

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



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POWERPLANTS

Group Chair's Factual Report

April 14, 2025

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A. INCIDENT

Location: Dulles, Virginia
Date: January 19, 2024
Time: 1251 Eastern Standard Time (EST)
Airplane: Cessna 208B, N1983X, Southern Airways Express

B. POWERPLANTS GROUP

Group Chairman	Robert Hunsberger National Transportation Safety Board Washington, DC
Member	Cody Watson Federal Aviation Administration (DC Flight Standards District Offices) Herndon, Virginia
Member	Casey Love Textron Aviation Wichita, Kansas
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Technical Advisor (Canada)	Mike Hodge Pratt & Whitney Canada Bridgeport, West Virginia

C. SUMMARY

On January 19, 2024, about 1251 eastern standard time, a Cessna 208B airplane, registration N1983X, powered by a Pratt & Whitney Canada PT6A-114A turboprop engine, reported a partial loss of power during initial climb from Dulles International Airport (IAD), Dulles, Virginia. The crew made a forced hard landing on Route 606. The right landing gear wheel struck a car, and the propeller impacted a guardrail multiple times during roll out. There were no passenger or crew injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 flight.

The flight crew reported that at about 400 feet above ground level (AGL) they felt a reduction in engine power and the Standby Power On light illuminated. They

subsequently turned on the fuel boost pump and heard the engine noise change without an accompanying increase in engine power.

The pilot, who was at the controls, instructed the copilot to declare an emergency and initiate procedures to return to IAD. During the turnback, it became evident that the engine was unresponsive, and the airplane was rapidly losing altitude. The pilot made the decision to land the airplane on highway 606, near the perimeter of IAD. During the landing, the airplane touched down on the paved surface of the road and collided with a steel guardrail before coming to a stop. The flight crew secured the airplane, and the crew and passengers were met by first responders.

Inspectors with the Federal Aviation Administration responded to the incident site and examined the airplane. Damage was noted to the highway guardrail, propeller, right main landing gear, cargo pod, and fairing. The airplane was towed to a nearby parking lot and secured. Subsequently, the wings were disassembled, and the airplane was transported to the Southern Airways Express maintenance facility at Lancaster Airport (LNS), Lititz, Pennsylvania for further examination.

Investigation party members from Textron Aviation, Pratt & Whitney Canada, the Federal Aviation Administration (FAA), and the National Transportation Safety Board (NTSB) completed the airplane and engine examination between February 5-6, 2024. The engine was later shipped to the Pratt & Whitney Canada Bridgeport, West Virginia facility for additional examination and a test cell run which were conducted on March 5, 2024.

The Pratt & Whitney Canada PT6A-114A turboprop engine exhibited no indications of external or internal damage that would have precluded normal operation. A test cell run was performed, and power levels were measured above minimum engine overhaul manual specifications with no fluctuations in engine speed or torque during testing. The propeller blades showed evidence of power at impact including gouges on the leading edge, material missing from the blade tips, and blade bending opposite the direction of rotation. A propeller examination performed by McCauley Propeller in Wichita, Kansas did not identify indications of pre-impact failure and concluded that the propeller blade damage was consistent with significant rotational energy at impact. The propeller blade internal witness marks were also consistent with the blades being in the forward thrust operating range at impact.

D. DETAILS OF THE INVESTIGATION

1.0 Engine Information

1.1 Engine Description

The Pratt & Whitney Canada (PWC) PT6A-114A turboprop engine is a reverse flow turboprop engine featuring a three-stage axial compressor, a single-stage centrifugal compressor, an annular combustion chamber, a single-stage compressor turbine, and a single-stage free power turbine. The engine is equipped with a hydromechanical fuel control. According to the FAA type certificate data sheet E4EA, Revision 30, dated June 16, 2021, the engine has a power rating of 675 equivalent shaft horsepower¹. An engine cross section is shown below in **Figure 1**.

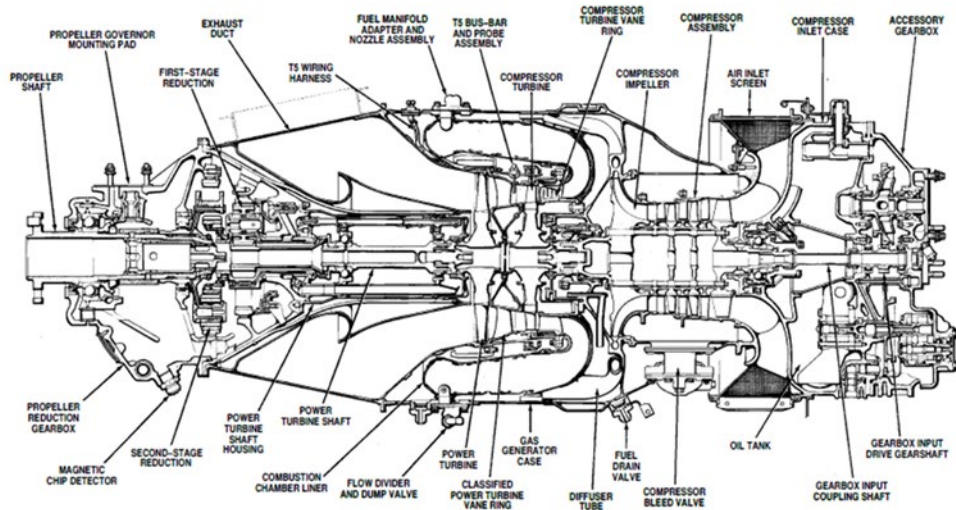


Figure 1- Pratt & Whitney Canada PT6A-114 Engine

(Source- Pratt & Whitney Canada)

1.2 Engine Operating History and Maintenance

The incident engine, engine serial number (ESN) PCE-PC1896, had accumulated 13,539.0 hours time since new (TSN) and 3,627.3 hours time since overhaul (TSO) at the time of the incident according to the operator records.

The last engine overhaul was completed at Dallas Airmotive, Dallas Fort Worth International Airport, Dallas, Texas in February 2020. ESN PCE-

¹ The engine ratings are based on static sea level condition 29.92 inches of mercury (in Hg) pressure, compressor intake screen installed, no external accessory loads and no air bleed.

PC1896 was installed on the incident airplane on September 14, 2020. The last engine related maintenance was completed by Southern Airways Express on December 31, 2023, and included a P&WC engine minor inspection, ignition system inspection, compressor/turbine wash, fuel nozzle inspection, and propeller overspeed governor removal and replacement (**Photo 1**). The engine was operated on condition and had not undergone a hot section inspection or other heavy maintenance since major overhaul.

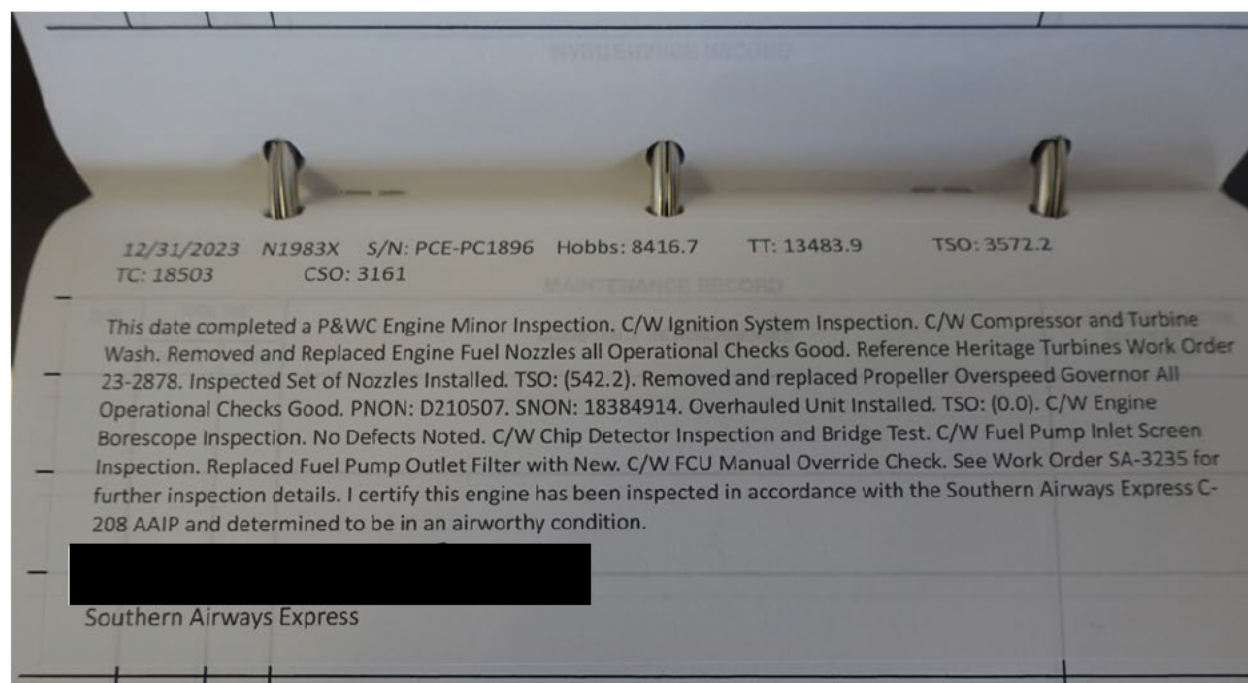


Photo 1- Engine Logbook Entry- December 31, 2023

2.0 Airframe and Engine Examination

2.1 Visual Examination

The engine was secured in the Southern Airways express maintenance hangar when the investigation team arrived (**Photos 2 and 3**). The airplane wings, tail section, cabin seats and interior trim were stored next to the airplane in the hangar. According to Southern Airways Express, the battery was not disconnected prior to transport from Dulles, so after arrival the battery was disconnected, and the cowl doors were sealed shut with security tape.



Photo 2- N1983X, as Received



Photo 3- Propeller, as Received

The three propeller blades all exhibited impact damage including gouging and blade tip material loss. The blade tips were all bent opposite the direction of rotation. Blades 1 and 2² were in the feathered position and Blade 3 was rotated 180 degrees relative to the other two blades. Two blade tip fragments were recovered from the highway and shipped in a box (**Photo 4**).



**Photo 4- Propeller Blade Tip Fragments Recovered from Highway
(Source- FAA)**

² The propeller blade numbers were imprinted in the blade hub.

The safety wire securing the emergency power throttle in the cockpit was intact (**Photo 5**).

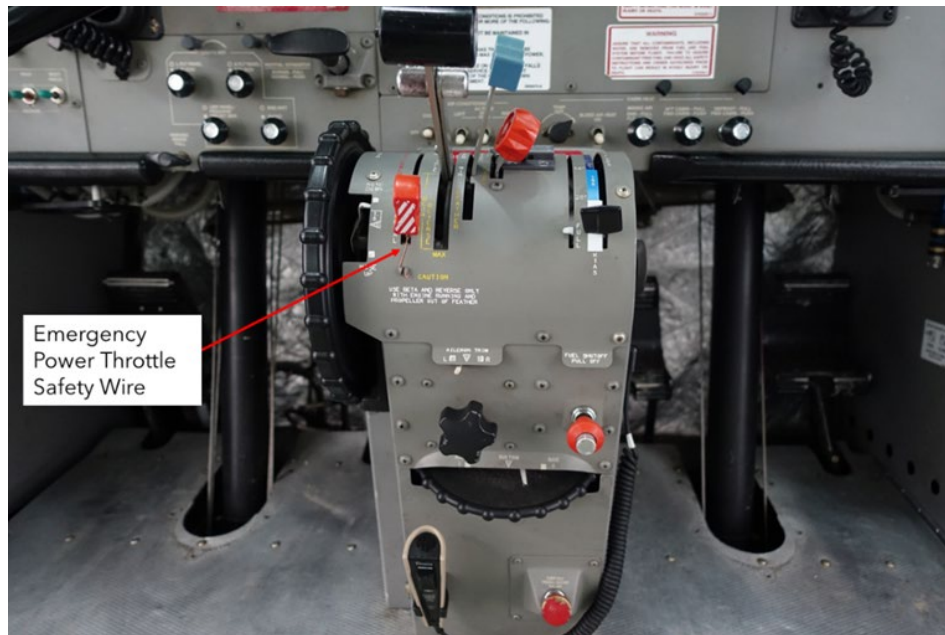


Photo 5- Cockpit Throttle Quadrant

Three fuel samples collected on scene from the left wing tank, right wing tank, and reservoir tank were shipped with the airplane. All samples were clear with no evidence of water or other contamination (**Photo 6**). The investigation team opted not to perform fuel sample testing due to a lack of evidence that fuel contamination was a contributing factor in the incident.



Photo 6- Fuel Tank Samples

2.2 Airframe Checks

The fuel selector handle on the overhead panel of the cockpit was rotated and cable continuity to both wings was confirmed. The fuel shutoff switch in the left and right wing was rotated and the shutoff ball valve translated smoothly and matched the switch click position at open and closed.

The airframe fuel strainer was removed and was in good condition with light debris and no obstructions. The main fuel supply line from the airframe fuel strainer to the fuel pump was intact and a low-pressure air check confirmed there were no obstructions in the line. Ground power was supplied to the airplane and the auxiliary fuel pump was cycled on to partially drain the reservoir (header) tank. When the tank reached the low volume set point an alert light illuminated in the cockpit. The fuel shut-off valves and position switches are housed in the airplane wings. When ground power was applied to the airplane and the starter breaker was reset, the fuel selector aural warning sounded. The test confirmed that the fuel selector aural warning was functional. The fuel shut-off valve located below the floorboards near the pilot's rudder pedals operated correctly and the control cable was secured. The low fuel level warning breaker was collared in accordance with the aircraft maintenance manual.

The cockpit power lever was advanced from ground idle to takeoff power and the condition lever was advanced from shutoff to flight idle multiple times and there was concurrent smooth rotation of the power and condition levers on the engine fuel control unit (FCU).

2.3 Propeller

The propeller nose cone was removed to examine the propeller hub. The counterweight attaching studs on Blades 1 and 3 were pulled out of the hub and the threads exhibited deformation (**Photo 7**). The counterweight attaching stud on Blade 2 was below torque specification and when removed, the threads also exhibited deformation. The pitch of all three blades could be rotated by hand with minimal resistance.



Propeller Blade
Counterweight

Photo 7- Propeller Blade Counterweights, Separated

The propeller piston assembly was removed, and all pitch change attaching linkages inside the hub were fractured (**Photo 8**). The blade shanks had impact damage and gouging. The propeller was removed as an assembly and packaged for shipment to McCauley Propeller in Wichita, Kansas. The counterweight, nose cone, and propeller logbook were included in the shipping crate (**Photo 9**).

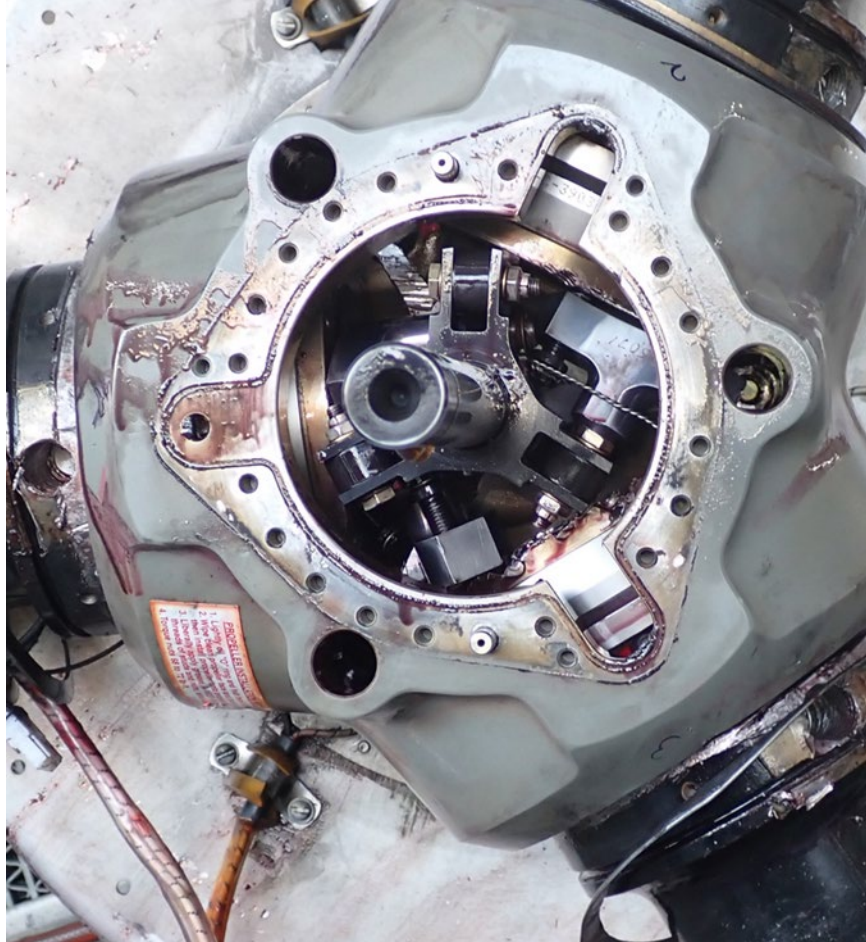


Photo 8- Propeller Blade Pitch Change Attaching Linkage Damage



Photo 9- Propeller, as Shipped to McCauley

2.4 Engine Examination

External engine surfaces appeared unremarkable with no evidence of uncontainment or undercowl fire (**Photos 10 and 11**). The gas generator (Ng) spool was manually rotated by turning the alternator/alternator pad in the accessory gearbox (AGB). The Ng spool rotated smoothly with no audible grinding. The reduction gearbox (RGB) and AGB magnetic chip detector plugs had no significant debris accumulation (**Photo 12**). The fuel, oil, and P3³ filters were in good condition and free of debris (**Photos 13**). The P3 and Py⁴ b-nut connections on the propeller governor, FCU, and bulkhead were torqued, and safety wired. A safety wire could be not inserted through the forward or aft clevis inspection holes that function as check points for proper thread engagement during engine rigging. The beta arm was installed on the correct side of the beta arm retaining pin and the beta block was intact and secure (**Photo 14**).



Photo 10- N1983X Engine Bay

³ P3 is compressor discharge pressure.

⁴ Py is a governor air pressure signal to the FCU.



Photo 11- ESN PCE-PC1896 Data Plate



Photo 12- Reduction Gearbox and Accessory Chip Detector Plugs



Photo 13- (L) P3 Filter, (R) Oil Filter

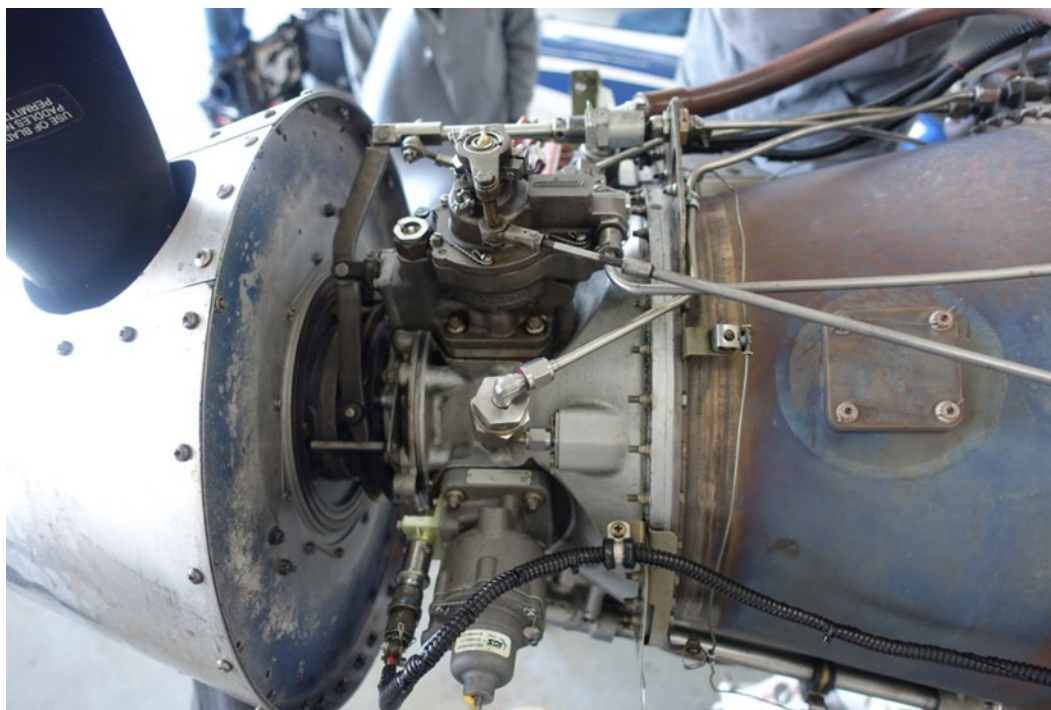


Photo 14- Propeller Governor and Beta Arm

A borescope was inserted into the engine inlet to inspect the axial compressor blades. Minor 1st stage compressor leading edge erosion was observed but there was no evidence of impact/foreign object damage (FOD) on visible rotor blades or stator vanes (**Photo 15**). A fuel nozzle was removed to inspect the combustion liner, fuel nozzles, and compressor turbine. The combustion liner had minor discoloration but there was no evidence of burn through or excessive coking (**Photo 16**). According to PWC, the combustor condition was typical of similar service run engines. The power turbine blades visible through the exhaust were all complete and unremarkable. The PT rotor spun smoothly with no audible grinding (**Photo 17**).

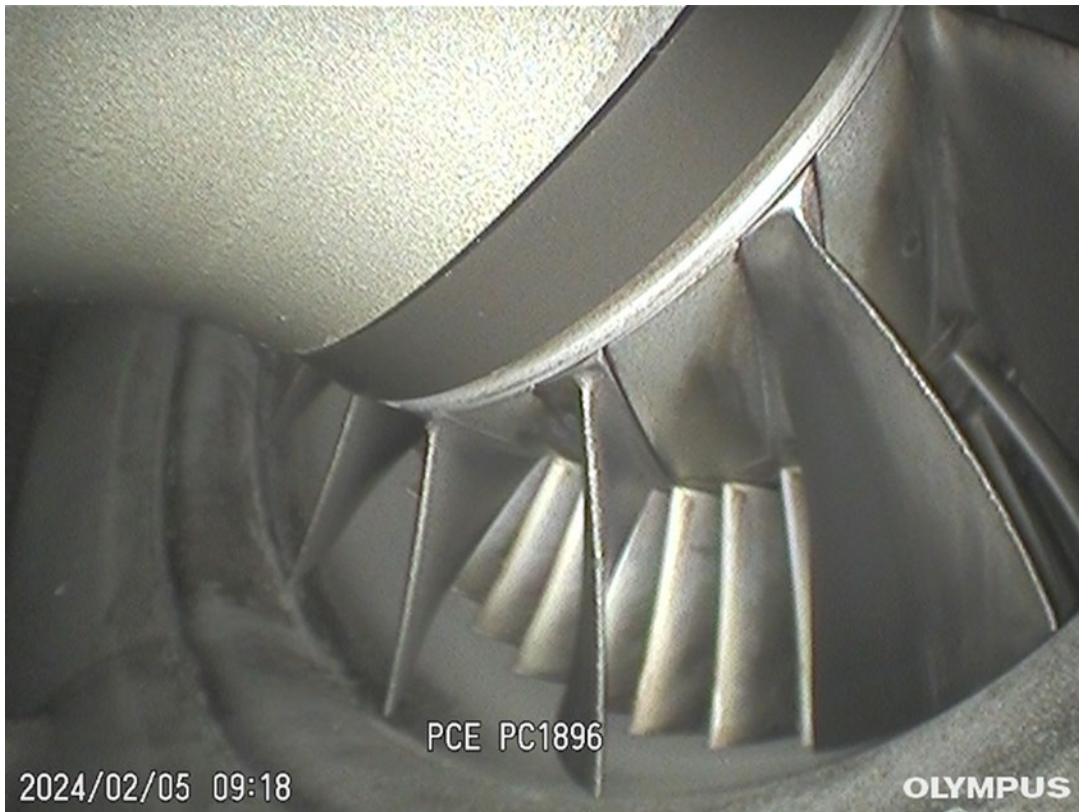


Photo 15- Borescope Photo of 1st Stage Axial Compressor and 1st Stage Stator Vanes



Photo 16- (L) Combustion Liner, (R) Fuel Nozzle



Photo 17- Power Turbine Blades, Trailing Edge

An engine alternator positive power cable attaching lug nut was partially backed off (**Photo 18**). The engine was removed from the airframe and placed in an engine container for shipment to PWC in Bridgeport, West Virginia for additional examination and testing (**Photo 19**).

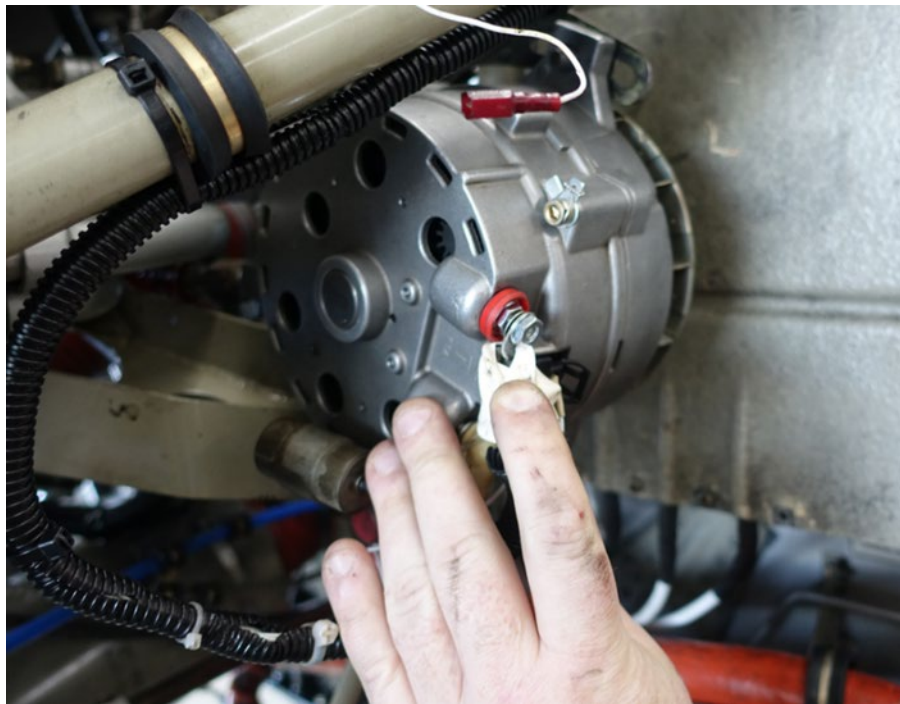


Photo 18- Engine Alternator Power Cable Attaching Lug



Photo 19- Engine, Prepared for Shipment

2.5 Engine Test

Investigation party members from Southern Airways Express, Textron Aviation, PWC, the FAA, and the NTSB met at the PWC facility in Bridgeport, West Virginia and completed the engine examination and test cell run on March 5, 2024.

A visual examination of the engine was performed prior to installation in the test cell. The external oil scavenge pump rear element housing lower inboard mount flange was fractured. The pump remained securely attached to the engine and the team opted to run the engine in the as received condition and monitor for leaks. The engine was installed in the test cell and dry and wet motor cycles⁵ were performed. There were no unusual engine noises or other anomalies observed. The fuel flow was measured at 89 pounds per hour during the wet motor cycle which met the engine overhaul manual requirements.

An engine start was performed and the time to light and time to idle recordings met overhaul manual specification. A fuel leak was observed at the fuel flow transmitter b-nut connection to the engine fuel pump filter bowl. The engine was shutdown, and the b-nut was torqued to maintenance manual specification and

⁵ Dry motor is performed by engaging the starter to windmill the engine core without fuel flow. During wet motor, the fuel shutoff valve is moved to the open position, so fuel is cycled through the fuel pump when the starter is engaged.

no subsequent leaks were observed. The b-nut connection was separated during the initial engine inspection at Southern Airways Express. The engine was slowly accelerated from ground idle to takeoff power. There were no unusual noises, and all engine operating parameters remained within overhaul manual limits. The engine was then tested at power settings of 675 shaft horsepower (SHP) and 725 SHP with no power fluctuation or loss of torque observed. The engine performance parameters at both power settings were normalized to standard day condition and met engine overhaul manual performance limits. The compressor bleed valve closing point was measured and met overhaul manual requirements. The maximum propeller rotation speed, measured in revolutions per minute (RPM), was measured at 108 RPM below the overhaul manual requirements. The RPM setting is customer field adjustable. A pressure gauge was fitted to the FCU port that supplies fuel to the airframe motive flow pump to measure fuel pressure during engine operation. The pressure was recorded between 84 and 92 PSI which was within the expected range according to the PWC Accessories Laboratory. Following testing, the engine oil filter, AGB, and RGB magnetic chip detectors were removed for inspection and no debris was observed.

2.6 Propeller Examination

The propeller assembly was shipped to McCauley Propeller in Wichita, Kansas for additional visual examination. The examination concluded that the propeller had sudden-failure type damage typically associated with impact failures. There were no anomalies identified that were consistent with pre-impact failure. The specific blade angles at the time of initial impact could not be determined but internal witness marks were consistent with the blades being in forward thrust operating range. The blade leading edge damage, missing blade tip material, and blade tip bending were all consistent with significant rotational energy during the impact sequence. The McCauley Propeller examination summary is available in the docket as "Powerplants Attachment #1-McCauley Propeller Teardown Inspection of Propeller from: Cessna 208B, N1983X."

Submitted by:

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