



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

DATE November 13, 2019

AIRFRAME AND ENGINE EXAMINATION

WPR20LA012

This document contains 21 embedded photos.

A. ACCIDENT

Location: Holden, Utah

Date: 10/22/2019

Aircraft: Czech Sport Aircraft Sportcruiser / N204BF

NTSB IIC: Fabian Salazar

B. EXAMINATION PARTICIPANTS:

Name: Fabian Salazar
ASI
National Transportation Safety Board
Federal Way, WA 98003

Name: Enrique Dillon
Director/President
BRS Aerospace
Miami, Florida

Name: Jordan Paskevich
Chief Accident Investigator
Rotax Flight Safety Inc.
Vernon B.C. Canada

Lukas Koterec
Chief Executive Officer
Cruiser Aircraft Inc.
Sebastian, FL.

C. SUMMARY

Examination of the airframe and engine was conducted at the operator's hangar, located at the Skypark Airport (BTF), Bountiful, Utah. Examination of the airframe revealed the Ballistic Recovery System (BRS) system left-side rear suspension cable fractured and separated from the airframe. The engine number 2 cylinder exhibited damage to the valve train and required further examination from BRP-Rotax GmbH & Co KG, Gunskirchen, Austria (BRP-Rotax).

D. DETAILS OF THE INVESTIGATION

Airframe Examination

The airframe was examined by a party member representing the airframe manufacturer. The wings had been removed from the fuselage for recovery. The fuselage was placed on pallets and secured with straps. The straps were removed to facilitate examination of the interior of the cockpit. The cockpit canopy had a fracture to the acrylic, but the cockpit space was not compromised. The interior of the cockpit did not sustain damage. The three-screen electronic flight instrumentation system was secure. The ballistic recovery system handle was pulled out about 3 inches and suspended by the cable. The fuel selector system was positioned to the left tank.

Fuselage right side. The right side of the fuselage was not damaged from the accident; however, there was visible damage to the composite material at the base of the canopy that began at the top of the fuselage, aft of the engine nacelle, and ran along the canopy side to about the aft section of the canopy, near the hand hold. The BRS right-aft suspension cable had created the damage to the composite material as it deployed. The right wing was not damaged including the flap and aileron. The right composite main landing gear had fractured and separated from the lower fuselage. The right-side fuselage, aft of the canopy to the empennage was undamaged. Empennage. The horizontal stabilizer exhibited no damage. The one-piece elevator exhibited a minor dent on the top right side. The right and left side of the vertical stabilizer and rudder were undamaged.

Fuselage left side. The left side of the fuselage, from the empennage to the canopy was undamaged. The fuselage sheet metal above the left wing exhibited wrinkling. There was no tear in the composite canopy from the left-side BRS suspension cable. The left wing exhibited substantial damage, with upward bending of the aileron and wing. The left main landing gear was fractured above the spindle. The left flap was undamaged.

The engine cowling area was secure and undamaged. The three-bladed propeller was secure and undamaged. The spinner was undamaged. The nose gear remained attached to the underside of the fuselage and exhibited minor damage.

Flight control continuity was confirmed from the control stick to the wing mounts and from the root of the removed wings to the ailerons. From the control stick to the elevator, and from the rudder pedals to the rudder.

The BRS was examined by a party member representing BRS Inc. The parachute exhibited minor tearing only. The right-side rear suspension cable was intact and exhibited no damage. The right-side front fabric suspension strap was intact and exhibited no damage. The left-side front fabric suspension strap was intact and exhibited no damage. The left-side rear suspension cable was fractured near the left-side canopy hinge. The cable exhibited a frayed or broom-straw appearance. When placed near the canopy hinge, the cable break was abeam the hinge retention bolt. The left-side rear suspension cable had initially torn through the composite material at the top of the forward fuselage but stopped at the location of the canopy hinge. Beyond the separation, the cable extended to, and remained attached to the metal ring that secured the four suspension units to the parachute.

Engine Examination

The engine was examined by a party member representing the engine manufacturer. The engine remained attached to the airframe at the undamaged mounts. When the number two-valve cover was removed, there were components of the valve train loose in the chamber. The intake rocker arm was displaced past the top of the valve spring. The valve spring retainer was absent and found in two halves in the rocker box chamber along with remnants of the valve guide. The top and bottom spark plugs were removed, exposing damaged electrodes. The number two-cylinder was removed exposing the top of the piston. The piston exhibited impact damage and a hole consistent with being struck by the side of the intake valve. The piston exhibited multiple fractures to the piston skirt. The number two-piston wrist pin had separated from the piston and lodged between the crankshaft and the wall of the number two-cylinder bore. The number two-intake valve lodged into the intake valve opening. The valve was inverted where the stem was pointing toward the piston and had a S-bend to it. The number two-cylinder exhibited multiple fractures of the cylinder skirt. The valve spring shim exhibited a circumferential indentation or wear mark. The chip detector was removed and exhibited multiple metallic metal shavings attached to it.

The oil pump was removed, and the pump shaft exhibited discoloration and galling.

The number one-, three-, and four-cylinder assemblies were disassembled. No anomalies were found that would have precluded normal operations.

According to the engine maintenance logbook, the last engine service was a 100-hour inspection conducted on October 4, 2019, at a Hobbs time of 2097.3 hours. During that inspection, the oil filter was removed, cut open and found to be free of any contamination.

The failed components were shipped to BRP-Rotax, Austria, for further examination. Later, the rest of the engine was shipped to the same facility to aide in the examination.

Examination of the engine by BRP-Rotax revealed the fracture area of the valve spring retainer had a fatigue break with pronounced vibration stripes. The breakage exit area was close to the upper edge (outer bore), but the exact breakage exit was in a destroyed or damaged condition.

PHOTO EXHIBIT



Figure 1. N204BF, Right-side view.



Figure 2. Front view.



Figure 3. Left-side view.



Figure 4. Rear view.



Figure 5. Cockpit view.



Figure 6. Left wing, showing substantial damage.



Figure 7. Right side, showing exemplar track for the BRS right-side suspension cable.



Figure 8. Right-side, forward view of the exemplar track for the BRS right-side suspension cable.



Figure 9. left-side internal view of the break in the left-side BRS suspension cable near the location of the canopy hinge bolt.



Figure 10. Left-side view of the engine, showing the number two and four-cylinders.



Figure 11. Right-side view of the engine, showing the number one and three-cylinders.



Figure 12. Number two-rocker box cover and contents found in it upon removal.



Figure 13. Number two-valve spring shim, showing a worn, circular groove.



Figure 14. Number two-piston top.



Figure 15. Number two-cylinder, bottom view, showing the fractured cylinder skirt. The fracture piston skirt is visible.

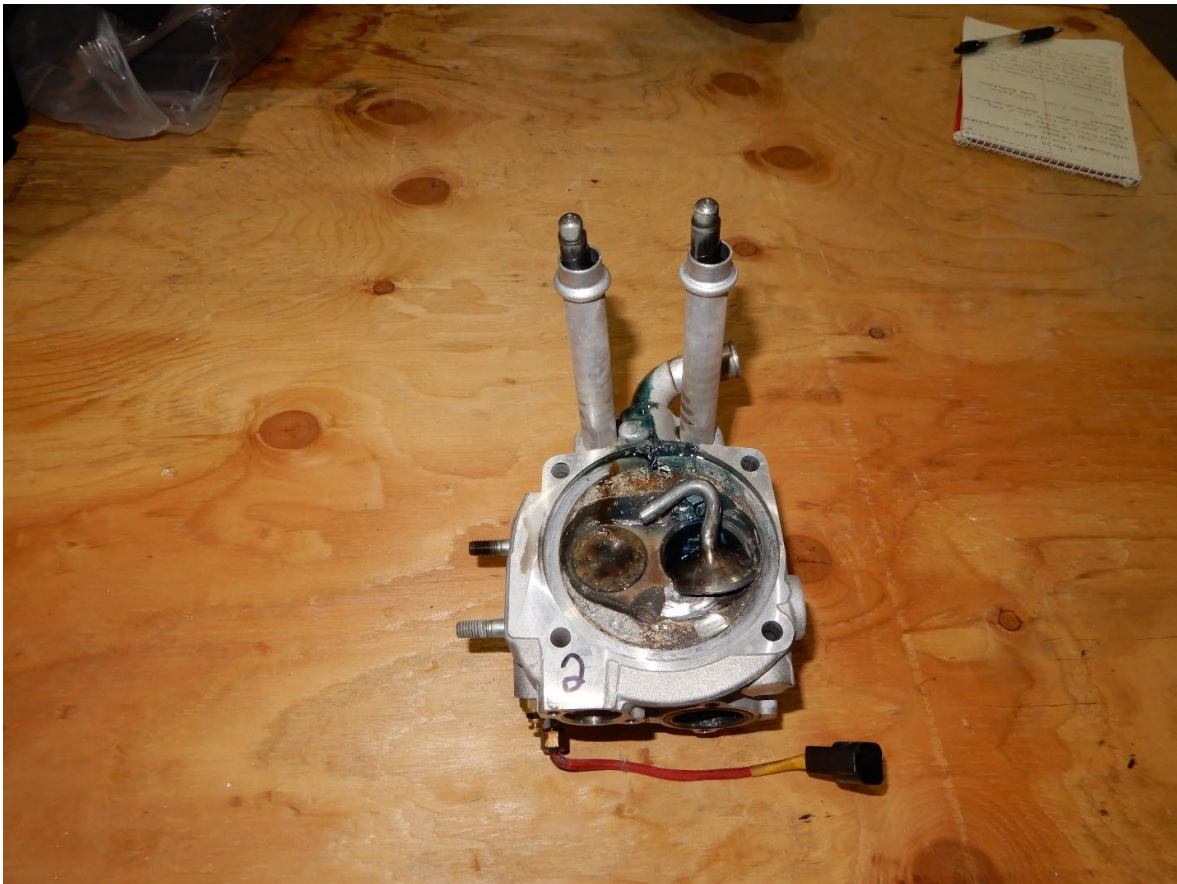


Figure 16. Number two-cylinder head, showing the intake valve displaced and lodged in the valve port.

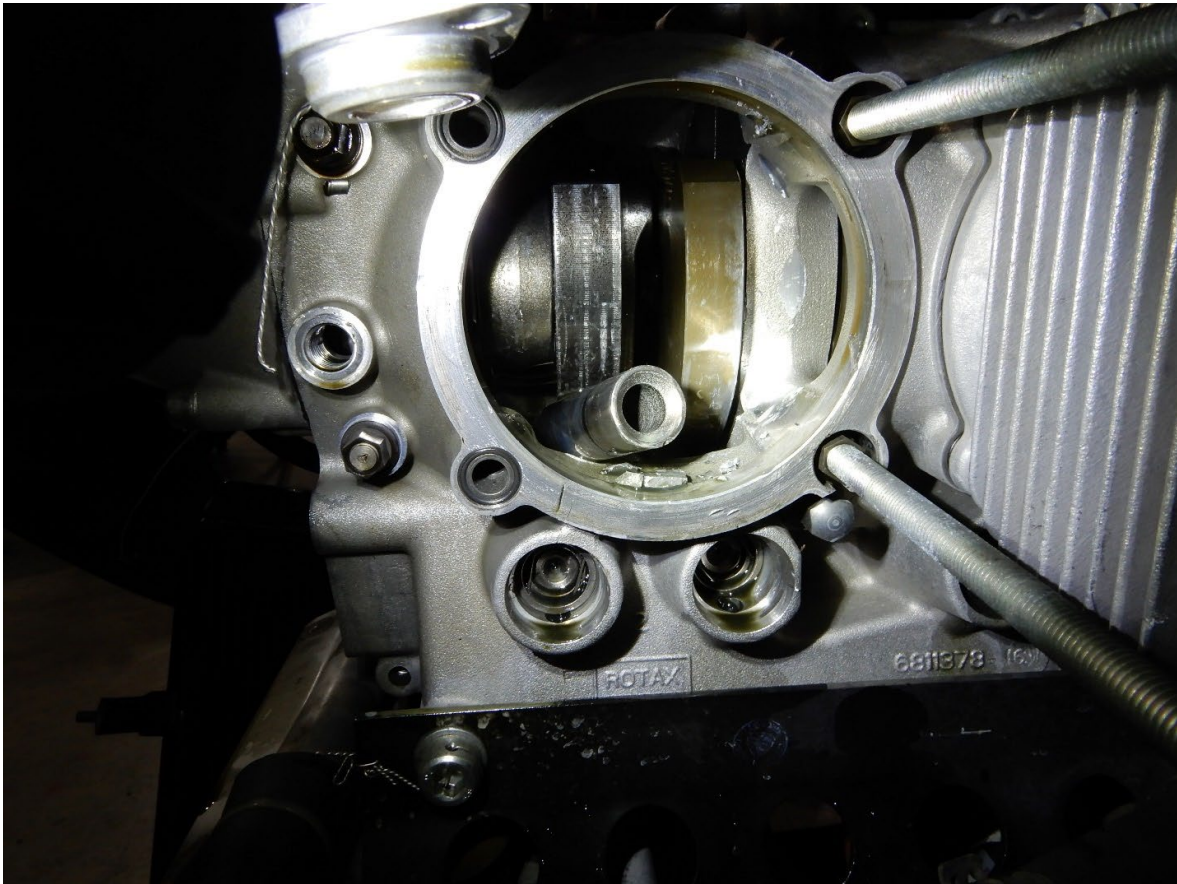


Figure 17. Number two-cylinder bore, showing the number two-piston wrist pin lodged between the crank shaft and the bore.



Figure 18. Oil pump shaft, showing discoloration and galling.

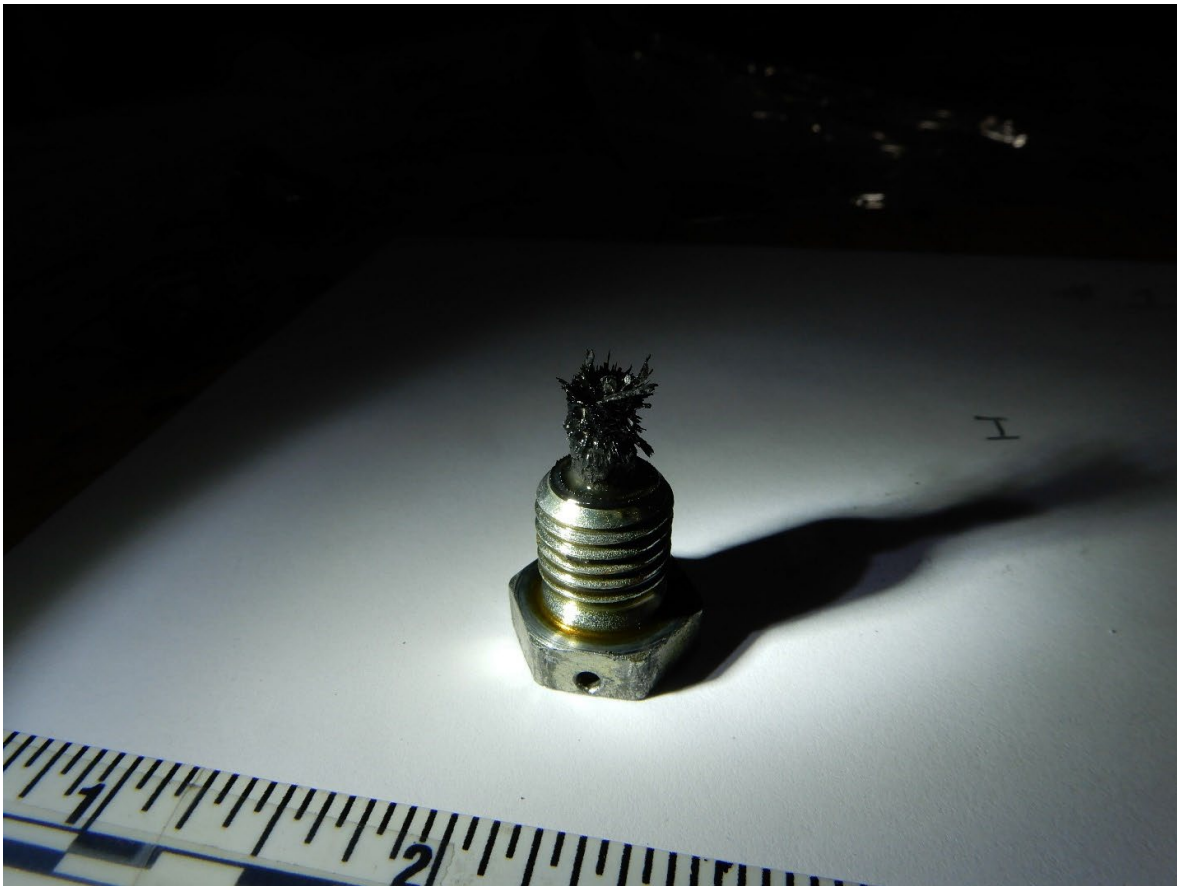


Figure 19. Magnetic chip detector, showing metal shaving attached.



Figure 20. Number two-cylinder, top and bottom spark plugs.

Datum: Date:	Model: Sport Cruiser S/N: C0610 Reg# N204BF	Model: Rotax 912- ULS 2 S/N: 9 569 290 ROTAX AIRCRAFT DIVISION	FLY Academy	Flight Hours: 1689.8 Hobbs: 2097.3	23
	C/W Engine 100/200 HR inspection IAW Rotax Maintenance Manual check list. Drained oil and removed filter. Added 3 Liners Aeroshell Sport 4 Plus oil, cut oil filter for inspection, no contamination found. Installed new oil filter P/N: 825 016. C/W 200hr carburetor inspection IAW Rotax HMM 73-00-00 Section 3. Weighed floats and found left carburetor 2.95g, 3.08g, and right carburetor with 3.30g, 3.31g. Performed Carburetor Synchronization IAW Rotax LMM 73-20-00 Section 10.1-3. Performed compression test 1.) 81/87 2.) 79/87 3.) 84/87 4.) 81/87. Replaced all 8 spark plugs with new NGK DCPR8E. Performed routine maintenance and servicing. Run up, ops and leak check good. I certify that this engine has been inspected in accordance with a 100/200 HR inspection and found to be in safe operating condition.				Repairman: _____ Lucas K. West
Date: October 4, 2019	Model: Sport Cruiser S/N: C0610 Reg# N204BF	Model: Rotax 912- ULS 2 S/N: 9 569 290 ROTAX AIRCRAFT DIVISION	FLY Academy	Flight Hours: 1740.2 Hobbs: 2157.8	
Date: October 18, 2019	Performed 50 HR oil change. Drained oil tank and filled with 3L Sport Aero Shell Plus 4. Run up, ops and leak check normal.				Repairman: _____

Kannad Battery PIN:
01418235

Figure 21. Excerpt from the engine logbook, showing the last maintenance performed on the engine.