

CEN19FA307

NTSB Airframe and Engine Examination Notes

The NTSB investigator-in-charge (IIC) and an air safety investigator (ASI) from Textron Aviation (the type certificate holder for the Cessna 140) responded to the accident site on September 10, 2019. The investigative team members documented the accident site and the wreckage.

The airplane's initial impact heading was 176°. The airplane came to rest on a heading of 024° and at an elevation of 2,910 ft above mean sea level. From the initial impact position to the final impact position, it was 44 ft on a heading of 258°. The accident site consisted of grass.

First responders canvassed the surrounding prairie area for aircraft parts on September 9, 2019, and none were found.

There was no postimpact fire. No property damage to buildings occurred. No ground injuries occurred.

Airframe (total time = 2,089.37/tach time= 1380.37 at the time of the last inspection. 1384.67 at the time of the accident)

The airframe data plate was observed, and the airframe serial number was confirmed.

All structural components of the airframe were accounted for at the accident site.

The airplane sustained substantial damage to both wing structures, the fuselage, and the empennage.

Flight control continuity was established for the airframe. The left and right control wheels were fractured due to forward cabin compression damage. The aileron interconnect chains remained attached to the sprockets and the cables were wrapped around the aileron interconnect pulley assembly. The elevator push-pull tube at the base of the control column was crushed aft which fractured the forward elevator bellcrank located below the floor assembly. The elevator UP cable remained attached to the impact separated piece of the forward elevator bellcrank and was located further aft inside the floor assembly.

The cockpit had dual flight controls installed.

The two seats (one bench seat) had lap belts installed. Both lap belts were separated from the floor due to the impact forces.

Both wings, covered in fabric, were cut open to verify flight control continuity. A variety of foreign object debris (FOD) was observed in both wings (FOD such as insulation, seeds, feathers, etc. from mice living inside the wings over a period of time).

The manual flap handle was observed beyond full UP (flaps fully extended) and was bent to the right. The manual flap handle was no longer engaged on the ratcheting portion of the flap extension handle. A flap impact related witness mark was observed on the right side of the fuselage indicating the flaps were

extended at impact. The right wing root was damaged, and the flap torque tube was observed separated from the right flap. Angular flap position was not determined due to fuselage compression damage.

The fuel tank selector handle was found in the right tank position. The fuel tank selector handle moved freely with no binding or resistance when turned by hand.

The carburetor heat control in the cockpit was found in the off position. However, the position of the carburetor heat at the engine was undetermined due to impact damage.

The cockpit sustained impact damage. Several analog gauges were damaged and/or removed from the cockpit dashboard due to the impact. Each of the analog gauges were photographed.

The two wing fuel tanks were breached from the accident sequence and the onboard fuel level at the time of the impact was undetermined. The left and right fuel cap were found in place and secured. A small amount of fuel was obtained from both fuel tanks and was tested with water finding paste. No signs of water were observed in the two fuel samples.

The fuel strainer glass bowl was fractured and not observed. The fuel strainer screen was crushed flat to the firewall and was covered in dirt and debris from the ground impact.

There were no onboard electronic devices such as a global positioning system.

The landing gear was a tailwheel configuration.

The emergency locator transmitter was activated due to the impact forces but was deactivated by the Federal Aviation Administration on September 9, 2019.

While the airplane was equipped with a carbureted engine and was conducting a low-level aerial observation flight, the airplane was not equipped with a carburetor temperature system or a stall warning indicator, nor was it required to be. The carburetor temperature system and stall warning indicator for the Cessna 140 was available from Cessna as optional equipment.

No mechanical malfunctions or failures were observed with the airframe.

Engine (total time = 2,089.51/tach time = 1380.37 at the time of the last inspection. 1384.67 at the time of the accident)

The engine data plate was observed, which sustained impact damage. The engine serial number was confirmed through maintenance records.

All components of the engine and engine accessories were accounted for at the accident site.

Engine control continuity was established.

The engine was found attached to the engine mount system; however the engine was pushed rear into the cockpit. The engine was pulled out from the cockpit with a rope attached to a truck for the examination.

The engine crankcase remained intact from the accident sequence.

No evidence of fire damage was observed on the engine crankcase or engine accessories.

The left magneto remained attached to the engine. The right magneto mounting flange was fractured and the right magneto was found loosely oriented at an angle inside the accessory section. All ignition harness leads produced spark when rotated by hand.

The top spark plugs were removed and appeared new with minor wear. Two of the top plugs were oil soaked; the other two were black and covered in soot. The bottom spark plugs were observed using a lighted borescope and appeared normally worn and dark in color.

The carburetor was removed and examined. The throttle valve appeared to move normally. The carburetor lid was opened. The single float was free to rise and fall normally, and the needle valve appeared to seat properly. All passage ways were clear, and the fuel nozzle looked normal. The carburetor inlet screen was clean.

Thumb compression was performed on all four cylinders. The crankshaft was able to be moved freely by hand with no binding or resistance. All rocker box covers were removed and all of the valves moved freely when the crankshaft was moved by hand.

Three of the four cylinders were borescoped (and photographed) and no anomalies noted. The #2 cylinder was not borescoped due to a tornado warning and the NTSB IIC and Textron Aviation ASI having to leave the accident site due to inclement weather conditions that were rapidly approaching.

No cargo was found in the cabin.

No mechanical malfunctions or failures were observed with the engine.

Propeller

All components of the propeller assembly were accounted for.

The two-blade metal propeller was found attached to the crankshaft. Both blades were attached.

The #1 blade had no bending. The #2 blade, about mid-span, was bent rearward about 90 degrees.

No mechanical malfunctions or failures were observed with the propeller assembly.

Maintenance Records

A review of the airplane's maintenance records revealed no evidence of any uncorrected mechanical discrepancies with the airframe and engine.