

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24FA304

EXAMINATION

July 14-16, 2024, and December 3, 2024

A. ACCIDENT

Location: Cuba, Kentucky
Date: July 13, 2024
Time: 15:27 Local
21:27 UTC
Airplane: Air Tractor, AT-802A, N2003Y

B. EXAMINATION (JULY 14-16, 2024, AND DECEMBER 3, 2024)

IIC	Aaron McCarter NTSB Washington, DC
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Party Coordinator	Nicholas Anderson FAA/FSDO Louisville, KY
Technical Advisor	Frederic Cardinal Pratt & Whitney Canada

C. SUMMARY

On July 13, 2024, about 1530 eastern daylight time, an Air Tractor AT-802A, N2003U, was substantially damaged when it was involved in an accident near Cuba, Kentucky. The airline transport pilot was fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations (CFR) Part 137 agricultural flight.

D. DETAILS OF THE INVESTIGATION

1.0 Accident Site

The airplane initially contacted a corn field on the west side of Grover Hall Road. The corn was neatly sliced in a progressively lower pattern in about a 20° angle and approximately 30 rows were displaced. Witness marks from the tail wheel and both main landing gear were observed. The airplane appears to have contacted in a wings level, pitch down attitude. The right wing was raised slightly based on slicing signatures of corn in the debris field. The aircraft then contacted a drainage ditch, slid across Grover Hall Road, and impacted a secondary embankment before coming to

rest in a bean field approximately 50 feet from the road. The wreckage path was approximately 100 feet long.

°**Figure 1 Accident site photo with lat/log, headings, and elevation.**

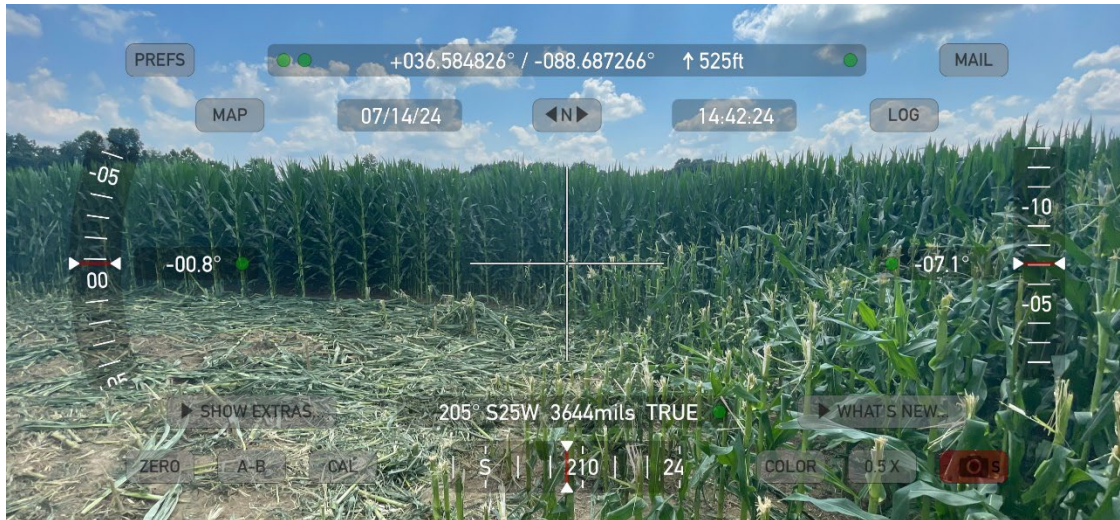


Figure 2 Accident site at initial impact. Note sliced corn stalks in about a 20° path.

The smell of the spraying chemicals was prominent on the westerly side of the debris field. The smell of jet fuel was present around the front of the airplane. Oil, fuel, agricultural chemical was puddled below the cockpit and right-wing root of the airplane. The airplane came to rest facing a Southeasterly position.

2.0 Airframe Examination

Air Tractor Inc, AT-802A.

MGW: 16,000 lbs

DOM: 2011

Annual (AF) inspection conducted on May 5, 2024

Hobbs 5948.9

AF TT:5948.9

Eng TT: 5670.1 on August 3, 2023 (100 hr inspection.)

MX Logbook Eng: Airworthy, no defects noted on site.

MX Logbook Airframe: All AD complied with. Airworthy, no defects noted on site or during the examination.

MX Logbook Prop: Inspected. Airworthy, no defects noted on site or during the examination.

The airframe is a 2011 Air Tractor, AT-802A, serial number 802A-0428 owned by Oops LLC.

<u>Manufacturer:</u>	Air Tractor, Inc.	<u>Model Number:</u>	AT-802A
<u>Serial Number:</u>	802A-0428	<u>Registration Number:</u>	N2003Y
<u>Date of Manufacture:</u>	October 26, 2011		
<u>Engine installed:</u>			
<u>Manufacturer:</u>	Pratt & Whitney	<u>Model Number:</u>	PT6A-65AG
		<u>Serial Number:</u>	PCE-PN0140
<u>Propeller installed:</u>			
<u>Manufacturer:</u>	Hartzell Propeller, Inc.	<u>Model Number:</u>	HC-B5MP-3F/M11276NS
<u>Hub Model:</u>	HC-B5MP-3F	<u>Serial Number:</u>	EVA3157
<u>Blade Model:</u>	M11276NS	<u>Serial Numbers:</u>	L16109, L16110, L16111, L16112, L16113

Figure 3 Aircraft, engine, and prop data.

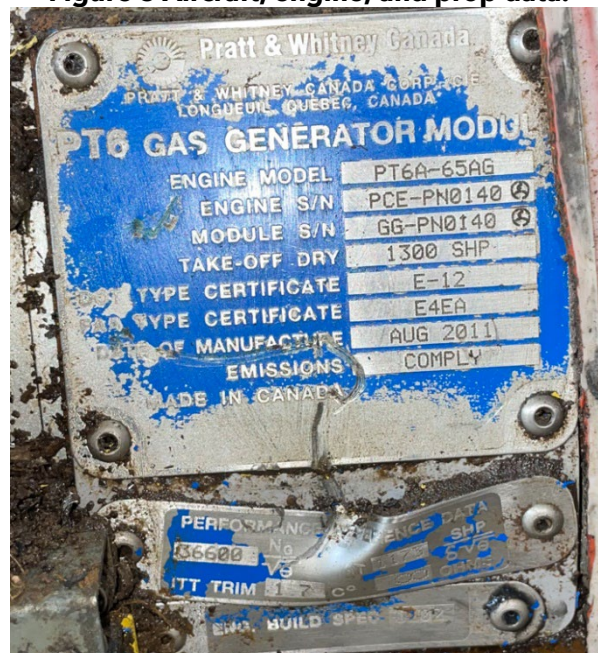


Figure 4 Engine data plate.

The engine remained attached to the engine mounts. Both wings remained attached to the fuselage. The rudder remained attached to the fuselage. The elevator was impact separated from the empennage. The hopper and fuselage from the cockpit forward were bent down from impact forces. The engine mount and engine were displaced up. The propeller assy. at the RGU separated from the engine.

2.1 Fuselage

The fuselage was intact and sustained substantial damage to the frame structure in the area surrounding the hopper. The tubular steel structure was bent and fractured on both the left and right sides surrounding the hopper.

2.2 Empennage

The empennage was mostly undamaged with the exception of the elevators. Bending of the tubular structure on the bottom of the airplane aft of the cockpit was present. Control cable continuity was established from the cockpit to the rudder. The left and right elevators were impact separated during the accident sequence. Control cable continuity was visually established from the cockpit to the elevator mounting points. The right elevator displayed significant leading-edge damage, likely from the right main landing gear tire departing the airplane during the accident sequence.



Figure 5 Closeup of empennage.



Figure 6 Empennage with side panels removed.

2.3 Wings

The left and right wings remained attached to the fuselage. Both wings were breached as a result of the impact forces and no fuel was found in either tank. The left-wing tip was separated from the wing. The left flap remained with the left wing but was partially separated. The left aileron was wrinkled. Significant damage was observed at the wing root. The right wing flap was separated from the wing. The right wing was significantly damaged at the wing root. Aileron control continuity was visually established. Fractures on both torque tubes below the cockpit were noted from impact damage.



Figure 7 Front view of wreckage (above) and wing damage (lower)



Figure 8 Wing damage and control rod overload damage.



Figure 9 Control rod overload damage.





Figure 10 Airframe damage pic (above) with tail wheel (lower)

2.4 Cockpit

The control stick moved freely and moved the rudder elevator cables and a portion of the aileron torque tubes. The rudder pedals were damaged and displaced in the cockpit but remained connected to the rudder cables.

The airplane's Hobbs meter was damaged. The engine instrumentation was displayed to the left of the pilot and the navigation equipment was displaced to the right. The fuel pressure gauge was found off the scale right, the left and right fuel level gauges were off the scale left (0), the oil pressure and temperature gauge were illegible, the torque gauge was "0".

The attitude indicator was electronic. The airspeed indicator reading is "0". The altimeter read approximately 860 feet.



Figure 11 Instrument panel.

The flaps switch was in the up position. The power lever was approximately $\frac{1}{2}$ " above "idle". The propeller lever was just above the feathering position. The fuel cutoff lever was at the bottom of the "flight idle" position but above the "fuel cut off" position. The tail wheel was in the "locked" position. The fuel shutoff lever was broken from impact forces. Note that emergency services personnel were in the cockpit post-accident conducting lifesaving and extraction efforts.



Figure 12 Engine controls as found on site.

An iPad used for spraying operations was mounted in the center of the panel between the engine and navigational instruments. The mount remained in-place, but the iPad was not recovered. A Parker manufactured GPS was located below the navigational instruments.

The engine start switch was in the "start" position. The generator switch was "off".



Figure 13 Instrument panel with CB panel and Parker GPS display.

The rudder trim indicator was in the "takeoff" position. The pitch trim indicator was in a neutral position.

2.5 Survivability

The airplane was equipped with a 5-point harness with airbags on the shoulder harness. The airbags deployed during the accident sequence. The pilot's seat was made of tubular steel. The seat structure bottom was folded down from the impact forces. The accident was not survivable.



Figure 14 Cockpit and seat damage.

2.6 Fuel/Fuel System.

The engine fuel pump and fuel control unit (FCU) were removed from the powerplant and sent to Pratt & Whitney Canada (PWC) for further examination and bench testing. The fuel filter on the engine servo was unobstructed with trace amounts of debris. Approximately 1/4 cup of liquid consistent with Jet-A drained from the fuel servo when the fuel filter was removed. The following components investigation was performed on December 3, 2024, at the PWC Service Investigation Facility at Saint-Hubert, Quebec, Canada.

Accessories from ESN PN0140				
Accessory	P&WC P/N	OEM P/N	OEM	S/N
Fuel control unit	None	8063-014-02	Woodward	17645667
Fuel Pump	3040760	825601-5	Eaton	011079

The fuel pump was received without the input drive shaft. Debris similar to dirt was observed on the inlet side of the fuel pump, indicative of terrain impact and manipulation. The FCU drive side of the fuel pump drive gear showed the presence of a greyish substance. Chemical analysis indicated the substance is perfluorinated polyether oil and a molybdenum disulfide grease (lubricant). There is no specification

for application of a lubricant at this location. Testing of the fuel pump with a spare drive shaft showed a fuel flow capacity at low speed and pressure conditions below the specification's minimum limit. This deviation may have been related to debris ingestion and is representative of engine start conditions. The flow capacity at high speed and high-pressure conditions, representative of the in-flight conditions, showed the fuel pump was delivering the required fuel flow. There were no defects or damage evident that would have prevented normal operation of the fuel pump prior to the event.

The FCU was tested in accordance with the Woodward component maintenance manual (CMM) 73-20-11. The testing showed the FCU subsystems were functional and mostly within the CMM limits with the following deviations observed.

The governor droop schedule TP 5.5 was 4 pounds per hour (PPH) below the minimum limit of the CMM. The CDP (P3) schedule TP 6.1 was 3 PPH above the CMM maximum limit. The TP 6.5 was 6 PPH above the CMM maximum limit. The start and acceleration schedule TP 9.6 with the P/L at -5 degrees was 5 PPH below the CMM minimum limit. TP 9.7 was 2 PPH above the CMM maximum limit. TP 9.8 was 2 PPH above the CMM maximum limit. The TP 9.9 was 4 PPH above the CMM maximum limit. TP 9.10 was 9 PPH above the CMM maximum limit. The TP 9.11 was 10 PPH above the CMM maximum limit. The TP 9.12 was 12 PPH above the CMM maximum limit. TP 9.13 was 4 PPH below the CMM minimum limit. The TP 9.14 was 16 PPH above the CMM maximum limit. There were no defects or damage evident that would have prevented normal operation prior to impact.

The wing fuel tanks were breached during the impact sequence. The accident scene had a smell consistent with aviation fuel. According to the owners of the airplane, the flight duration was expected to last no longer than 1 ½ hours.

The fuel shutoff valve was broken from impact forces. The fuel control lever was frozen just above the fuel cut off position, and the lower portion of the "flight idle" labeling.

3.0 Engine Examination

Engine Model: PT6A-65AG, 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: 1,300 SHP

The engine remained attached to the engine mount and was displaced in an upward orientation as a result of impact forces. The propeller and gear box at the front of the engine were impact separated. The oil lines to and from the propeller assembly were

broken in the same location as the gear box separation. The oil level gauge remained installed in the engine with little oil on the gauge.

PRIMETURBINES
A **PAG** Company

F.A.A. Certified Repair Station No. [REDACTED]
Pennsylvania 16002 (USA) Main [REDACTED]

ENGINE LOG

Date: 8-30-23	Tach/Hobbs: 5760.1	Engine Model: PT6A-65AG	Engine S/N: PC-E PN0140	Acft. Reg. No: N2003Y
Engine T.T. 5760.1		Starts: Flights:	Hartzell Prop	Acft. Mod/Ser No: AT802-0428

Complied with 100 hour inspection. Inspected 1st stage compressor blades for FOD, oil filter, chip detector, firewall fuel filter, fuel pump outlet filter, fuel pump inlet screen, P3 filter, rigging and lines. Installed new fuel pump outlet filter. Installed new oil filter. R&R simple nozzle set ref: 8130-3 WO M4R4448. Greased and inspected prop NYCO.

All I.A.W. PWC MM PN 3032842 REV. 68 Dated 4-10-23 and Hartzell manual # 139 Rev. 19, 9/2021. Ground run for leak and ops check OK. AD's checked for compliance to this date. I certify that this engine and prop has been inspected I.A.W. a 100 hour inspection.

MAINTENANCE RELEASE: The aircraft, aircraft engine, appliance identified above was repaired and inspected in accordance with current maintenance rules of the Federal Aviation Regulation and is approved for return to service.

Pertinent details of the repair are
on file at this repair station under work order No: **PF1635**.

Authorized Signature: [REDACTED]

Figure 15 Engine log.

The pneumatic lines were found secured to the fuel control unit. The turbine control line was intact and secure.

The compressor turbine disk was visually examined via borescope and no anomalies were observed. Typical operational wear was observed. The combustion chamber, large and small exit ducts were in good condition. The power turbine section was visually examined. The power turbine vanes and disc were undamaged and did not exhibit any rubbing on the blade tips or the shroud. Organic matter with a smell consistent of soil was found in the bottom of the shroud, indicative to ingestion during the accident sequence.



Figure 16 Engine with cover removed.



Figure 17 Left side of engine.



Figure 18 Engine accessory section.

The engine would not rotate when force was applied to the front of the engine. The engine would partially rotate using the spline drive at the back of the engine. The engine was separated at the hot section for further examination. The engine would spin freely up to the combustion chamber, but the front of the engine would not spin after removal. The front of the engine was found to have deep impacted organic debris and pieces of fiberglass packed into the forward reduction gearbox teeth preventing rotation.



Figure 19 Split open engine and turbines during exam.



Figure 20 Engine/Prop RGU

The throttle control cable continuity was confirmed. The cable was broken from the fuel servo at its attaching point. The mixture cable continuity was visually confirmed. The cable was pinched in the fuselage. The propeller control cable continuity was visually confirmed. The cable was separated from the governor at its attaching point.

4.0 Propeller Examination

Propeller HC-B5MP-3F, Serial Number EVA-3157, Blades # L16109, through L16113. The 5-blade metal Hartzell propellers, (designated A, B, C, D, E for identification) each blade exhibited features consistent with low or reduced power applied near the time of impact. The propeller assembly and reduction gearbox (RG) impact was separated at the engine shaft and was discovered on an embankment about 60 ft. from the main wreckage. When placed up on the RG, the propellers rotated about the axis smoothly through 720° with no limitations to movement or unusual noises. All gears were minimally damaged and showed no anomalous pre-impact damage at the RG assembly.

All 5 blades exhibited varying degrees of damage with the A and C blades exhibiting wave bending throughout the entire span. The B, D and E blades were bent uniformly aft mid span about 80° to 90° degrees. Four of the blades were at

their respective indicator (red line) pitch stops (13.9°) indicative they were at reduced or low power at the time of impact. The B blade was not on the pitch stop and rotated freely on its axis. Two of the blades contained a 3/4" deep gouge on the trailing edge of the blade about 15 inches from the tip and the additional blades contained dents and scrapes of lessor severity in about the same location indicative of impact damage being caused by wreckage and debris during the accident sequence. There was no damage indicative of a wire strike, and no wires were damaged on site or in the surrounding area. The blades exhibited chordwise/rotational abrasion. There was no damage to indicate the propellers were feathered or in a flight power setting prior to impact.

PROPELLER MAINTENANCE RECORD

Position <u>Centredline</u>	PITCH RANGE
Propeller Model <u>HC-85MP-3F</u>	High/Feather <u>83.1</u>
Propeller S/N <u>EVA3157</u>	Start Lock <u>NA</u>
Blade Design <u>M11276NS</u>	Low <u>13.9</u>
Blade S/N's	Reverse <u>-10.0</u>
No. 1 <u>L16109</u>	Aircraft Manufacturer <u>Air Tractor Inc.</u>
No. 2 <u>L16110</u>	Aircraft Model <u>AT-802A</u>
No. 3 <u>L16111</u>	S/N <u>802A-0428</u>
No. 4 <u>L16112</u>	Registration <u>N2003Y</u>
No. 5 <u>L16113</u>	
No. 6 _____	
Spinner Assembly Part No. _____	

PRIMETURBINES
A **PAG** Company

PROP LOG

F.A.A. Certified Repair Station No. [REDACTED] Main [REDACTED]
[REDACTED] via 16002 (USA)

Date: 8-30-23	Tach/Hobbs: 5760.1	Engine Model: PT6A-65AG	Engine S/N: PC-E PN0140	Acft. Reg. No: N2003Y
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Figure 21 Propeller details and logbook.



Figure 22 Propeller assy. As found on site (L) and during examination. (R)

Submitted by:

Aaron McCarter and Ryan Enders
Aviation Accident Investigator