

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



December 6, 2019

MATERIALS LABORATORY FIRE FACTUAL REPORT

Report No. 19-062

A. ACCIDENT INFORMATION

Place : Walton, New York
Date : November 9, 2018
Vehicle : Cessna 310R, N5044J
NTSB No. : ERA19FA039
Investigator : Adam Gerhardt
AS-ERA

B. ACCIDENT SUMMARY

On November 9, 2018, about 1500 eastern standard time, a Cessna 310R, N5044J, was destroyed when it impacted terrain near Walton, New York. The airline transport pilot was fatally injured. The airplane was operated by the pilot as a personal flight conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight, which originated from Niagara Falls International Airport (IAG), Niagara Falls, New York, about 1405, and was destined for Teterboro Airport (TEB), Teterboro, New Jersey.

C. DETAILS OF THE EXAMINATION

The airframe and engines were examined at Anglin Aircraft Recovery in Clayton, Delaware. The examination took place between March 19-20, 2019. A full layout of the significant recovered pieces was performed. The following are findings relative to the observations.

AIRFRAME EXAMINATION

Cockpit

Most of the cockpit section was missing except for the floor section from the forward part of the cockpit as shown in Figure 1. This section exhibits heavy sooting and varying levels of thermal damage. Two small sections of broomstrawing^{1,2} on sections of the pedestal wall were observed as shown in Figures 2, 3 and 4. There was also some evidence of thermal-related tearing of the pedestal structure as shown in Figure 5.

¹ Broomstrawing occurs in aluminum components when the aluminum, in a semi-molten state, is subjected to a shock load resulting in aluminum taking on a feathered or string-like appearance similar to broom straws.

² Kuchta J.M. and Clodfelter R.G., *Aircraft Mishap Fire Pattern Investigations*, Air Force Aero Propulsion Laboratory, Tech Report AFWAL-TR-85-2057 August 1985

The exterior skin directly beneath the cockpit exhibited a localized area of thermal damage as shown in Figure 6. In this area, the exterior paint was missing, and the primer was discolored white and had powdery appearance. There were other smaller areas of localized areas of paint damage on the exterior surface. In these areas, the paint was discolored black with some localized bubbling of the paint. There were no other areas on the exterior that exhibited thermal damage.

The rudder pedals were recovered. Three pedals were completely intact and displayed no significant damage. The fourth pedal exhibited a fracture at the top. The pedals are shown in Figure 7. The fractured section was not recovered. A small section of flooring and side wall carpeting of the side wall of the airplane was recovered. No significant thermal damage was found in this area.

Most of the interior cabin carpet was recovered. The recovered sections exhibited some areas with light thermal damage, but the damage did not extend through the thickness of the carpet. Varying degrees of sooting were found, but the carpet sections were otherwise intact.

Seats

All four seats were recovered. The four seat frames were intact and exhibited varying levels of mechanical damage. Three seats still had some cushion material present. One seat still had the vinyl seat cover intact. Several sections of polyurethane foam were recovered. These sections exhibited varying levels of thermal damage and sooting. A photograph of two seats is shown in Figure 8.

Cockpit Avionics Wiring

A large portion of the avionics wiring was recovered. No signs of electrical arcing (beading, pitting, or fused wire conductors) were observed. Several wire bundles remained intact, with undamaged insulation as shown in Figure 9. There were some wire bundles missing outer insulation or exhibited discoloration to the insulation, but no damage to the underlying wire conductors was observed. The damage to wire bundles in this area was consistent with mechanical damage.

Avionics and Instruments

All recovered instruments exhibited crushing and other mechanically related damage. Several components exhibited limited thermal damage and sooting, mainly to the exterior of the instruments. None of the instruments exhibited obvious signs of arcing.

Lower Navigation Unit

When examined a localized burn pattern on the bottom of instrument was observed as shown in Figure 10. Sooting and light to moderate thermal damage to the circuit board was observed, but the thermal damage did not appear to extend beyond this localized area.

Radar Display

The unit displayed severe mechanical damage. There was some localized thermal damage. The shape of the burn pattern on the back side of the housing was consistent with the thermal damage occurring after the crush damage. A portion of the housing was removed to access the interior of the display. The internal section displayed no evidence of thermal damage, or electrical shorting/arcing. In addition, a polymeric internal component exhibited no thermal damage/melting. The antenna was not recovered.

Circuit Breaker Panel

Small fragments of the circuit breaker panel face plate and surrounding paneling were recovered and examined. The panel displayed heavy thermal damage. The paneling was delaminated, and no identifiable circuit breakers were recovered.

Fuselage

Two sections of the fuselage were recovered, which displayed the registration number on both sides of the airplane as shown in Figures 11 and 12. Each section was cut for recovery purposes. The left section exhibited general mechanical damage and was heavily sooted with varying levels of soot tailing along the rivet lines as shown in Figure 13. The right side exhibited similar damage, with less soot tailing. No other thermal damage was found on these sections. Fragments of the fuel system components exhibited no significant thermal damage.

Empennage

The recovered sections of empennage exhibited significant mechanical damage with varying degrees of soot was found across all exterior surfaces as shown in Figure 14. No other thermal damage was observed.

Wings

Both wings exhibited significant mechanical damage and fragmentation as shown in Figures 15 and 16. Fragments of the left wing exhibited heavy sooting over its outboard surfaces, with localized areas of thermal damage. The right wing exhibited less sooting and no observable thermal damage. The recovered fragments of the tip tanks did not exhibit significant sooting. The recovered sections of the cowling displayed no thermal damage. The inboard fragments of the wings exhibited no thermal damage and little sooting. Small sections of the fuel bladders exhibited no sign of thermal damage.

Cabin Heater

The cabin heater exhibited mechanical-related damage and some localized thermal discoloration with some light sooting on the outer casing as shown in Figure 17. No internal thermal damage was observed. Polymeric materials on the flapper valve and thermostat

inside the exhaust duct were located, and no evidence of thermal damage/melting or sooting internal to the recovered exhaust ducting was observed as shown in Figures 18 and 19.

The cabin heater was sent to the manufacturer for further examination³. According to the manufacturer's service report, a visual inspection of the heater duct was conducted. The following observations were made. The duct was heavily damaged. The external surfaces appeared to be heavily sooted. The duct's internal surfaces were free of any sooting or appearance of exposure to exhaust gases⁴. The portion of the heater received exhibited extensive impact damage. Visual inspection of the internal surfaces of the exhaust pipe indicated that the heater was functioning properly. There was not excessive build-up of sooting indicating an improper fuel/air mixture. The outer wrap surrounding the heat exchanger assembly was pulled open to facilitate a visual inspection of the outer surfaces and weld joints of the combustion chamber. The amount of damage restricted the full removal of this wrap. Access to approximately 85% of the circumference of the heat exchanger was gained without sectioning the heater, which was enough to allow the examiners to visualize all welds and joints. No indications or visual evidence was found indicating that the heat exchanger was compromised pre-impact. The welds around the exhaust tube were closely inspected. No sooting was evident in this area. No cracks or weld anomalies were identified. The welds at the outlet end of the combustion chamber were examined and no cracks or other weld anomalies were found. The combustion chamber endcap was intact and showed no indications of pre-impact deformity. No sooting or indications of exhaust gas leakage were evident on any of the interior surfaces examined.

Voltage Regulators

Two voltage regulators were recovered and examined. The regulators had impact damage but displayed no thermal damage and little sooting. The attached wiring still had intact insulation and the wire ends exhibited damage consistent with mechanical damage with no signs of electrical arcing.

Nancy B McAtee
Fire and Explosion Specialist

³ For more information, see 8259 *HEATER INSPECTION JULY 30, 2019 FAA Crash Investigation, NTSB Accident Number: ERA19FA039*, Tarter, J. General Manager, Engine Systems Troy, Indiana, 31 July 2019

⁴ According to the manufacturer, when installed, this duct is located immediately downstream from the heater combustion chamber and would generally have some build-up or indication of exposure to exhaust gases if the heat exchanger's integrity was compromised.



Figure 1. Recovered section of cockpit floor



Figure 2. Area of broomstrawing on pedestal structure (side view).



Figure 3. Second area of broomstrawing on pedestal structure.



Figure 4. Close-up photograph of second area of broomstrawing.



Figure 5. Thermal tearing of pedestal (highlighted in white circle).



Figure 6. Exterior fuselage surface located under cockpit floor.



Figure 7. Rudder pedals.



Figure 8. Seat frames with sections of padding. Intact seat is in the lower right corner.



Figure 9. Recovered instrument panel wiring.



Figure 10. Lower surface of lower navigation unit.



Figure 11. Section of fuselage (left side).



Figure 12. Section of fuselage (right side).

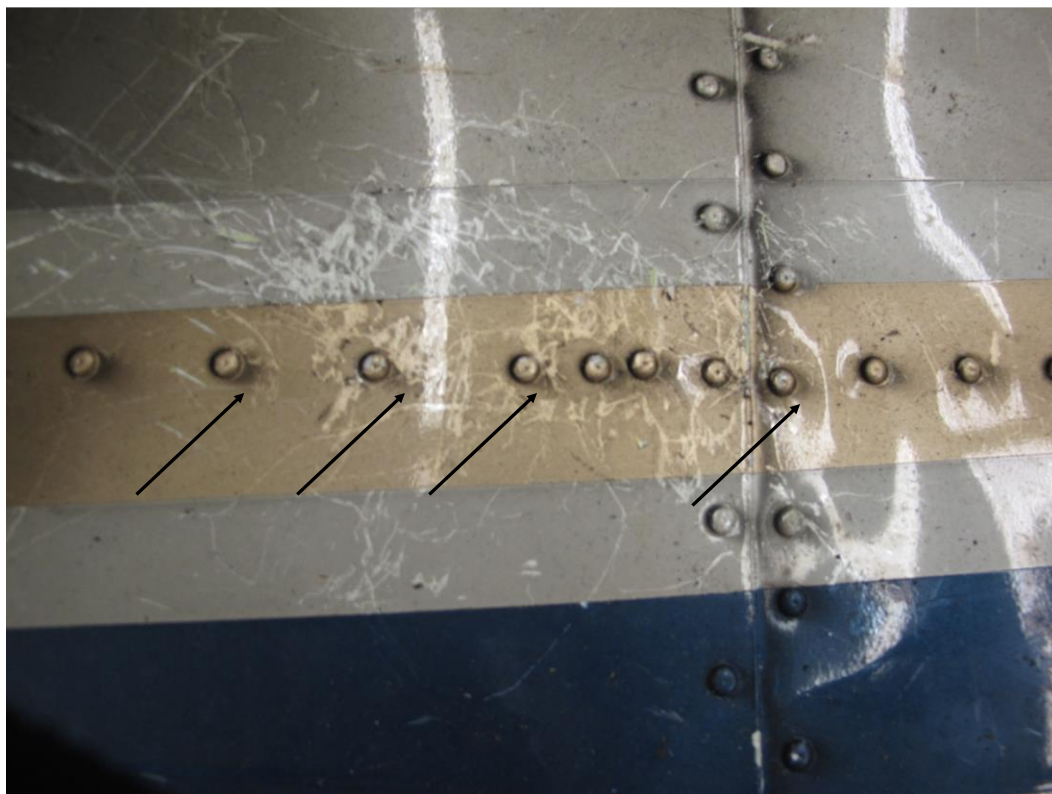


Figure 13. Soot tailing on rivets (highlighted with black arrows).



Figure 14. Recovered sections of empennage.



Figure 15. Recovered sections of left wing.



Figure 16. Recovered sections of right wing.



Figure 17. Aircraft cabin heater.

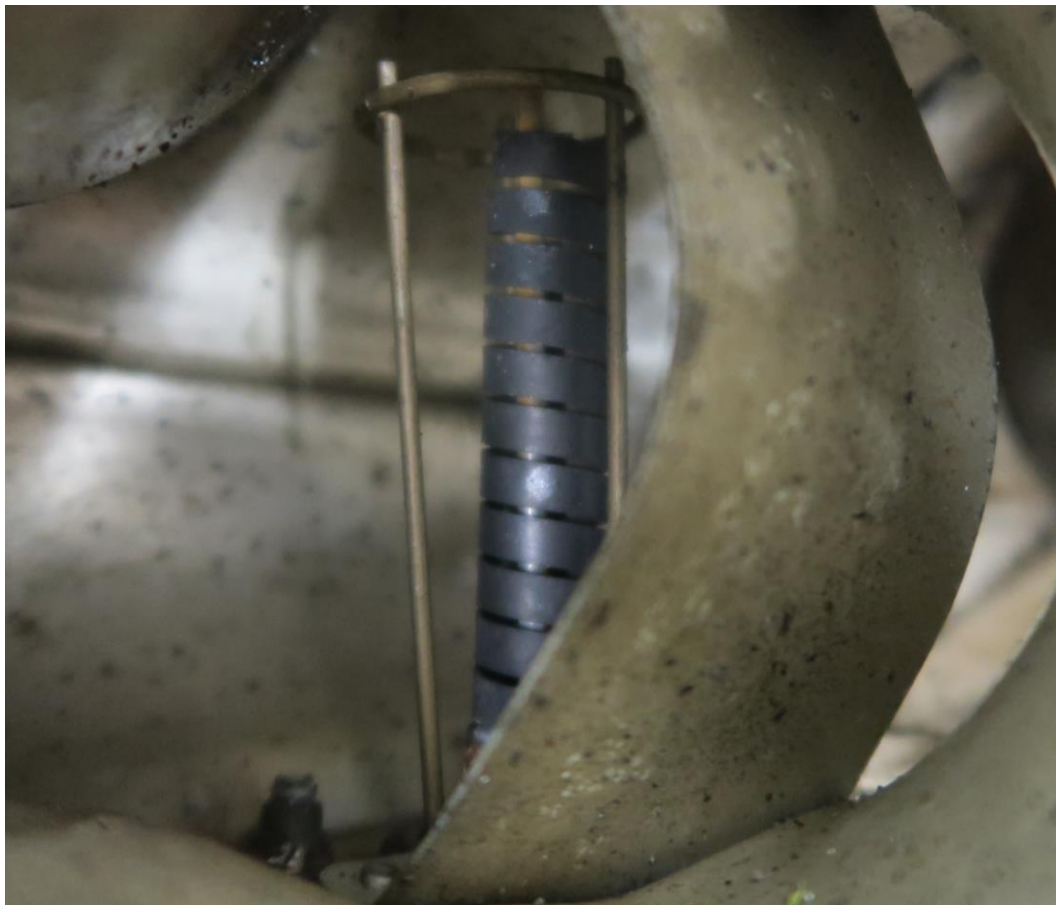


Figure 18. Interior of cabin heater.



Figure 19. Air control flapper valve inside the cabin heater.