



ERA20LA011

Harrisburg, Pennsylvania

October 4, 2019

Piper, PA46-310P – N4385K

NTSB ENGINE EXAMINATION REPORT

March 12, 2020

PARTICIPANTS IN THE EXAMINATION

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HISTORY OF FLIGHT

On October 4, 2019, at 1713 eastern daylight time, a Piper PA46-310P, N4385K, was substantially damaged during a forced landing to the Susquehanna River following a total loss of engine power while on approach to the Harrisburg International Airport (MDT), Harrisburg, Pennsylvania. The private pilot and a passenger sustained minor injuries. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the personal flight which originated at the Greater Rochester International Airport (ROC), about 1600, and was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

ENGINE INFORMATION

Engine Manufacturer: Continental Motors

Engine Model Number: TSIO-550-C

Engine Serial Number: 802503

Recent Inspection: March 1, 2019 – Annual inspection

Recent Recorded TSMOH: 74.9 as of accident date

YEAR 20 DATE	RECORDING TACH TIME	TODAY'S FLIGHT	TOTAL TIME IN SERVICE	Description of Inspections, Tests, Repairs and Alterations Entries must be endorsed with Name, Rating and Certificate Number of Technician or Repair Facility. (See back pages for other specific entries.)
SUN AVIATION, INC., Vero Beach, FL (VRB) Date: 03/01/19 ACTT: 5084.8 Eng TT: 2361.7 Eng TSO: 54.7				N4385K SN: 46-8508027
Accomplished an annual engine inspection IAW FAR 43, Appendix "D", using the Piper PA46-310P 1 hour inspection report as a guide. Accomplished engine compression check as follows: 1-73/80, 2-75/80, 3-77/80, 4-74/80, 5-75/80 and 6-77/80. Accomplished an oil and filter change, cut open filter removed and inspected, see with 8 cps Phillips XC 20W50 oil and one CH48109-1 filter. Accomplished AD 84-26-02 inspection of paper induction air filters AD 2011-06-10 TIT probe replacement not due at this time. Replaced oil vernatherm valve seal, installed 627496 Retimed right and left magnetos per MM 74-10-00. Adjusted propeller control and set propeller RPM to 26000 per MM 61-20-00 and 76-10-00. Retensioned alternator belt per MM 24-30-00. Reattached right hand tailpipe heat shield to right hand tailpipe. Lubricated wastegate butterfly per Hartzell SIL A-111. Adjusted alternate air door linkage per MM 12-10-00. Replaced right hand rear engine vibration mount heat shield, installed P/N 84136-004 per IPC figure 49.				
MAINTENANCE RELEASE: This aircraft, airframe, aircraft engine, propeller or appliance identified above was repaired and inspected in accordance with current regulations of the Federal Aviation Administration and is approved for return to service. All work was performed in accordance with applicable aircraft, engine and or appliance maintenance manuals and instructions. Pertinent details are on file at the repair station office, WO # [REDACTED] A.D.'s researched through Rev. 2019.03				
Signature [REDACTED] Sun Aviation, Inc, Municipal Airport, Vero Beach, FL 32961				CRS # [REDACTED]

Picture 1. Most Recent Inspection (annual inspection)

INITIAL EXAMINATION AS RECEIVED

The engine was received crated and sealed. After removal of the crate, the engine was examined and the following discrepancies were noted:

- Corrosion on both turbos
- The right turbo had impact damage to the bottom
- The cylinder heads exhibited corrosion to the aluminum cooling fins due to water submersion.

The engine was mounted to a portable cart utilizing mount legs for further examination and teardown.



Additional recovery information

Due to the airplane being submerged in water for a duration of time, the recovery team drained the oil and filled the engine cylinders with diesel to prevent moisture damage to the engine.

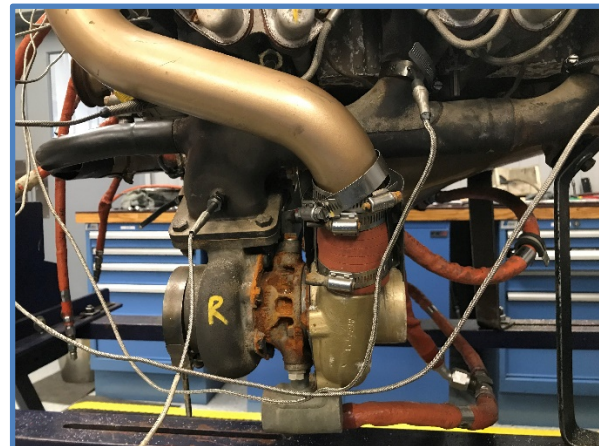


Picture 2. View of airplane in water

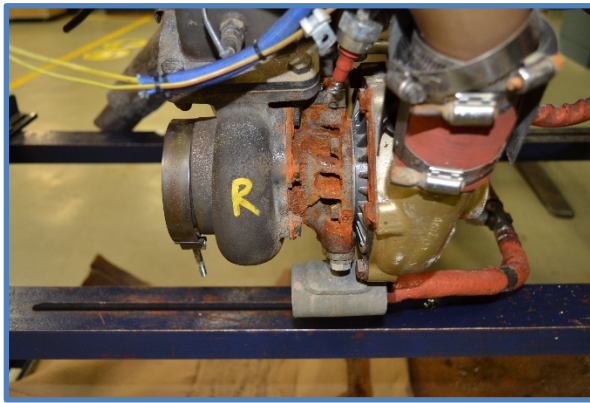
DETAILED EXAMINATION

Induction and Exhaust System

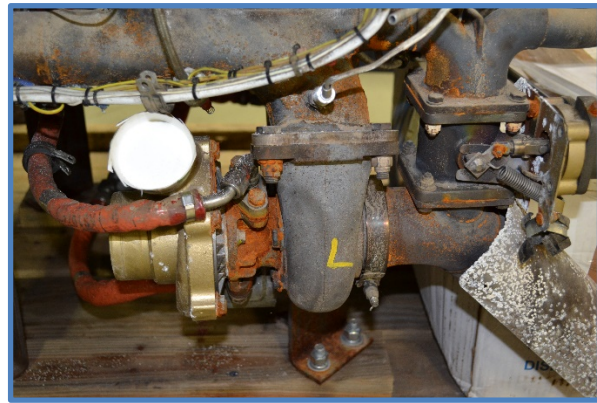
The air induction and exhaust tubes remained attached to the engine. The right turbo had impact damage to the bottom, but not enough to necessitate a substitute, it could be manually rotated. The intercoolers, both turbos, cross over tube and exhaust tubes remained attached to the engine to facilitate examination.



Picture 3. Intake and Exhaust Systems



Picture 4. View of corrosion on right turbo



Picture 5. View of corrosion on left turbo



Picture 6. View damaged right turbo

Vacuum Pumps

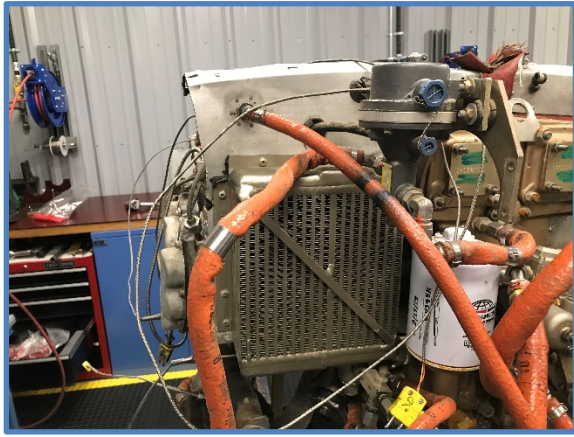
The vacuum pumps (instrument air pumps) were removed from the engine to facilitate examination. Both instrument air pumps could be manually rotated, and no apparent damage was noted.



Picture 7. Vacuum Pumps

Oil Cooler

The engine oil cooler was examined, no apparent damage was noted.



Picture 8. View of oil cooler.

Propeller Governor

The propeller governor was removed from the engine and rotated by hand. When it was rotated oil was pumped through the governor.



Picture 9. View of Propeller Governor.

Alternator

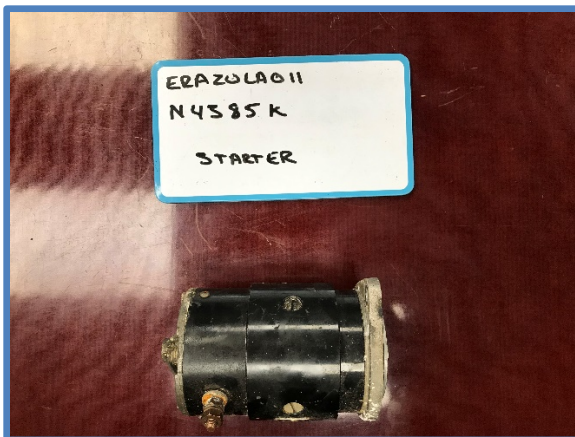
The alternator #1 remained attached to the engine, no apparent damage was noted. Alternator #2 was removed to facilitate examination.



Picture 10. Alternator

Starter

The starter was removed from the engine and examined, the starter contained water and was binding. As a precautionary measure the starter was substituted to facilitate examination.



Picture 11. Starter

Spark Plugs

The top sparkplugs were removed and inspected. The condition was normal and the color was normal but with corrosion due to water submersion. The engine was manually rotated, and thumb compression was achieved on all six cylinders.



Picture 12. View of top Spark Plugs

Magnetos

The magnetos remained attached to the engine and were removed. They were both mounted to a test stand and produced spark on all towers.



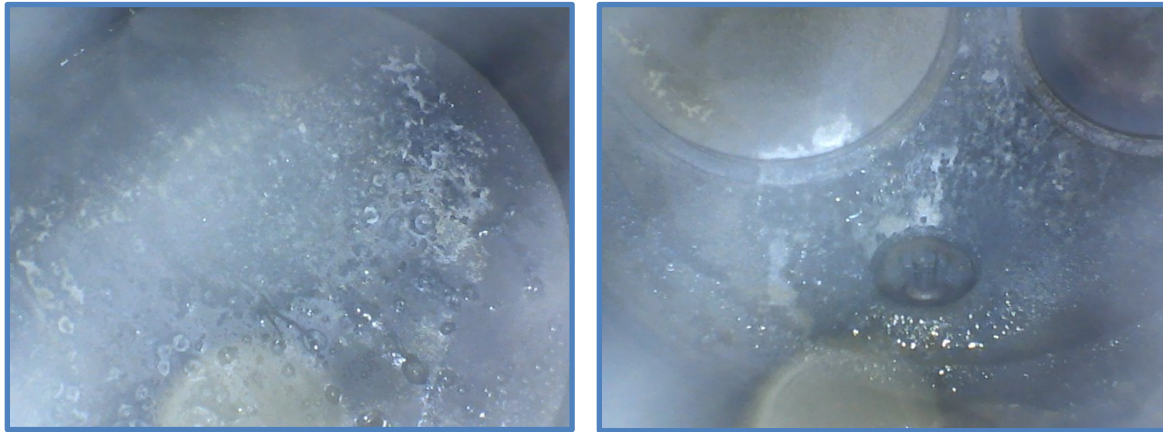
Picture 13. Magnetos on Test Stand

Cylinders

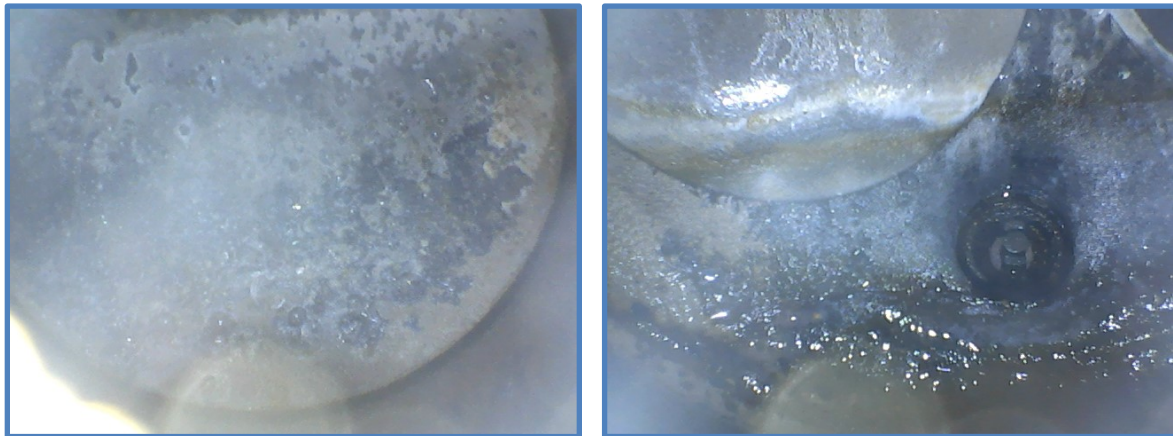
During the accident recovery exam, an electronic borescope inspection was performed on each cylinder. All intake and exhaust valves were intact and exhibited normal combustion deposits. Each piston crown exhibited normal combustion deposits and cross hatching was visible on cylinder bores.

A cold compression check of the cylinders resulted in the number # 1 = 3/80, # 3 = 25/80, # 5 = 32/80 and the # 2 = 40/80, # 4 = 27/80 and # 6 = 34/80.

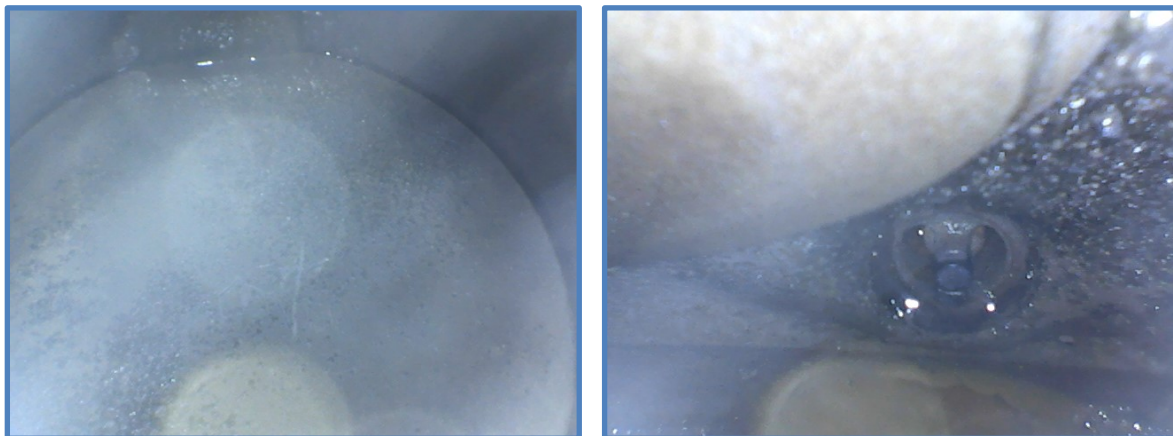
After completing a test run, the hot compression check of the cylinders resulted in the number # 1 = 74/80, # 3 = 73/80, # 5 = 74/ 80 and the # 2 = 74/80, # 4 = 73/80 and # 6 = 72/80.



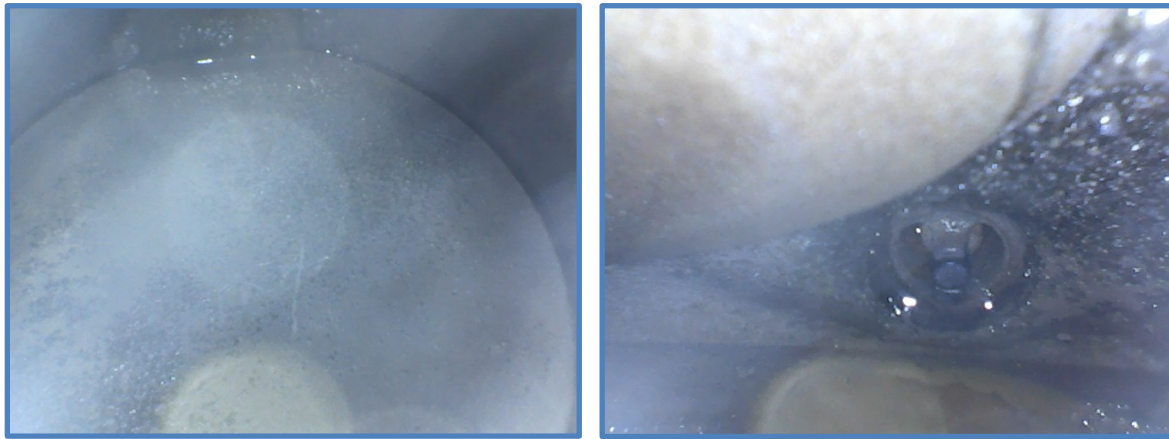
Picture 14. View electronic lighted borescope examination of cylinder 1



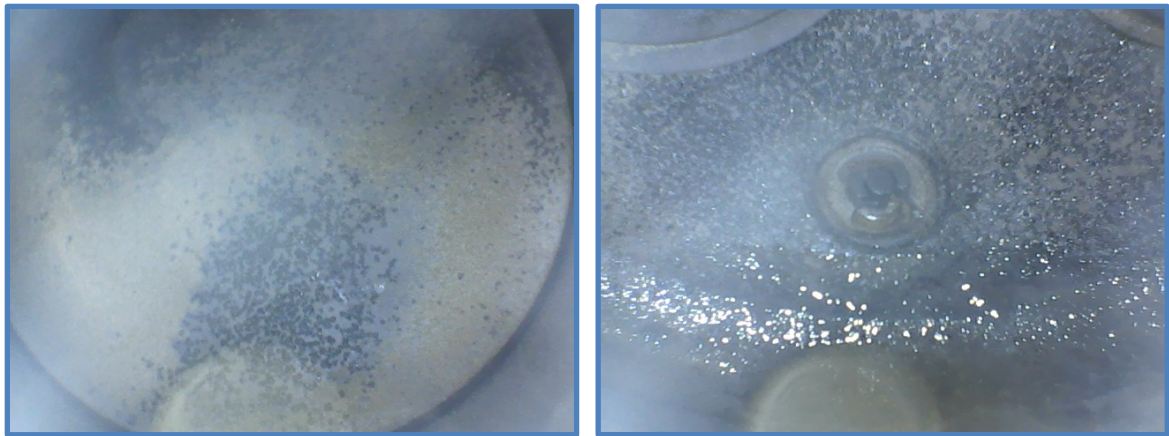
Picture 15. View electronic lighted borescope examination of cylinder 3



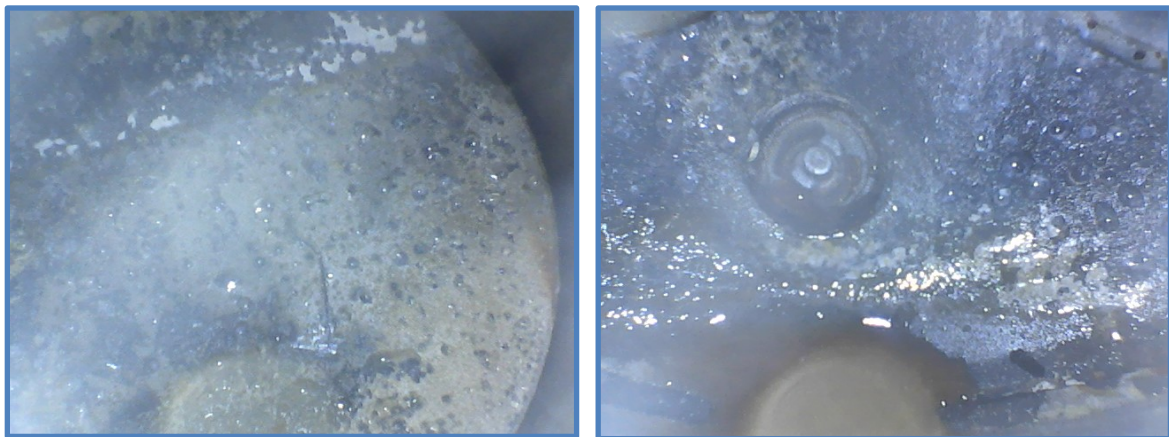
Picture 16. View electronic lighted borescope examination of cylinder 5



Picture 17. View electronic lighted borescope examination of cylinder 2



Picture 18. View electronic lighted borescope examination of cylinder 4



Picture 19. View electronic lighted borescope examination of cylinder 6

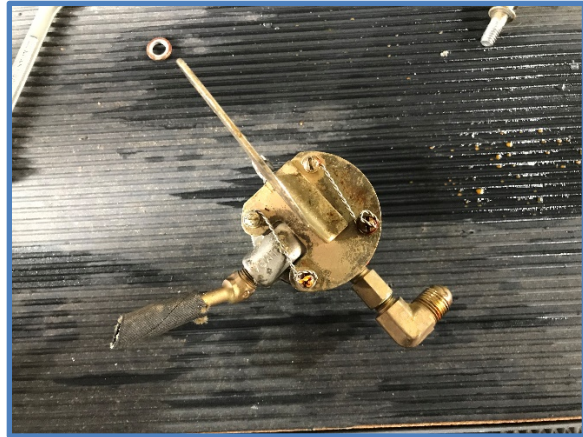
Engine Test Run

The engine was mounted on a stand and prepared for the test run, installing the appropriate fuel connections, exhaust pipes, test equipment and propeller. During the first attempt to start, the engine would not start. Further examination of the fuel system identified a stoppage at the fuel manifold valve. Removal and examination of the fuel manifold valve identified water and

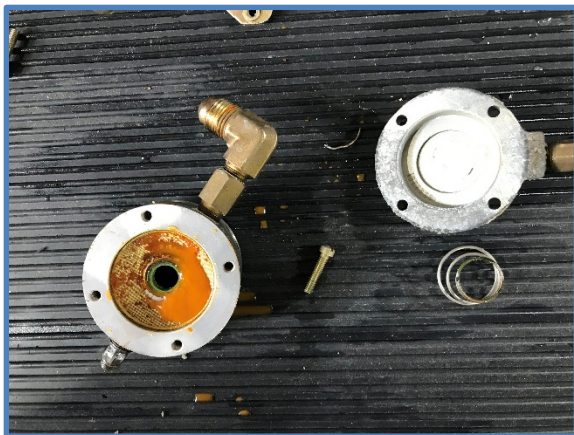
corrosion inside the fuel manifold valve, consistent with the engine being submerged in water. The fuel manifold valve was cleaned, reassembled and utilized to complete the engine test run. The remaining engine starts and performance test were completed with no further discrepancies.



Picture 20. View of engine in test cell



Picture 21. View of fuel manifold valve



Picture 22. View of corrosion and water in fuel manifold valve

SUMMARY

The examination revealed that the engine did not reveal any pre-impact anomalies that would have prevented its ability to produce rated horsepower.

FUTURE ACTIVITIES

The engine will be returned to Anglin's Aircraft Recovery, Clayton, DE in preparation for the release of the wreckage by the National Transportation Safety Board IIC.