



AIRPLANE EXAMINATION

WPR17LA003

Roberts, Idaho

October 8, 2016

1400 MDT

Kolb Sport 600; N914NK

PARTICIPANTS IN THE EXAMINATION

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HISTORY OF FLIGHT

On October 8, 2016, about 1400 mountain daylight time, an experimental amateur built Kolb Sport 600 airplane, N914NK, was substantially damaged during a forced landing in Roberts, Idaho following a loss of engine power. The private pilot and his passenger received minor injuries. The airplane was owned and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the cross country flight that departed a private airstrip at approximately 1400 mountain daylight time and was destined for Joslin Field – Magic Valley Regional Airport (TWK), Twin Falls, Idaho. The personal flight was originating at the time of the accident.

According to the pilot, he departed runway 24 after a successful pre-flight inspection and engine run-up. As the airplane reached approximately 100 feet above ground level, the pilot “felt” the airplane lose power. He then lowered the nose and initiated a left turn teardrop maneuver to land on runway 06. The pilot engaged the airplane’s auxiliary fuel pump to maintain engine power, but the propeller stopped rotating a few seconds later. Towards the end of the turn, the pilot determined that the airplane would not reach the dirt landing strip and leveled out early to land parallel to the runway. The airplane touched down about 200 feet south of the runway in sage brush and subsequently impacted debris before it nosed over inverted and came to rest.

Postaccident examination by a Federal Aviation Administration inspector revealed substantial damage to the rudder. The inspector reported that the right wing fuel tank was approximately half full.

The wreckage was retained for further examination.



Photo 1: Airplane at Rest

ENGINE INFORMATION

Engine Manufacturer: Rotax Engines
 Engine Model Number: Rotax 914UL
 Engine Serial Number: 4418601
 Recent Inspection: Annual – 521.3 hours
 Recent Recorded TSMOH: 577 hours
 Time Since Inspection: 55.7 hours

According to the Rotax maintenance manual, the Rotax 914UL must be overhauled at 1,000 total flight hours or 10 years, whichever is first. At the time of the accident, the engine was 12 years old.

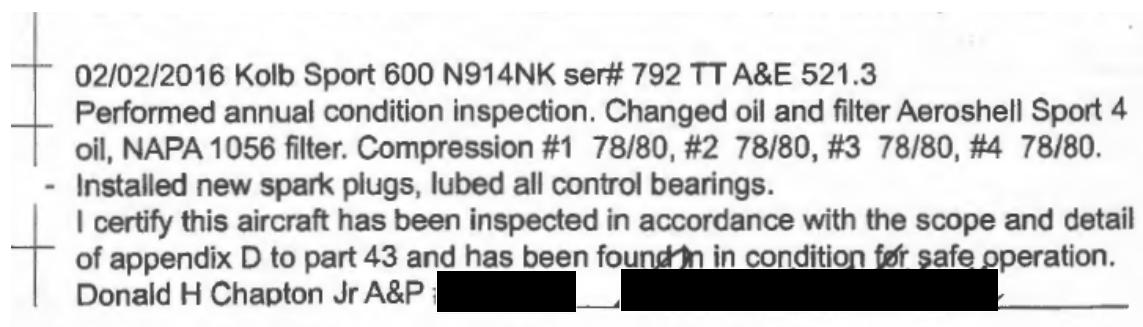


Photo 2: Recent Condition Inspection

INITIAL EXAMINATION AS RECEIVED

The airplane was recovered from the accident site to Precision Aviation, Inc. in Twin Falls, Idaho. The airplane was viewed by the IIC and engine manufacturer and subsequently photographed prior to examination.



Photo 3: Airplane After Recovery



Photo 2: Engine as Received

DETAILED EXAMINATION

The engine sustained minimal damage with the exception of the radiator, which was crushed aft and displayed a leak. Two propeller blades were separated at the propeller collar and the third blade remained intact.

Compression Test

	Pre-Engine Run
Cylinder No. 1	79/80
Cylinder No. 2	78/80
Cylinder No. 3	78/80
Cylinder No. 4	79/80

Carburetors

Both carburetors were manufactured by Bing; the serial number to the right carburetor was 040029 and the serial number to the left carburetor was 040089. The throttle cables displayed normal travel from the idle to full power. The float bowls were removed prior to the engine run. The float pins to both carburetor bowls displayed wear on one side, consistent with having contacted the float bracket. According to the manufacturer, this wear is prevalent in units that have accumulated approximately 500 flight hours.

The floats from both carburetors were removed and weighed. The right carburetor floats weighed a total of 8.8 grams, 1.7 grams above the manufacturer's limitation, and the left carburetor floats weighed a total of 10.0 grams, 3 grams above the published limitation. The floats were placed in glasses filled with 100 LL aviation grade gasoline and allowed to soak overnight for a period of 12 hours in accordance with the engine manufacturer's test procedure. At the end of the test period, the right carburetor floats' weight increased to 8.9 grams and the left carburetor floats' weight increased to 10.1 grams. It is presumed that any remaining fuel within the floats would have evaporated between the accident and the postaccident engine examination, a span of approximately 2 months. According to the Rotax maintenance manual, the floats are required to be weighed every 200 hours. Additionally, the guidance states that the carburetors must be removed and inspected every 200 hours.

According to the maintenance manual, both carburetors were removed on May 12, 2016 and sent to California Power Systems for overhaul. The logbook entry that captured the removal of the carburetors was recorded at a total tachometer time of 537.1 total flight hours. The entry from the carburetor overhaul facility stated that a "Rotax carb overhaul kit [was] installed as per Rotax Heavy maint. Manual." The entry further states that the "Jet needle was moved to a leaner setting per customer request." A review of the jet needle to both carburetors revealed that they were in the no. 1 needle clip position, the leanest setting. Both pistons exhibited no visual scoring, which indicates that the carburetors were properly balanced. Each carburetor main jet was free of obstructions.

Gascolator

The gascolator was disassembled and several ounces of fuel were drained into a plastic container. The fuel bowl contained dirt. The fuel filter screen displayed dirt and debris approximately 1 inch in length by 0.5 inches wide.



Photo 5: Gascolator Bowl



Photo 6: Gascolator Fuel Filter Screen

Fuel Pump

The main and auxiliary fuel pumps were manufactured by Pierburg; the part number was 03T060. The main pump serial number was 7121440.78 and the auxiliary fuel pump serial number was 7.21440.78. The filter screens to the main and auxiliary fuel pumps were inspected. The auxiliary fuel pump was free of debris, while the main fuel pump was clogged with some gray dirt and fibers. The units were reassembled to facilitate an engine run.

The rotax engine manual states that both the main and auxiliary fuel pumps should be on during takeoff; however, the airplane pilot's operating handbook (POH) limitation section requires that only the main fuel pump should be on during takeoff. A procedure to operate the airplane with the auxiliary fuel pump on was not found in the normal or emergency procedures sections. According to the engine manufacturer, most airplane manufacturers follow the Rotax guidance to takeoff with both fuel pumps on.

Additionally, the engine manual states that if the gascolator displays contamination then the fuel pumps must be inspected. This guidance is not specified in the maintenance schedule, but is included under the fuel filter inspection and the page is referenced under the schedule.

Fuel Pump Test

The fuel pumps were connected to a 12V battery at the manufacturer's facility in Vernon, British Columbia for testing. One end of a hose was submerged in a bucket of water and the other end was connected to the inlet line of each pump during the separate tests. A pressure gauge was connected to the outlet port of each pump through another hose. The main fuel pump motor functioned normally when tested and achieved a constant fuel pressure measurement of 33 psi. The auxiliary fuel pump motor also functioned normally when tested and achieved a constant fuel pressure measurement of 32 psi.

Spark Plugs

The spark plugs were manufactured by NGK (part no. DPR8EA9), and were removed and examined. The top plugs displayed normal wear. The no. 1 – 3 top spark plug ground electrodes gaps measured 0.035, no. 4 measured 0.032. The bottom plugs all exhibited normal wear. The bottom spark plug gaps were as follows: no. 1 – 0.035; no. 2 – 0.032; no. 3 – 0.034; no. 4 – 0.034.



Photo 7: Sparkplugs

ENGINE TEST RUN

A fuel tank was plumbed into the header tank through the left wing fuel line at the wing root. Water was fed into the radiator to prevent the engine from overheating as the radiator was damaged during the accident. Two complete engine tests were subsequently performed: test no. 1 was accomplished with the main fuel pump on and test no. 2 was performed with both the main and auxiliary fuel pumps on. The throttle was advanced to full power approximately 5 times between these tests to capture the performance of the engine with only the main fuel pump engaged and then both the main and auxiliary fuel pumps on. The following engine parameters were captured during each test at idle power, maximum rated power, and maximum continuous power: fuel pressure, oil temperature, oil pressure, cylinders 1-4 exhaust gas temperature, cylinders 1-4 cylinder head temperature, and manifold pressure.

SUMMARY

The engine produced significant vibrations during the first engine test that dissipated over the course of a 2 minute period near the idle power setting. The cause of the vibration was unknown. Further, the engine lost power for approximately 1 second at 2,500 rpm and 24 in. Hg manifold pressure when the throttle was advanced to full power. The results of the first complete engine test were within the ranges prescribed by the engine manufacturer.

Prior to the second complete engine test the throttle was advanced twice to the full forward position with only the main fuel pump on and once with both the main and auxiliary fuel pumps on. During all three tests, the engine lost power for about 1 second at 2,500 rpm and 24 in. Hg. manifold pressure. A 4th and 5th test were administered with the main fuel pump on and both the main and auxiliary fuel pumps on, respectively. During these final tests, the engine advanced to full power smoothly without any anomalies.

The results of the second complete engine test were within the ranges prescribed by the engine manufacturer.

Engine Test #1 (Main Pump) - Results

RPM	Fuel PSI	Oil Temp.	Oil PSI	OAT	Cylinder No. 1 (EGT)	Cylinder No. 2 (EGT)	Cylinder No. 3 (EGT)	Cylinder No. 4 (EGT)
Idle (2000 rpm)	0.4	59	39	28	900	662	684	975
Max Power (5830)	4.3	86	45	28	1484	1400	1370	1464
Max Power Continuous	5.9	122	39	28	1453	1410	1326	1477

RPM	Cylinder No. 1 (CHT)	Cylinder No. 2 (CHT)	Cylinder No. 3 (CHT)	Cylinder No. 4 (CHT)	Manifold PSI
Idle (2000 rpm)	83	71	43	44	17
Max Power	121	98	43	44	36 max 39
Max Power Continuous	134	109	43	44	31

Engine Test #2 (Both Pumps) - Results

RPM	Fuel PSI	Oil Temp.	Oil PSI	OAT	Cylinder No. 1 (EGT)	Cylinder No. 2 (EGT)	Cylinder No. 3 (EGT)	Cylinder No. 4 (EGT)
Idle (2000 rpm)	0.4	98	39		926	700	500	923
Max Power (5770)	6.0	108	38		1478	1370	1390	1485
Max Power Continuous (5440)	4.8	146	37		1463	1418	1350	1461

RPM	Cylinder No. 1 (CHT)	Cylinder No. 2 (CHT)	Cylinder No. 3 (CHT)	Cylinder No. 4 (CHT)	Manifold PSI
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Idle (2000 rpm)	97	83	26	27	14
Max Power (5770)	109	87	29	29	40
Max Power Continuous (5440)	128	101	30	30	32