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ROTECH FLIGHT SAFETY INC.

Rotech Flight Safety Ltd. [REDACTED]
 Vernon, BC V1H 1M5 Canada
 [REDACTED]

INVESTIGATION FIELD NOTES

<u>ACCIDENT INFORMATION</u>			
Date of accident:	October 4 2011	NTSB file number:	WPR12FA001
Location of accident:	West Jordan UT	FAA Inspector:	Schott Hartley
Location of Investigation:	Salt Lake City UT	Law Enforcement:	Unknown
Investigator In charge:	Kurt Anderson	Corner/Medical Examiner	Unknown
<u>AIRCRAFT INFORMATION</u>			
Aircraft Make:	Aero Design	Aircraft registration:	N91BV
Aircraft Model:	Pulsar	Aircraft S/N	146
Propeller make, model & S/N	Unknown		
<u>ENGINE INFORMATION</u>			
Engine Type:	Rotax 582 Mod 90	Engine TTSN:	Unknown
Engine Serial Number:	3917142	Engine TTSOH:	Unknown
Engine Manufacture date:	Unknown	Engine position:	Tractor
<u>ADDITIONAL INFORMATION</u>			
Persons in attendance:	Mr. Kurt Anderson – NTSB – Investigator in charge		
	Mr. Scott Hartley – FAA – Investigator in charge		
	Mr. Rick Steadnitz – FAA – FAST Team		
	Mr. Jordan Paskevich – Rotech Flight Safety		
Date of Report:	November 1 2011		
RFS File number:	2011-056		

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Field Notes

MAG – Magneto side of engine

PTO – Power takeoff side of engine

Initial inspection

- Engine found previously removed from aircraft and was sitting on the hanger floor.
- The engine sustained severe impact damages resulting in the gearbox becoming partially separated from engine.
- Engine was not oil injected.
- An aftermarket non-standard HACMAN mixture control was installed on aircraft.
- Both propeller blades were severely damaged from impact.
- The exhaust system was partially separated and appeared to have been modified from stock configuration.
- The starter was previously mounted to the MAG side of the engine and was found separated from engine due to impact damage.
- The spark plugs and caps were damaged from impact
- The coolant system (I.e. coolant lines and radiator) was found breached from impact and partially removed from the engine.
- PTO Carburetor suffered impact damage and was found separated from engine and the float bowl was not attached.
- The MAG Carburetor was still attached to the engine, with the float bowl partially disconnected from the carburetor body.
- The air cleaners were damaged from impact and the PTO carburetor air cleaner was separated from the carburetor.

The engine was then transported to a better location for further tear down and investigation

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Field Notes

Tear down inspection

- The spark plugs were removed from the engine and examined for proper type, spark plug gap and running condition.
- All spark plugs were of the proper type BR8ES. The spark plugs were examined for the running condition of the engine. All spark plugs appeared to indicate that the engine was running a very rich fuel to air ratio.
 - PTO # 1 spark plug electrode gap was .028
 - PTO # 2 spark plug electrode gap was .021
 - MAG # 3 spark plug was damaged from impact. The plug electrode gap was .024
 - MAG # 4 spark plug was damaged from impact. The plug electrode gap was .023

The proper spark plug electrode gap should be .020 +/- .002 as stated in the Rotax repair section 2.3) Technical data ROTAX engine type 582 UL page 12
- With the spark plugs removed the engine was rotated and good thumb compression and continuity was established.
- The remaining coolant system was removed to gain access to the exhaust Y pipe for inspection.
- The exhaust Y pipe was examined and removed so an inspection of the pistons and combustion chamber could be conducted.
- With the exhaust Y pipe removed the combustion chamber and pistons were examined and no seizure marks or scoring could be found. The piston rings were free in there respective lands and were not packed with carbon.
- The ignition system was examined and appeared to be in good overall condition with the exception of the spark plug caps (damaged from impact). Some wires were found chafing and it was undetermined if this was caused from post or pre impact damage.
- The fuel pump was found broken off its mounting position from impact damage. It was temporarily placed in its original mounting position to see if it was correctly installed. In the Rotax installation manual section 15) page 15-1 it states that the fuel pump should be installed in a cool place (not on the engine itself), with the small drain hole near the impulse connection towards the bottom. On this particular engine it was observed that the small drain hole on the fuel pump was not facing the appropriate direction. The fuel pump was not mounted on the engine and appeared to have been a cool place, as stated in the installation manual.

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Field Notes

Tear down inspection

- The cylinder head was removed from the cylinders and examined. No anomalies could be found with the cylinder head.
- With the cylinder head removed the tops of the pistons could be examined. The tops of the pistons appeared to be undamaged but there was quite a bit of black carbon built up, indicating a rich running condition. Small bits of foreign material was found sitting on top of the pistons. This was contributed to pieces falling into the spark plug holes during disassembly.
- The cylinders were removed so they could be examined for scoring and seizure marks. The cylinder appeared to be in good condition with no scoring or seizure marks found.
- With the cylinders removed the pistons, connecting rods and bearings could be examined. No anomalies could be found with these components and everything was in good overall condition.
- The starter cover on the MAG side of the engine was removed so the coil and stator assembly could be examined. The coil and stator assembly was extremely dirty and oily indicating that there might have been a crank case seal leaking. No other anomalies could be found with the coil and stator assembly.
- With the coil and stator assembly removed the MAG outer crankshaft seal could be examined for condition. This seal was found to have been leaking which would affect the engines performance and reliability. According to the Rotax maintenance schedule found in the Rotax maintenance manual section 10.2) page 10-2 at 150 hours the crankshaft should have been inspected and the outer seals should be replaced.
- The gearbox was removed so the PTO crankshaft seal could be examined for condition. The gearbox was extensively damaged from impact and was only held on with two of the 6 bolts. With the gearbox removed the PTO crankshaft seal was examined and found to be not leaking and in good overall condition.
- The carburetors were examined for condition and proper installation. Both the MAG and the PTO carburetors had a 180 main jet. The stock main jet for this engine is a 165. A 180 main jet allows more fuel to be introduced into the engine resulting in a richer fuel to air mixture.

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Field Notes

Tear down inspection (continued)

-The tops of the carburetors were removed so the Jet needle and needle clip position could be examined. It was discovered that the Jet needles were installed incorrectly and placed above the retaining cup instead of underneath as it was designed. This would result in an extreme rich running condition of the engine resulting in a severe impact on engines performance.

- The exhaust system was examined and found to have been modified from its original condition. The modifications that were made to the exhaust system were located in the mid length of inlet tube between the exhaust flange and muffler. The exhaust system was also noted to be in poor condition and had suffered some minor impact damage.

The exhaust system is tuned for the respective engine and performance and must not be changed. If modifications are inevitable, then the mid length of inlet tube between exhaust flange and muffler must be maintained without fail. For necessary modifications the owner must ask for manufacturer's approval in writing, as stated in the Rotax installation manual section 10) Exhaust system page 10-1

Report completed by: Jordan Paskevich- Rotech Flight Safety