

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

SUMMARY OF AIRCRAFT EXAMINATION

-- CEN18FA140 --

A. ACCIDENT

Location: Friona, Texas
Date: April 15, 2018
Time: 2100 central daylight time
Aircraft: Bordinuk Challenger II Special (s/n CH20295CW1294), N635DT¹

B. PARTICIPANTS

Timothy Sorensen
Senior Aviation Accident Investigator
National Transportation Safety Board
Denver, Colorado

Jordan Paskevich
Accident Investigator
Rotech Flight Safety Inc.
Vernon, BC Canada

C. ACCIDENT SUMMARY

On April 15, 2018, about 2100 central daylight time, an experimental, amateur-built Bordinuk Challenger II Special airplane, N635DT, was substantially damaged during an in-flight collision with terrain near Friona, Texas. The flight instructor and student pilot were fatally injured. The airplane registration had expired. The flight was being operated by the flight instructor as a Title 14 *Code of Federal Regulations* Part 91 instructional flight. Visual meteorological conditions prevailed, and the flight was not operated on a flight plan. The local flight originated from the Hefner Farms Airport (7TS9), Bovina, Texas, about 2020.

¹ FAA records revealed that the registration was expired at the time of the accident.

Summary of Aircraft Examination

D. DETAILS OF AIRCRAFT EXAMINATION

An on-scene airframe examination was completed by the NTSB investigator-in-charge (IIC) on April 16, 2018. The airplane was recovered to D & D Aviation at the Clovis Municipal Airport on April 17, 2018. A post-recovery engine examination was completed under the direct oversight of the NTSB IIC with the assistance of a technical representative of Rotech Flight Safety.

E. DESCRIPTION OF ACCIDENT SITE

The accident site was located in a harvested corn field about 0.4-mile northwest from the departure airstrip. The airplane came to rest upright and was oriented on a south heading. An irrigation boom was located about 400 feet north-northwest from the airplane. No other obstructions were within the vicinity of the accident site.

F. SUMMARY OF AIRCRAFT EXAMINATIONS²

Airframe – Bordiuk Challenger II Special (s/n CH20295CW1294)

The forward fuselage was compromised. The airframe structural tubes were separated in multiple locations; the fracture surfaces appeared consistent with overstress. The instrument panel and seats were dislocated and deformed. The windscreen was fragmented; plexiglass fragments were located at the accident site. The forward control stick was separated above the hinge point. The separation appeared consistent with overstress. The aft control stick was bent and dislocated from the airframe structure. The forward and aft throttle levers remained attached to the fuselage structure. The throttle cable was continuous from the levers to the engine. The aft fuselage appeared to be intact. The fuel tank was dislocated from the airframe and located adjacent to the wreckage at the accident site. It was breached and did not contain any fuel at the time of the examination.

The wing remained in position relative to the fuselage. The wing-to-fuselage structural tubing was deformed and separated; the fracture surfaces appeared to be consistent with overstress separations. The leading edge structural tubing (forward spar) was deformed, with corresponding deformation of the adjacent ribs. The trailing edge structural tubing (aft spar) appeared intact. The wing skin (fabric) was torn and partially separated in the areas of the leading edge deformation. The forward wing struts remained attached to the forward wing spars and the fuselage structure. The aft wing struts remained attached to the aft wing spars and the fuselage structure; however, both were bent. The ailerons remained attached and were free to move.

The empennage remained attached to the aft fuselage structure and appeared intact. The horizontal stabilizer struts were intact. The rudder and elevators remained attached to the vertical and horizontal stabilizers, respectively. The rudder trim tab appeared intact and was positioned trailing edge left. Elevator trim tabs were installed on both the left and right elevators. The tabs appeared intact and were both positioned trailing edge down.

² Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

Summary of Aircraft Examination

G. SUMMARY OF AIRCRAFT EXAMINATIONS *(continued)*

The aileron control cables remained attached to the forward and aft control sticks. The left aileron cable was separated below the bellcrank; the cable was frayed consistent with an overstress separation. The left aileron bellcrank appeared intact. The push-pull tube from the bellcrank to the left aileron was attached and appeared undamaged. The right aileron cable was continuous to the bellcrank tab; however, the bellcrank tab was separated consistent the overstress. The push-pull tube from the bellcrank to the right aileron was attached and appeared undamaged.

The elevator control tubes remained attached to the forward and aft control sticks. The control tube was continuous to the aft fuselage bellcrank, and from there to the elevators.

The forward and aft rudder pedals remained attached to the corresponding airframe support; however, the supports were dislocated from the adjacent airframe structure. The rudder cables remained attached to the forward pedals; they were continuous to rudder. The push-pull tubes from the aft rudder pedals to the forward pedals were separated consistent with impact forces. The nose wheel steering push-pull control tubes from the forward rudder pedals were also separated consistent with impact forces.

Engine – Rotax 503 (s/n 4488563)

Propeller – Ivoprop UL360

The engine remained attached to the airframe mounts. A belt-drive reduction system was installed.³ It appeared to be intact and undamaged. The propeller remained secured to the reduction system propeller mounting flange. The exhaust system expansion chamber and muffler remained secured to the engine assembly. The engine was equipped with an electric starter, which appeared intact. The cooling fan assembly exhibited damage consistent with impact. Multiple cooling fan blades were separated.

The spark plugs were securely installed.⁴ The electrode of each plug exhibited an oil residue consistent with an overly rich condition during operation. The electrodes were intact, with gaps that ranged from 0.030 to 0.041 inch. The engine rotated freely, and compression and suction were obtained on both cylinders. No scoring or excessive heat signatures were observed on the portion of the cylinders visible through the exhaust and intake ports.

The ignition modules remained secured to the engine case. The ignition harness remained attached to the modules; however, the boots displayed cracking at the connections. Three of the four harness leads were separated at the spark plugs; the boots were damaged consistent with impact.

The carburetors appeared intact. The carburetor sockets were cracked. No fuel was observed in the float bowls; however, each bowl contained some sediment. The sieve screens were crushed on the mixing tube. The main jets were securely installed and clear of obstructions. The idle jets were clear of obstructions. The needle valves / valve seats

³ The Rotech technical representative indicated that this was a non-Rotax modification.

⁴ Two types of spark plugs -- one NGKR BPR6EY 11 and one NGKR BR8ES -- were installed in each cylinder.

Summary of Aircraft Examination

G. SUMMARY OF AIRCRAFT EXAMINATIONS *(concluded)*

operated normally. The floats were intact and appeared operational. Several of the rubber fuel lines exhibited cracking.

The pneumatic fuel pump remained secured to the engine and appeared intact. Disassembly of the unit did not reveal any anomalies. A small pebble was observed resting against one of the check valves; however, the investigation could not determine whether this was introduced post-accident due to disconnected fuel lines. An electric fuel pump was installed. The pump operated when electrical power was applied; although, no fuel was introduced to the pump during the exam. The fuel line common to the fuel filter assembly was separated. The filter assembly appeared intact. One element appeared to be flattened for an unknown reason. Otherwise, the filter element appeared intact.

An oil injection system was not installed, which required the use of pre-mix fuel. The fuel-to-oil mixture ratio in use at the time of the accident could not be determined.

The air filter assembly was intact⁵; although, it had accumulated debris either in-service or at the accident site.

Two propeller blades were deformed with corresponding composite delamination near mid-span. The third blade appeared intact.

Two engine test runs were completed after the examination.⁶ The engine started without difficulty and ran with no anomalies noted. No mechanical anomalies consistent with a loss of engine power were observed.

⁵ The Rotax technical representative indicated that this was a non-Rotax air filter assembly.

⁶ The engine components were re-installed to facilitate the test runs, with exception of the propeller blades. The test runs were completed with only the drive reduction belt assembly installed.