns were consistent with normal engine operation. When the engine was rotated by hand, suction and compression were observed on all cylinders. All cylinders were borescoped, and no anomalies were noted.

Play was observed in the valve shaft between the grommets and the airbox holes. The airbox was removed for further examination. The bushings were visually inspected and were unremarkable. The airbox was visually inspected, and two previously repaired cracks in the round section near the bracket welds were observed. The airbox was illuminated from the inside, and no light was observed in the areas of these cracks.

The SCEET hose from the air filter to the airbox was observed to have two tears near the filter end.

The mixture and throttle control linkages were found connected to the fuel servo. The throttle and mixture moved through their full range of motion via cockpit controls.

The throttle-quadrant friction adjustment was tested by rotating the friction adjustment lever approximately 90 degrees and observing tactile resistance at the control handles.

The exhaust system remained installed, and no notable damage was observed.

The propeller had no observable damage and remained attached to the crankshaft flange.

EGT probes from cylinders #1 and #3 were swapped for troubleshooting. High EGT at cylinder #1 was confirmed during the second test run.

The fuel injection nozzle lines were disconnected from each cylinder, and flow was tested via the electric fuel pump. All fuel lines produced about the same amount of fuel: each fuel injector nozzle was removed and examined. The fuel injector nozzle for engine #1 contained white/greyish debris and was retained for further testing. All other nozzles had no observable contamination.

The fuel flow divider was removed, and white/greyish debris was found inside the diaphragm metering stem. The blockage was aligned with the ports for cylinder 1. The debris was removed and retained for further testing.

The fuel inlet line between the firewall and fuel flow divider was removed, and no obstructions were noted.

A white/greyish sealant was observed on the threading of the fuel flow transducer.

1.2 Engine Function Test Run

The engine was prepared for a functional test run with the following modifications:

- The left wing and fuel lines were reconnected.
- 7 gallons of fuel were added to the left wing tank.
- The battery was charged.

The engine was run four times during the first day of the examination. During these runs, the engine was successfully operated at full throttle both with and without the electric fuel pump activated. High EGT was observed at the #1 engine cylinder during all four runs, consistent with the data from the accident flight.

During the first run, a mag drop test was performed. The engine was operated at around 1800 RPMs, and the left magneto was turned off. The RPMs dropped by about 70 RPMs. The left magneto was turned back on, the RPMs stabilized around 1800, and the right magneto was turned off. The RPMs dropped about 50 RPMs. With the engine at full throttle and both magnetos on, the RPM was observed to be about 2,350.

After the first run, the EGT probes from cylinders #1 and #3 were swapped for troubleshooting. High EGT in cylinder #1 was confirmed during the second run, regardless of the probe used. The fuel injector nozzle lines were then disconnected from the fuel injectors, and fuel was flowed through the lines using the electric fuel pump. The fuel was captured in four containers, one at each nozzle, and the quantities were compared and found to be about equal.

The #1 cylinder fuel injector nozzle was removed, revealing a small piece of grayish-white material inside. After removing the substance, the engine was run a third time, but high EGT was still observed in cylinder #1.

Before the fourth run, the top and bottom spark plugs from cylinder #1 were removed, cleaned, and inspected. No damage and normal wear and coloration were observed on the spark plugs. The induction pipe was removed from cylinder #1 and was observed to be free of any blockage. The gasket was in good condition. The spark plugs and induction pipe were reinstalled. During the fourth run, the mixture was adjusted to lean-of-peak, causing all four cylinders to indicate high EGT. When the mixture was adjusted to rich-of-peak, EGT decreased for all cylinders except #1.

Following this run, the fuel divider cap and divider metering stem were removed. A piece of grayish-white material was found partially obstructing the port for cylinder #1 in the divider metering stem. A fifth run is planned for the second day of the exam.

On the second day of the exam, both fittings were removed from the fuel flow transducer, and the threads were cleaned until no sealant was present. The fittings were reinstalled in the transducer, and the transducer was reinstalled in the airplane.

After the first engine run of the second day of the exam, the left fuel tank was observed to have low fuel quantity. During that run, the engine was rough-running with throttle increases and shut down at idle. After adding fuel to the left fuel tank, those issues did not occur on subsequent runs.

Before the second engine run, the fuel injector nozzles from cylinders #1 and #2 were swapped. During this second run, the EGTs for all cylinders remained approximately equal across all throttle and mixture settings, including lean-of-peak operation, where all EGTs increased. The mag drop test was within recommended limits. The engine ran smoothly at idle, around 750 RPM. The engine smoothly increased to about 2,350 RPMs when the throttle was advanced to take-off power, and it continued to run smoothly.

After that second run, the fuel injector nozzles were swapped back to their respective positions. On the third run of the second day, the engine operated normally at all throttle and mixture settings.

After this third run, the #1 cylinder fuel injector nozzle was removed, and a wood plug was inserted into the nozzle. This created about an 80% blockage. On the fourth run, the EGT for cylinder #1 was higher than that of the other cylinders at all throttle and mixture settings. The engine produced about 2,380 RPMs at full throttle and a full-rich mixture setting. During lean-of-peak operation by reducing the mixture, the cylinder EGTs all increased. After that, the mixture was returned to rich, and the EGTs for cylinders #2 through #4 decreased while cylinder #1 remained high. The engine almost shut down at idle during this run, with the lowest RPM observed at about 350 RPM, but the throttle was increased to keep the engine from shutting down.

After the fourth run of the day, the fuel injector line and fitting were disconnected from the fuel divider. The port in the divider was plugged, and the disconnected fuel injector line was taped shut to simulate a 100% blockage. A fifth run was then conducted. During this run, the engine ran roughly during the entire test and would almost shut down with the mixture in the rich position and the throttle at idle. With the throttle fully open and the mixture fully rich, the engine ran roughly at 670 RPM. With the mixture leaned for smoother operation and the throttle remaining fully open, the engine ran at about 2,000 RPM. The throttle was reduced to idle, and the

mixture was set to rich. From this position, the throttle was increased in one rapid, smooth motion to full throttle. The engine initially responded with an increase in RPMs to about 1,850, followed by a rapid decrease in RPMs and an increase in roughness.

1.3 Maintenance Information

The fuel flow transducer was removed and replaced on January 8, 2025. The Tachometer was at 4,880.1 when the transducer was replaced.

The Maintenance Manual (number 761-883), page 73106, dated July 31, 2024, does not call for sealant on the transducer threads for aircraft serial numbers 28020001 through 28020143, which applies to this aircraft. Serial numbers 28020144 and up require Loctite 567 to be applied to the threads.

Even though the Maintenance Manual does not call for the use of sealant on this S/N aircraft, Piper stated that the next revision of the Maintenance Manual will include the use and procedure for sealant for this S/N.

Tach time as observed at the beginning of the examination: 4898.8

Submitted by:

Cory Maxon
NTSB