

**NATIONAL TRANSPORTATIONS SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594**

SUMMARY OF AIRCRAFT EXAMINATION

-- CEN16FA346 --

A. ACCIDENT

Location: Moss Hill, Texas
Date: September 3, 2016
Time: 1900 central daylight time
Aircraft: Bellanca 7ECA (Citabria) airplane (s/n 1177-76), N787MW

B. PARTICIPANTS

Timothy Sorensen
Aviation Accident Investigator
National Transportation Safety Board

John Butler
Air Safety Investigator
Lycoming Engines

C. ACCIDENT SUMMARY

On September 3, 2016, about 1900 central daylight time, a Bellanca 7ECA airplane, N787MW, impacted the Trinity River about one-third mile south of Highway 105 near Moss Hill, Texas. The pilot and passenger sustained fatal injuries. The airplane was substantially damaged. The airplane was registered to a private individual and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The local flight originated at an undetermined time from a private airstrip located in Cleveland, Texas.

D. GENERAL DESCRIPTION

Airframe

The Bellanca 7ECA (Citabria) is a two place, high wing, single-engine airplane, with a tandem seating arrangement and a conventional (tailwheel) landing gear configuration. The airplane is certificated in the normal and aerobatic categories.

Summary of Accident Site and Aircraft Examinations

Engine Assembly

The Lycoming O-235-C1 engine is capable of producing 115 horsepower at 2,800 rpm. The engine is a four-cylinder, horizontally opposed, air cooled, direct drive, normally aspirated, reciprocating design configuration.

Propeller Assembly

The McCauley 1C90/LM7246 propeller assembly is a two-blade, fixed pitch design, fabricated from an aluminum alloy.

E. DETAILS OF AIRCRAFT EXAMINATIONS

The NTSB investigator-in-charge did not conduct an on-scene examination. The airplane was relocated from the accident site to Air Salvage of Dallas, Lancaster, Texas. Post-recovery airframe and engine examinations were conducted on September 7, 2016.

All examinations and testing were completed under the direct supervision of the NTSB investigator-in-charge. Lycoming Engines provided technical support to the investigation as a party to the NTSB.

F. DESCRIPTION OF ACCIDENT SITE

The airplane came to rest inverted and partially submerged in the Trinity River. A small beach area was located along the bank of the river immediately south of the highway overpass. Both river banks were lined with low trees in the immediate vicinity of the accident site.

G. SUMMARY OF AIRCRAFT EXAMINATIONS¹

Airframe – Bellanca 7ECA, s/n 1177-76

The airplane nose section and forward fuselage exhibited aft crushing damage. The engine remained attached to the airframe; the firewall was deformed. The windshield and side windows had separated. The door remained attached and was removed to facilitate the post-recovery examination. The forward portion of the cockpit was compromised and the cockpit floor/lower fuselage was buckled. The control sticks remained attached to the fuselage pivot points. The aileron control torque tube between the forward and aft control sticks appeared intact. Aileron control cable continuity was confirmed from the rear control stick to the wing roots; the aileron balance/cross-over cable was continuous within the fuselage section. The fuselage structure was deformed from the firewall aft to the area of the rear seat. The wing spar and wing strut attachment points appeared intact; although, the forward fuselage structure was compromised as previously noted. The upper fuselage structure was buckled aft of the rear seat. The aft fuselage structure appeared to be intact and undeformed. The tailwheel assembly remained attached to the fuselage and was undamaged.

The wings had been removed to facilitate recovery. The left wing leading edge exhibited aft crushing damage over the entire span. The entire left wing assembly was distorted

¹ Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

Summary of Accident Site and Aircraft Examinations

G. SUMMARY OF AIRCRAFT EXAMINATIONS *(continued)*

and deformed, with localized tears in the wing skin/fabric. The forward spar was separated immediately outboard of the inboard (wing root) attachment fitting. The fitting remained attached to the fuselage structure and appeared intact. The aft spar attachment fitting remained with the wing and appeared intact. The wing strut remained attached at the mid-span attachment points. The strut was buckled and partially separated at several locations. The inboard attachment point appeared intact. The aileron remained attached. Control continuity was confirmed from the control surface to the wing root.

The right wing was deformed over the entire assembly, with leading edge crushing damage and multiple tears in wing skin/fabric. The forward and aft wing attachment fittings remained secured to the spars and appeared intact. The wing strut was separated with a corresponding failure of the forward spar at the strut attachment. The strut was buckled and separated near mid-span. The strut attach fittings appeared intact. The aileron remained attached. Control continuity was confirmed from the control surface to the wing root.

The horizontal stabilizers remained attached to the fuselage and appeared to be intact. The brace wires between the stabilizers and lower, aft fuselage/vertical stabilizer were intact. The elevators had been removed to facilitate recovery from the accident site. The elevators, including the stabilizer hinge points, appeared to be intact and undamaged. The control cable brackets common to the elevators, including the stops, were intact. The elevator control cables were continuous from the aft fuselage to the rear cockpit control stick; the aft control cable end fittings were intact. The cables had been disconnected from the elevators during recovery. The elevator push-pull tubes between the forward and aft control sticks were deformed, but remained attached to the forward and aft control sticks.

The elevator trim tab remained attached and exhibited free movement. The trim tab bracket remained attached to the tab and appeared undamaged. The upper trim cable had been disconnected from the tab bracket at the time of recovery; the cable attachment was intact and undamaged. The lower trim control cable remained attached to the tab control bracket. The trim cable pulley assembly common to the elevator was intact. The cables had been cut at the aft fuselage to facilitate removal of the elevators. The remaining length of the trim control cables were continuous from the aft fuselage to the cockpit control.

The vertical stabilizer remained attached to the fuselage and appeared to be intact. The rudder remained attached to the vertical stabilizer and exhibited free movement over its full range of travel. Rudder control continuity was confirmed. The rudder cables remained attached to the control surface. They were continuous from the control surface to the rear set of rudder pedals. The rear set of rudder pedals remained attached to the cockpit/cabin floor structure. The rudder control linkage between the forward and rear sets of rudder pedals were deformed but remained attached. Similarly, the brake linkage between the forward and rear sets of rudder pedals was deformed but remained attached to both sets of pedals. The forward, left rudder pedal remained attached to the cockpit floor structure; the forward, right rudder pedal was separated from the cockpit floor structure consistent with the previously noted damage.

Summary of Accident Site and Aircraft Examinations

G. SUMMARY OF AIRCRAFT EXAMINATIONS *(concluded)*

Engine – Lycoming O-235-C1, s/n L-12422-1

The engine remained secured to the engine mount; the engine mount was deformed. The crankcase appeared intact and the cylinders were secured to the case. Several push tubes were bent. Internal engine and accessory section continuity were confirmed via crankshaft rotation. Compression was obtained at each cylinder. Borescope examination of each cylinder did not reveal any anomalies. The spark plugs were intact; however, they exhibited sediment and corrosion consistent with water submersion. The oil screen was intact, but contained some sediment.

The carburetor was separated from the engine. Disassembly of the carburetor did not reveal any anomalies attributable to a loss of engine power. The gascolator was unremarkable. The inlet fuel and gascolator screens were intact and free of debris. The air box remained attached to the carburetor; it was damaged consistent with impact. The throttle, mixture, and carburetor heat controls were separated at the carburetor and carburetor air box, respectively. The controls were continuous from separation points to the cockpit controls.

The magnetos remained attached to the engine. Neither magneto provided a spark when run on a test bench. Both were disassembled and were unremarkable. They contained moisture and debris consistent with water submersion. The ignition harness was damaged and could not be tested.

Propeller Assembly – McCauley 1C90/LM7246, s/n 78122

The propeller assembly remained secured to the engine propeller flange. It was removed to facilitate the post-recovery examinations. The blades were arbitrarily marked “A” and “B”. Both blades remained attached to the hub. The hub appeared to be intact. The propeller spinner was crushed, torn, and partially separated from the backplate.

Blade “A” was bent aft about 20 degrees over the outboard one-half of the span. The outboard tip portion of the blade appeared to be bent forward slightly. The blade exhibited chordwise scratching on the forward face over the inboard one-half of the blade span. Several spanwise scratches were present on the outboard one-half of the span. The leading edge exhibited minor paint erosion, but there were no significant nicks or gouges. The aft face appeared to be undamaged.

Blade “B” appeared intact. The blade exhibited minor chordwise scratching near the leading edge on inboard one-third of the blade. In addition, minor paint erosion existed along the span of the leading edge. The blade was free of any significant leading edge nicks or gouges. Each blade root exhibited a chordwise scratch consistent with contact from the propeller spinner.