

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA22LA302

EXAMINATION

January 17, 2023

A. ACCIDENT

Location: Center Cross, VA
Date: July 8, 2022
Time: 1530 EDT
1930 UTC
Airplane: Air Tractor AT-502B; N50075

B. EXAMINATION

IIC	Aaron McCarter NTSB Washington, DC
Subject Matter Expert	Mathieu Renaud Pratt & Whitney Canada
Subject Matter Expert	Robert Duma Pratt & Whitney Canada

C. SUMMARY

On July 8, 2022, about 1500 eastern daylight time, an Air Tractor AT-502B, N50075, was substantially damaged when it was involved in an accident near Center Cross, Virginia. The commercial pilot was not injured. The airplane was operated as a Title 14 Code of Federal Regulations (CFR) Part 137 agricultural flight.

According to the pilot, prior to the spraying operation, the airplane was filled with aviation fuel and agriculture chemicals. While flying his sixth load, shortly after completing his final spraying pass, he turned and climbed about 350 ft above ground level when he heard a loud bang, which was followed by a loss of engine power and the airplane's inability to maintain altitude.

The pilot lowered the nose and attempted to perform a forced landing in a field that looked suitable. The airplane touched down and bounced. The pilot was unable to arrest the bounce and land within the distance of the field. The airplane impacted trees and terrain before coming to rest upright inside the tree line.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

The investigative team did not travel to the accident site for this examination. The airplane was recovered by AMF aircraft Recovery in Springfield, Tennessee. Aircraft had attempted an emergency landing after a loss of engine power in a harvested forest area at coordinates 37°47'41.898"N, 076°46'34.265.



1.1 Wings/Tail/Flight Control Continuity

The Right wingtip and several skin panels were located at the initial tree impact location. The left and right wing leading edges displayed signs of tree impacts and were crushed front to back to the wing's main spars. All flight controls were present with the right elevator detached due to impact damage but was discovered in the immediate vicinity of the accident site. Flight control continuity was verified to all flight controls to all surfaces. The rudder remained attached, and the vertical stabilizer was bent at a nearly 90° angle to the right. The right flap was retracted, and the left flap was partially deployed. The left wing was heavily impact damaged and crushed aft and was partially separated from the wing root. All damage was due to impact.

1.2 Cockpit

The cockpit, instrument panel, seat and lap/shoulder harness were intact, and all gauges were functional. The engine control levers for throttle, prop and fuel were functional; verified engine and propeller control continuity with no binding from the cockpit and engine.



1.3 Survivability

Cockpit and the surrounding structures were intact. There was no deformation, and the seat and shoulder harnesses were intact and functional. Survivable with minor injury sustained.



1.4 Fuel/Fuel System

The airplane was partially disassembled to facilitate transport to the recovery/storage hanger and any remaining fuel was drained prior to transport, however, the Federal Aviation Administration (FA) Inspector who traveled to the wreckage site confirmed that the fuel tanks were not compromised, and fuel poured out during removal from tree line. The fuel was confirmed to be Jet-A and was free of water or debris. Fuel was also discovered in the engine compartment filter drain. The fuel selector valve contained residual fuel and operated normally between the detents with no binding or limitations. The detents were distinctive.

2.0 Engine Examination

There was no observable engine FOD/debris located in the intake or exhaust. There were no external signs of a catastrophic engine failure. Rotation of the power section via the propeller assy. was not possible. Smooth and noise free rotation of the compressor was possible using the accessory gear box mounted accessory. Visual examination of the exterior of the accessory gearbox revealed no damage.

Pneumatic lines were intact and secured except for the flexible line from the P3 filter bowl adapter to the fuel control unit; the fitting adapter was found finger tight at the bowl adapter. The P3 filter and filter bowl were free of contaminant.

The power turbine control line was found in good visual condition and secured. The chip detectors were clean and free of contamination. The oil filter was visually free of contamination.

The fuel filter bowl was found with a small quantity of fuel in its cavity, the fuel filter was visually inspected and found free of visual contamination.

The engine was opened exposing the compressor turbine (CT) disk that was discovered in good condition with no anomalies noted. Following the CT disk removal, one blade was missing a small tip section that was found adjacent to the blade. CT segments and the compressor turbine vane were found with typical operational wear and in good condition.

The combustion chamber, large and small exit duct were found in good condition.

After splitting the engine, the power section was not unable to be rotated. The Inter Turbine Temperature (ITT) probes and power turbine vane were found in good visual condition without appearance of damage. The power turbine disk was found in good visual condition. After removing of the power turbine disk from the power section, the rotation of the reduction gear box was possible, and did not yield any

anomalous behavior or noises. There was evidence of rubbing on the power turbine blades on their tips and there were corresponding rub marks on the turbine shroud.

The compressor was rotated freely and did not exhibit anomalous behavior noise or limitations; it had mechanical continuity. The first stage compressor blades were inspected, and no damage was observed.

The reduction gear box revealing the 1st and 2nd stages were free of irregularities and rotated freely without anomalous behavior or unusual noises.

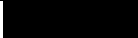
All engine accessories were in a good visual condition. The bleed valve was accessed, and the piston moved freely. The valve diaphragm revealed no defects.

There was no indication or pre impact anomalies of the engine that would have precluded normal engine operation.

3.0 Propeller Examination

At the accident site, the 3-blade metal Hartzell propellers, designated A, B and C for readability each exhibited features consistent with at least some power applied. Two propeller blades exhibited chordwise/rotational abrasion. One blade "A" was bent aft and twisted towards low pitch near the tip. Another blade "B" was bent aft about 90 deg and exhibited wave bends in the leading edge consistent with tree/branch strikes. The third blade "C" was fractured about 10-12" from the tip. The damage was consistent with some rotation and not feathered at impact.

4.0 Pilot Information


Cert#  w Class 2 Med
Certs: Commercial with Flight Instructor
Hours: TT 4,900; MM 3,100 With 100 hours last 90 days

5.0 Aircraft Information

Air Tractor Inc, AT-502B; Ser# 502B-0494
MGW: 9400
DOM: 1998
100 Hr. inspection conducted on February 1, 2022
Hobbs 9323 (9363 on accident date)
Eng TT: 10407
Eng: Airworthy, no defects noted.
Airframe: All AD complied with. Airworthy, no defects noted.

Prop: Inspected. Airworthy, no defects noted.

Engine Model: PT6A-34AG, Serial No.: PH0716

Type: Reverse Flow, Free Turbine Turboprop Compressor:

Multi-stage (one centrifugal stage, three axial stages)

Turbine: One axial power turbine and one axial compressor turbine Power

Ratings: Takeoff Power: 750 SHP @ 2200 RPM Max Continuous Power: 750 SHP

@ 2200 RPM Max Climb and Max Cruise Power: 700 SHP @2200 RPM

6.0 Meteorological Information

Location.....: KFYJ

Day of month.....: 08

Time.....: 18:35 UTC

Report is fully automated, with no human intervention or oversight.

Wind.....: true direction = 170 degrees; speed = 6 knots

Visibility.....: 10 Statute Miles

no clouds and no restrictions on vertical visibility

Temperature.....: 29 degrees Celsius

Dewpoint.....: 21 degrees Celsius

QNH.....: 30.02 inHg

Remarks

site does not have a precipitation sensor.

Temperature.....: 29.1 degrees Celsius

Dew Point.....: 21.4 degrees Celsius

7.0 Additional Information

Service Letter #178 Regarding Fuel Imbalance during maneuvering issued April 8, 1999, with a subsequent reissue in 2002 and 2009. See SL for detailed information. Based on the available evidence at the accident site and during the examination, there is not enough factual data to support a fuel imbalance. This model had 2 large dial fuel quantity gauges on the upper left of the instrument panel in plan view, however, the precise amount of fuel could not be determined, however, the FAA ASI reported, "When the aircraft was raised significant fuel was observed flowing from both the left and right wing root areas."

Submitted by:

Aaron McCarter
Aviation Accident Investigator