



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

Date: August 19, 2019

SUMMARY OF AIRCRAFT AND ENGINE EXAMINATION

(WPR18FA053)

This document contains no embedded photos.

A. ACCIDENT

Location:	Thompson's Station, Tennessee
Date:	December 21, 2017
Aircraft:	Gregory S. Browning Zodiac 601XL
NTSB Investigator-in-Charge:	Thomas M. Little

B. EXAMINATION PARTICIPANTS

Thomas M. Little
Senior Aviation Safety Investigator
National Transportation Safety Board
Western Pacific Region
Federal Way, Washington

Lynn D. Heath
Aviation Safety Inspector
Federal Aviation Administration
Nashville Flight Standards District Office
Nashville, Tennessee

Nick Otterback
Jabiru Technical Advisor the ATSB
Jabiru North America, LLC
Shelbyville, Tennessee

C. SUMMARY

On December 21, 2017, about 1307 central standard time, a Gregory S. Browning Zodiac 601XL experimental amateur-built airplane, N969GB, was substantially damaged following a loss of control and impact with terrain while maneuvering at low altitude near Thompson's Station, Tennessee. The private pilot and registered owner of the airplane, who was the sole occupant, sustained fatal injuries. The flight was being operated in accordance with Title 14 *Code of Federal Regulations* Part 91, and a flight plan was not filed. Instrument meteorological conditions prevailed at the time of the accident. The flight departed Bomar Field-Shelbyville Municipal Airport (SYI), Shelbyville, Tennessee about 1230, with an intended destination of Whifferdill Airport (TN77), Chapmansboro, Tennessee.

The airplane came to rest just south of a residential rural road near 3900 Caspair Road, Thompson's Station, Tennessee. After impact with a stand of trees about 60 ft tall on an impact heading of 120 degrees magnetic, the airplane came to rest on a magnetic heading of about 130 degrees in a slight nose down attitude. Both main and nose landing gear had separated on impact. The left wing's navigation light and housing component was located attached to a tree branch about 55 feet northwest of the main wreckage, and about 5 ft 6 inches above the ground. Two other pieces of fuselage skin, not large, were both located in the linear debris path leading up the main wreckage. The initial impact point was near the top of an 80-foot tall tree about 150 ft northwest of the main wreckage site. A second impact point was located about 100 ft northwest of the

main wreckage site. Several tree branches that were observed splintered were observed scattered along the debris path leading up to the main wreckage. There was no postimpact fire.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site Examination

The airplane came to rest just south of a residential rural road near 3900 Caspair Road, Thompson's Station, Tennessee. After impact with a stand of trees about 60 ft tall on an impact heading of 120 degrees magnetic, the airplane came to rest on a magnetic heading of about 130 degrees in a slight nose down attitude. Both main and nose landing gear had separated on impact. The left wing's navigation light and housing component was located attached to a tree branch about 55 feet northwest of the main wreckage, and about 5 ft 6 inches above the ground. Two other pieces of fuselage skin, not large, were both located in the linear debris path leading up the main wreckage. The initial impact point was near the top of an 80-foot tall tree about 150 ft northwest of the main wreckage site. A second impact point was located about 100 ft northwest of the main wreckage site. Several tree branches that were observed splintered were observed scattered along the debris path leading up to the main wreckage. There was no postimpact fire.

2.0 Airframe examination notes

An initial onsite examination of the airframe was performed by representatives from the NTSB and the FAA on December 22nd, the day following the accident. The examination revealed that the airplane initially impacted trees with the outboard section of the left wing, followed by terrain impact with the forward section of the airplane in a slight nose down attitude, which resulted in the engine mount being deformed due to impact forces. The cabin/cockpit area sustained impact damage, along with the right wing having sustained some leading edge damage. The fuselage aft of the main cabin bulkhead was wrinkled through its span. Except for minor damage to the top and bottom of the rudder, the empennage was not damaged. All components necessary for flight were accounted for at the accident site.

On December 23rd, the NTSB IIC examined the airplane at the facilities of AMF Aviation, LLC, located in Springfield, Tennessee. During the examination flight control continuity was confirmed from the cabin to all flight control. No anomalies were discovered during the examination that would have precluded normal operation.

2.0.1 Engine examination notes

On December 22nd, a preliminary onsite examination of the engine, which was overseen by representatives from the NTSB and FAA, was performed on by a field technician from Sport Aircraft Services LLC. Sport Aircraft Services LLC specializes in Jabiru engine maintenance, rebuilding, and installation. As a result of the examination the technician reported the following:

By using remnants of the propeller, he was able to turn the engine over by hand for two full cycles to feel for compression on all cylinders. All six (6) cylinders had distinct, normal-feeling compression for a cold engine. There was no grinding unusual noises or other indication of internal damage to the rotating assembly. The valve covers did not show any evidence of deformity due to valve train obstruction or malfunction.

The carburetor was found separated from its mounting flange. Upon removal of the float bowl, it was observed that the bowl contained a normal amount of fuel, which had a color and odor consistent with automotive gasoline. There were several very small particles of [debris] in the bottom of the float bowl. The technician concluded from his examination that there appeared to be nothing unusual about the engine fuel lines, ignition system, and general installation. The oil lines and oil cooler were caked in mud and appeared to be damaged due to impact [forces]. The technician concluded by stating that in his opinion that the engine appeared to be capable of normal operation at the time of the accident.

On February 5, 2018, a Jabiru North America, LLC technical advisor to the Australian Transport Safety Board performed an engine run under the supervision of the Federal Aviation Administration (FAA) aviation safety inspector assigned to the FAA's Nashville, Tennessee Flight Standards District Office. The technical advisor reported the following subsequent to the completion of the examination:

What remained of the engine mount was removed. The muffler can was crushed along with the tail pipe and was removed for the run, the jab engines are designed to run with straight pipes as well, so removal of the muffler would not affect the performance. Several of the intake pipes were also noted to be bend or deformed from impact. The remaining portions of the spinner and prop were also removed. The upper right and lower left engine mount point were bent, consistent with impact. Using a large hammer

and steel drift these were straightened enough to mount on the run stand. The starter mount was also bent. Using the same method as above the mount was corrected to allow the starter to engage the fly wheel. Both left and right distributor caps and rotors were destroyed by impact. These were replaced with used components off the shelf which match the ones removed. Both magnetos were in good shape and used for the test run.

The engine was then hung on our engine test stand. To ensure a safe run we performed a crank and prop flange run-out inspection. 1 plug from each cylinder was removed to easily turn the crank. Both the crank shaft and prop flange dialed less the 0.003, which is well within the limits set forth by the jabiru service manual. All plugs were reinstalled. Our run stand prop was installed as well. The prop used was a Sensenich wood prop 60ZK57 which is similar to what would have been on the aircraft. No sensors were hooked up for this run. The oil cooler adapter plate and cooler removed from the system as well due to impact damage of the cooler and possible leaks.

Initial attempts to start the engine failed. Upon further inspection, the #2-cylinder induction pipe was found to be bent from impact, previously noted. Although still intact, the pipe was bent enough to pull the mating flange away from the head about 1/8". This causes a massive intake leak which would prevent running. A used intake pipe was installed.

With the used intake pipe installed the engine fired and ran almost immediately. The engine was allowed to warm up to operating temperature for a few minutes. Once warmed up the engine was advanced to full throttle operation for several minutes. The engine also did idle smoothly as expected after the run in.

The engine was removed from the stand and any parts used for the run were removed. The engine was placed back on the shipping platform it was received on.