



AIRPLANE EXAMINATION REPORT

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Western Pacific Region

January 11, 2018

WPR17LA042
Willows, California
December 27, 2016
1553 PST
Air Tractor AT-602; N602L

PARTICIPANTS IN THE EXAMINATION

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HISTORY OF FLIGHT

On December 27, 2016, about 1553 Pacific standard time, an Air Tractor AT-602, N602L, was substantially damaged during a forced landing at Willows-Glenn County Airport (WLW), Willows, California. The commercial pilot was not injured. The airplane was owned and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the cross-country flight that departed Medlock Field Airport (69CL), Davis, California at approximately 1527. The personal flight was destined for WLW.

According to the pilot, he was returning the airplane to his home airport after a recent annual inspection. At the conclusion of the 25 minute flight, the pilot initiated a straight-in approach to runway 31 and slightly reduced the throttle. Immediately, he heard a “pop” noise, and observed a reduction in airspeed. When the pilot advanced the throttle to full power the engine power and

airspeed did not change and the airplane began to sink rapidly. Further attempts to recycle the throttle were unsuccessful. As the airplane approached a canal on the south end of the airport, the pilot deployed the wing flaps and the main landing gear touched down on a gravel road beyond a ditch. The tailwheel impacted the ditch and the airplane flipped over and came to rest inverted.

Postaccident examination by a Federal Aviation Administration inspector revealed substantial damage to the rudder and left wing spar.



Photo 1: Airplane at Rest

ENGINE INFORMATION

Engine Manufacturer: Pratt & Whitney Canada
Engine Model Number: PT6A-65G
Engine Serial Number: PCE-PN0028
Recent Inspection: 100 Hour – 4,974.5 hours (hobbs)

Recent Inspection: Gas Generator TTSN – 6,537.0

Recent Inspection: Power Section TTSN – 6,469.8 (substituted power section during light overhaul)

Recent Recorded TSMOH: never overhauled; Last “hot section” service was on May 1, 2014 at a total time of 4,078 flight hours. Time Since Inspection: 0.4 hours

MAINTENANCE RECORD 12

ENTRY: 12/22/14

Cleaned and visually inspected the exterior of engine. Performed compressor wash / rinse. Inspected / replaced oil filter and cleaned / inspected housing. Cleaned / inspected hi-pressure fuel pump inlet filter and replaced AN6235-3a outlet filter element and O-rings. Cleaned / inspected / lubed FCU / propeller interconnect linkage assembly. Removed starter / generator, cleaned internally with compressed air, inspected brushes (approximately 80 % of useable remaining), cleaned / inspected lubed splines and re-installed. Chip detector continuity tested, visually inspected, and system function tested. Beta block inspected (replaced). Ignitors visually inspected and ignition system function tested. P-3 filter and housing cleaned / inspected. Test run-up, no leaks or discrepancies noted - returned to service. Replaced bleed air valve w/ RHA unit SN 3N788 (P/N 3123126-01 - Prime Turbines WDD 52246. Fuel nozzle set sent to Prime Turbines (WDD 55476) for cleaning, testing and reinstalled w/ new gasket/seal set. Inspected this engine in accordance with P+WC maint. manual table 601, 100 hr inspection, and determined it to be in airworthy condition.

H = 4974.5
TIA = 6,537.0
GGTTSN = 6,537.0
PSTTSN = 6,469.8

Photo 2: Recent 100 Hour Inspection

INITIAL EXAMINATION AS RECEIVED

The airplane was recovered from the accident site to a hangar on the field where it was secured until the engine examination.



Photo 3: Airplane before Examination



Photo 2: Engine before Examination

DETAILED EXAMINATION

The engine sustained minimal damage with the exception of the left side exhaust tube, which displayed some compression wrinkles. The propeller was immovable and exhibited a mechanical sound from the aft portion of the gearbox at the engine power section. Each of the 5 propeller blades exhibited bends and chordwise scratches. Hydraulic fluid leaked from the hydraulic box that operates the hopper lid, located above the fuel controller, which also received some of the liberated hydraulic fluid.

Py Line

The Py line flexible hose was approved as a Federal Aviation Administration Supplemental Type Certificate (STC), designation SE8652SW, that was issued to Air Tractor, Inc. on January 28, 1997. The Py connection was secure at the connection to the propeller governor and fuel control unit; however, the outer hose rotated freely at the governor end. The Py inlet to the propeller governor displayed some fluid discharge.



Photo 5: Propeller Governor Py Nozzle

P3 Bleed Lines

The left side P3 bleed air tube, which direct engine bleed air into the cabin, was secured at both fittings. The right side P3 tube, which discharges bleed air from the compressor section, was also secured.

Bleed Air Valve

The bleed air valve, part number 3123126-01, serial number 3N788, was recently installed on the engine during the airplane's last annual inspection, 0.4 hours prior to the accident. According to logbook records, the overhauled unit had been serviced by Prime Turbines following its arrival in October 2015. The unit was then sold and shipped to Regenalld Michaud Aviation, c/o Growers Air Service, on December 1, 2016. Records retrieved from Prime Turbines show that the "old" unit arrived at their facility on December 12, 2016.

A preliminary inspection of the bleed valve showed that it was installed on the compressor section; however, the two bottom bolts used to secure the valve were finger tight. Each of the valve's 4 bolts were removed; the bolt threads and thread holes did not exhibit any deformation. A black residue with a viscosity that resembled oil was observed in the crevice of a lip normally used to guide the valve during installation and secure the valve's position.

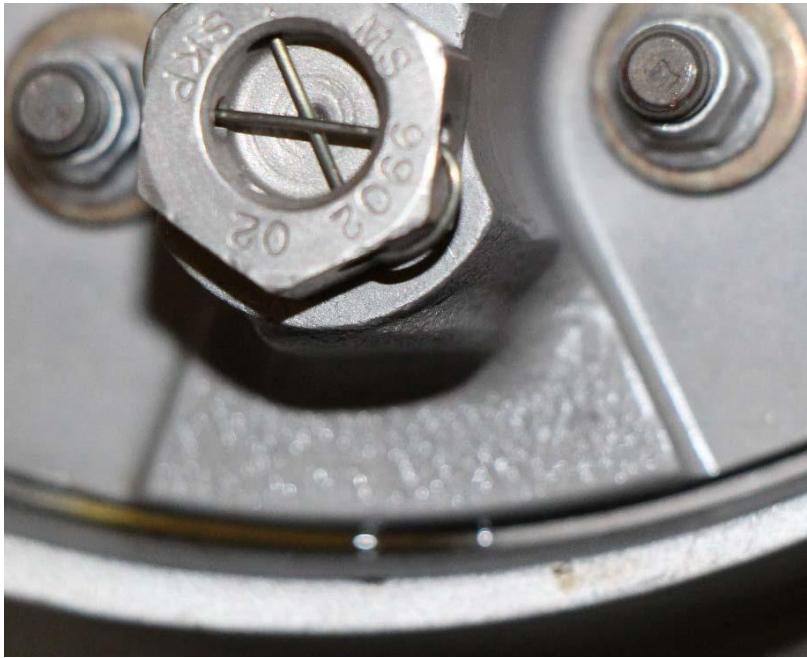


Photo 6: Black Residue at Lip of Bleed Valve

When the bleed valve was removed from the engine, the piston nearly fell to the floor, which indicates that the piston had been liberated from its secure position within the valve body. Examination of the valve mating surface at the engine revealed a black residue that had formed the shape of two of the valve seat screwheads on both the fore and aft sides. Further, the black residue covered the forward portion of the mating surface in a gradient of decreasing intensity.



Photo 7: Black Residue at Valve Mating Surface

An inspection of the bleed valve showed that the valve filter was intact and free of contamination. A comparison to the unit's corresponding illustrated parts catalogue, No. 3032842, revealed that the valve seat was missing. When prompted, a representative of Prime Turbines subsequently discovered the valve seat was with components that comprised the "old" core unit, which had been shipped to their facility by Grower's in exchange for the overhauled unit.



Photo 8: Image of Valve Seat Submitted to Investigation Team by Prime Turbines

According to section 5(A)(2) of the Compressor Bleed Valve maintenance manual, which contains procedures to remove the valve, the “Compressor bleed valve seat (7) is classified and must remain with gas generator assembly.” The valve installation is covered in section D, page 7, of the manual. The first procedural item, section D(1), states, “Install seat (7, Fig. 201) on replacement bleed valve with screws (9). Tighten screws to 5 to 6 lb. in.”

According to the engine manufacturer, under normal operating circumstances the piston will extend to the closed position as it rests against the valve seat. A carbon ring is installed in a canal on the piston and normally secured by compression as the piston is inserted into the valve body, previously referred to as the guide collar. If the valve seat is not installed, P3 air will move the piston towards its closed position in response to an increase in power demand from the operator. In this case, the piston can move beyond the valve body and the carbon ring will then expand, which prevents the piston from returning to an open position. The bleed valve normally discharges excess compressed air when a lower power setting is selected by the pilot. In this case, if the valve piston traveled beyond the seat, the bleed valve would have started to discharge P3 air, thus allowing P2.5 air to prevail and prevent the engine from accommodating any additional power demand.

A representative of the pilot’s service facility and Director of Maintenance (DOM) who was also responsible for signing off the airplane’s last annual inspection, reported that his facility only started working on PT6A-65AG engine about 2 years ago. During this time period, the company only serviced 2 engines of similar make and model including the engine from the accident airplane. The mechanic stated that they completed the engine inspection in accordance with the manufacturer’s maintenance manual, manual part no. 3032842, which was revised in March 2016. He further stated that he removed the bleed valve from the engine and another mechanic installed the overhauled unit. When asked about the valve seat, the DOM stated that he was not aware of the bleed valve on the 65AG had a valve seat and was certain that the mechanic who installed the unit was not aware of the part either. At the conclusion of the inspection, the line mechanic completed 2 engine runs to dynamically balance the propeller.

As part of their procedure, the company’s mechanics do not typically have a copy of the illustrated parts catalogue (IPC) and maintenance manuals (MM) on the service floor. The IPCs and MMs are accessible through a computer located in a nearby office. In response to this accident, the DOM is going to start printing IPCs and MM for his mechanics and may offer tablet PCs in the future. In addition, he plans to start reviewing the IPCs and MMs for new aircraft with his line mechanics before they begin work.

Further, a black residue had been placed around the circumference of the bleed air port in lieu of an “o” ring.

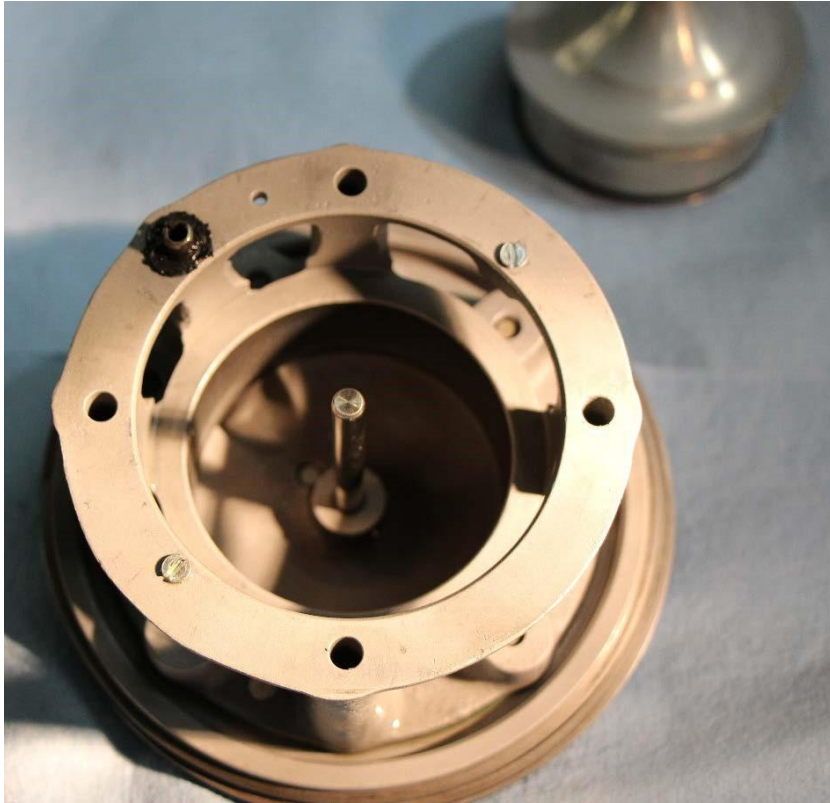


Photo 9: Image of Bleed Valve Body after Unit was Removed from Engine

Examination of the bleed valve piston revealed mechanical damage signatures at the piston tip near the engine side.



Photo 10: Piston Tip

Oil Filter, Fuel Filter, and High Pressure Fuel Pump

The oil filter, fuel filter, and filter to the high pressure fuel pump were inspected. The oil filter displayed some carbon debris, while both the fuel filter and filter to the fuel pump were free of contamination. A clear liquid was observed in the fuel bowl that exhibited an odor and appearance that resembled JET A fuel.