



**ERA17LA116**

**Chatham, New Jersey**

**February 24, 2017**

**Robinson R44 – N44EK**

**NTSB ENGINE EXAMINATION REPORT**

**April 12, 2017**

**PARTICIPANTS IN THE EXAMINATION**

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## HISTORY OF FLIGHT

On February 24, 2017, at 1823 eastern standard time, a Robinson R-44 helicopter, N44EK, collided with a building and terrain during an autorotation near Chatham, New Jersey. The private pilot received minor injuries and the passenger was seriously injured. The helicopter was registered to N44EK Inc. and operated under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual metrological conditions prevailed near the accident site at the time of the accident. No flight plan was filed for the flight that originated from Richmond Executive Airport-Chesterfield County (FCI), Richmond, Virginia, and was destined for the Lincoln Park Airport (N07), Lincoln Park, New Jersey.

## ENGINE INFORMATION

Engine Manufacturer: Lycoming  
Engine Model Number: O-540-F1B5  
Engine Serial Number: L-25498-40A  
Recent Inspection: March 7, 2016 – engine overhaul  
Rebuilt: March 7, 2016  
Recent Recorded TSMOH: 5.9 hours as of accident date.

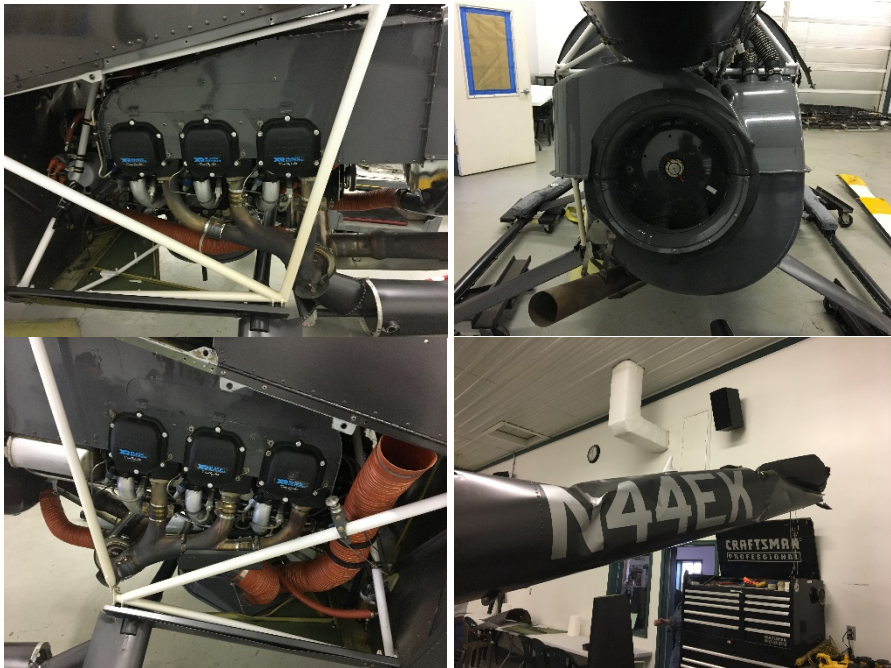
| YEAR<br>20<br>DATE | RECORDING<br>TACH<br>TIME | TODAY'S<br>FLIGHT | TOTAL<br>TIME IN<br>SERVICE | Description of Inspections, Tests, Repairs and Alterations<br>Entries must be endorsed with Name, Rating and Certificate Number of<br>Technician or Repair Facility. (See back pages for other specific entries)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |       |            |              |              |          |        |          |                |             |           |             |         |  |            |           |
|--------------------|---------------------------|-------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|------------|--------------|--------------|----------|--------|----------|----------------|-------------|-----------|-------------|---------|--|------------|-----------|
|                    |                           |                   |                             | <div style="display: flex; justify-content: space-between;"> <div>  <b>Victor Aviation</b><br/>           Victor Aviation Services, Inc.<br/>           Palo Alto, CA 4303-0608<br/>           F.A.A. Certified<br/>           Repair Station #BJ3R399L         </div> <div> <table border="0"> <tr> <td>A/C Reg. #</td> <td>N44EK</td> <td>A/C Ser. #</td> <td>W.O. # 17168</td> </tr> <tr> <td>Engine Make:</td> <td>Lycoming</td> <td>Model:</td> <td>O540F1B5</td> </tr> <tr> <td>Serial Number:</td> <td>L-25498-40A</td> <td>Eng. T.T.</td> <td>S.M.O.H "0"</td> </tr> <tr> <td>A/F T.T</td> <td></td> <td>Hobbs Time</td> <td>Tach Time</td> </tr> </table> </div> </div><br><ol style="list-style-type: none"> <li>Engine major overhauled In accordance with the current overhaul manual for this model with new Lycoming Cylinders.</li> <li>Crankcase repaired and certified By Nicksons Machine Shop.</li> <li>Carburetor by Marvel Schebler, Magnetos by Quality Aircraft Accessories, new ignition harness and new iridium sparkplugs installed. No other accessories supplied or installed at this time.</li> <li>The engine identified above has been inspected and repaired in accordance with current Federal Air Regulations and has been determined to be in airworthy condition for the work performed. Pertinent details of the repair are on file at this agency under work order number 17168 dated 11/24/2015.</li> <li>Engine was test ran satisfactorily upon completion of the above work.</li> <li>Engine was not installed by this agency, engine total time and aircraft information to be entered by installing agency.</li> <li>Nothing follows</li> </ol><br><div style="display: flex; justify-content: space-between;"> <div>In:</div> <div>Date: March 7th, 2016</div> </div><br><div style="text-align: center;">For repair station BJ3R399L Victor Aviation Services, Inc.</div> | A/C Reg. # | N44EK | A/C Ser. # | W.O. # 17168 | Engine Make: | Lycoming | Model: | O540F1B5 | Serial Number: | L-25498-40A | Eng. T.T. | S.M.O.H "0" | A/F T.T |  | Hobbs Time | Tach Time |
| A/C Reg. #         | N44EK                     | A/C Ser. #        | W.O. # 17168                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |            |              |              |          |        |          |                |             |           |             |         |  |            |           |
| Engine Make:       | Lycoming                  | Model:            | O540F1B5                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |            |              |              |          |        |          |                |             |           |             |         |  |            |           |
| Serial Number:     | L-25498-40A               | Eng. T.T.         | S.M.O.H "0"                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |            |              |              |          |        |          |                |             |           |             |         |  |            |           |
| A/F T.T            |                           | Hobbs Time        | Tach Time                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |            |              |              |          |        |          |                |             |           |             |         |  |            |           |

**Picture 1. Most Recent Maintenance on Engine**

## INITIAL EXAMINATION

The engine remained mounted to the helicopter and the following was noted:

- The helicopter was fueled about 40 minutes prior to the accident occurring and both fuel tanks were filled to about 6 inches below the filler neck.
- About 8 quarts of oil was noted in the engine.
- The throttle setting corresponded to  $\frac{3}{4}$  full throttle.
- The mixture was in the full rich position.
- The 4 tension belts were in place and under tension. They were cut to facilitate the engine examination. There were no burn or chaffe marks noted on the belts.
- All components remained attached to the engine.



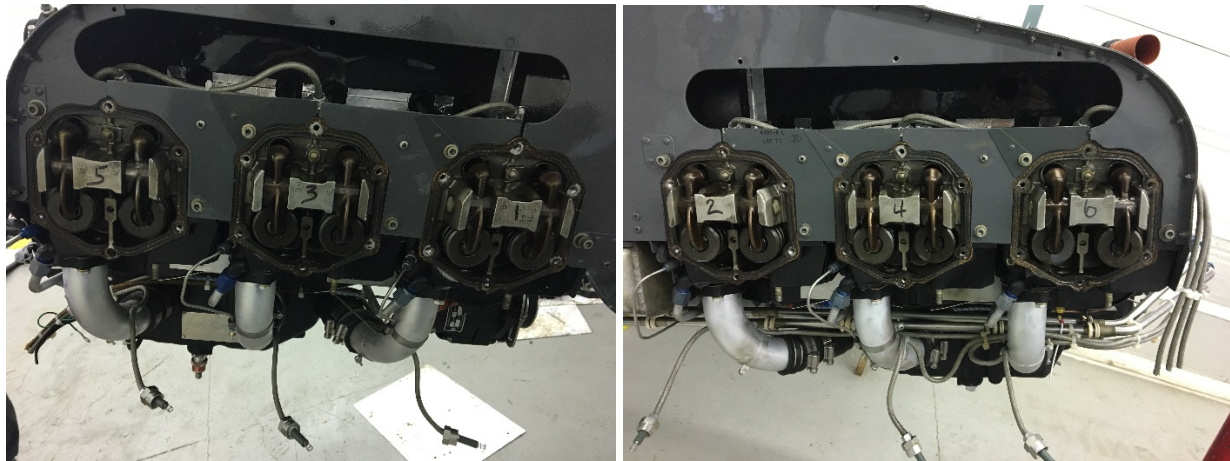
## **DETAILED EXAMINATION**

### **Exhaust System**

The exhaust piping was removed and no obstructions were noted.

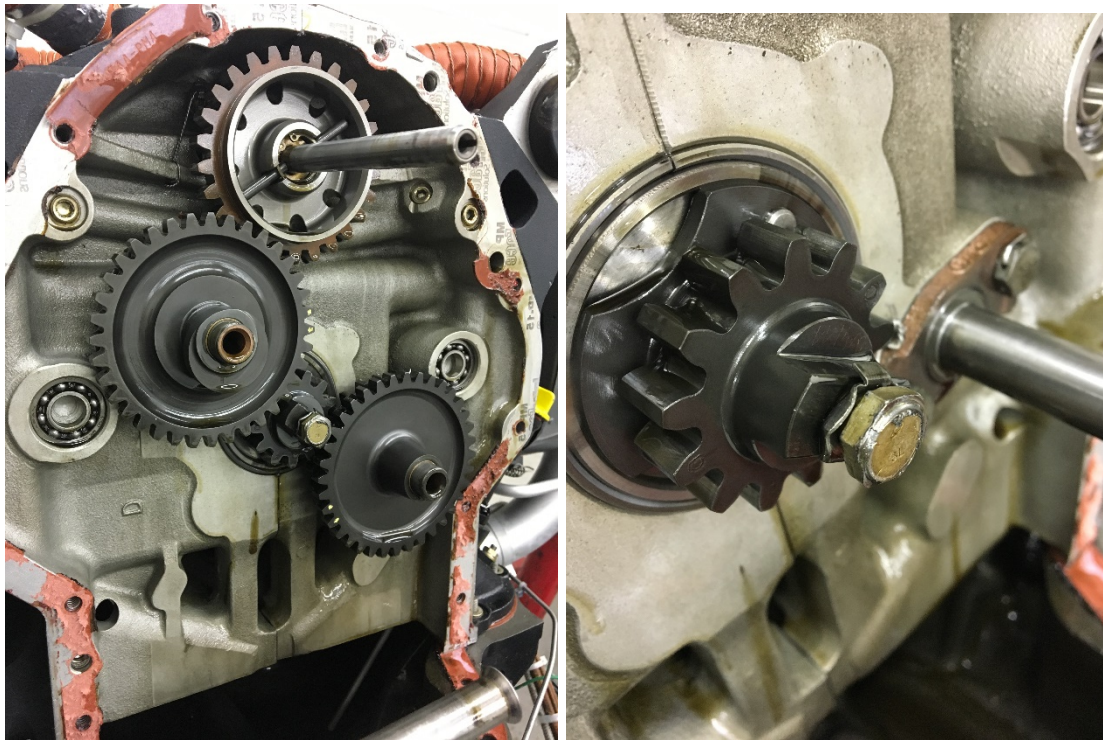
### **Cylinders and Valve Train**

The rocker box covers were removed and no anomalies were noted. However, when the crankshaft was rotated, there was no movement noted on any of the rocker arms. Thumb compression and suction was observed on cylinder No. 5 when the crankshaft was rotated. However, no compression was observed on any other cylinders. The cylinders were boroscoped and no anomalies were noted.



### **Crankshaft and Camshaft**

The engine was removed from the helicopter to facilitate further examination. The accessory section of the engine was removed. The crankshaft gear bolt was about 3/16 inches from the seated position. The safety washer was present, however the washer exhibited wear. Rotational scoring was noted on the crankshaft gear bolt head. The crankshaft gear bolt was removed, and the bottom threads of the bolt were damaged. The crankshaft gear was removed, and the pin was sheared.



Picture 2. View of Crankshaft Gear Bolt As Found



Picture 3. View of sheared pin and full crankshaft gear bolt.

### **Air Filter Box**

The air filter box was removed and no debris was noted.



Picture 4. View of air filter box.

### Spark Plugs

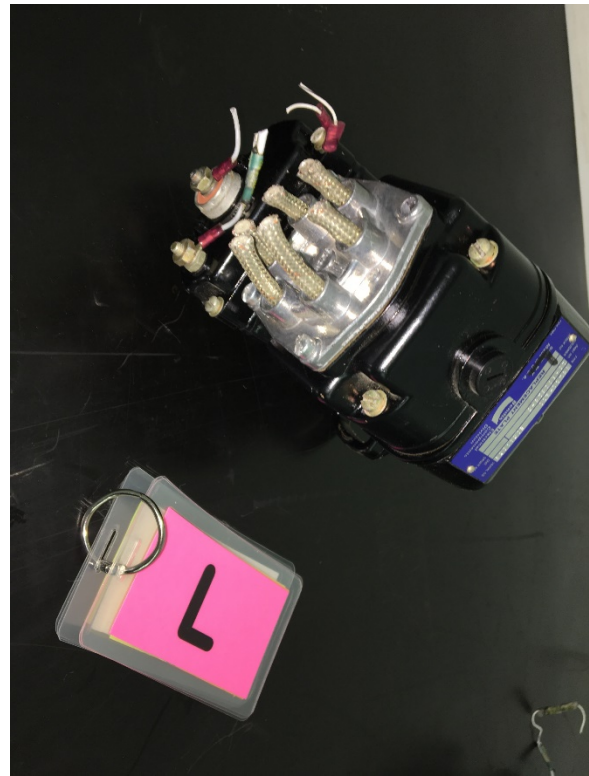
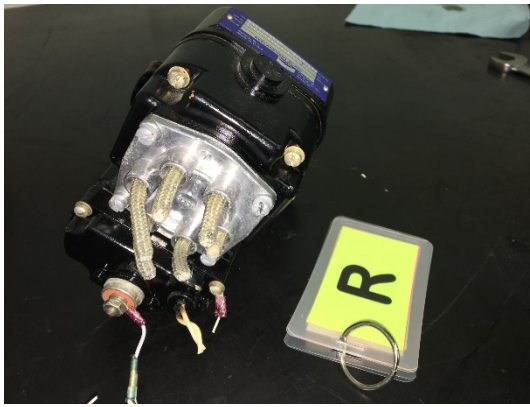
All spark plugs were removed from the engine. The spark plugs were fine electrode type plugs. All spark plugs were in “like new” condition.



Picture 5. All Top and Bottom Spark Plugs

### Magnetos

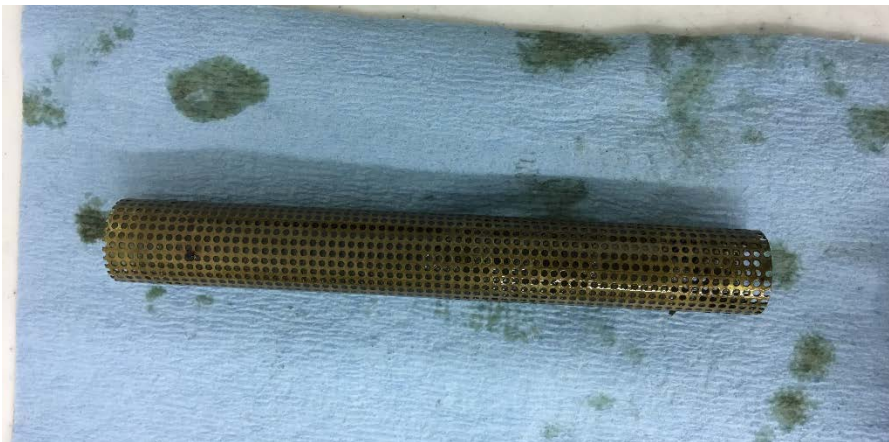
The magnetos remained attached to the engine and were removed. They were rotated by hand and spark was observed on all towers.



Picture 6. View of both magnetos

### Oil Suction Screen

The oil suction screen was examined and was not obstructed.



Picture 7. View of oil suction screen.

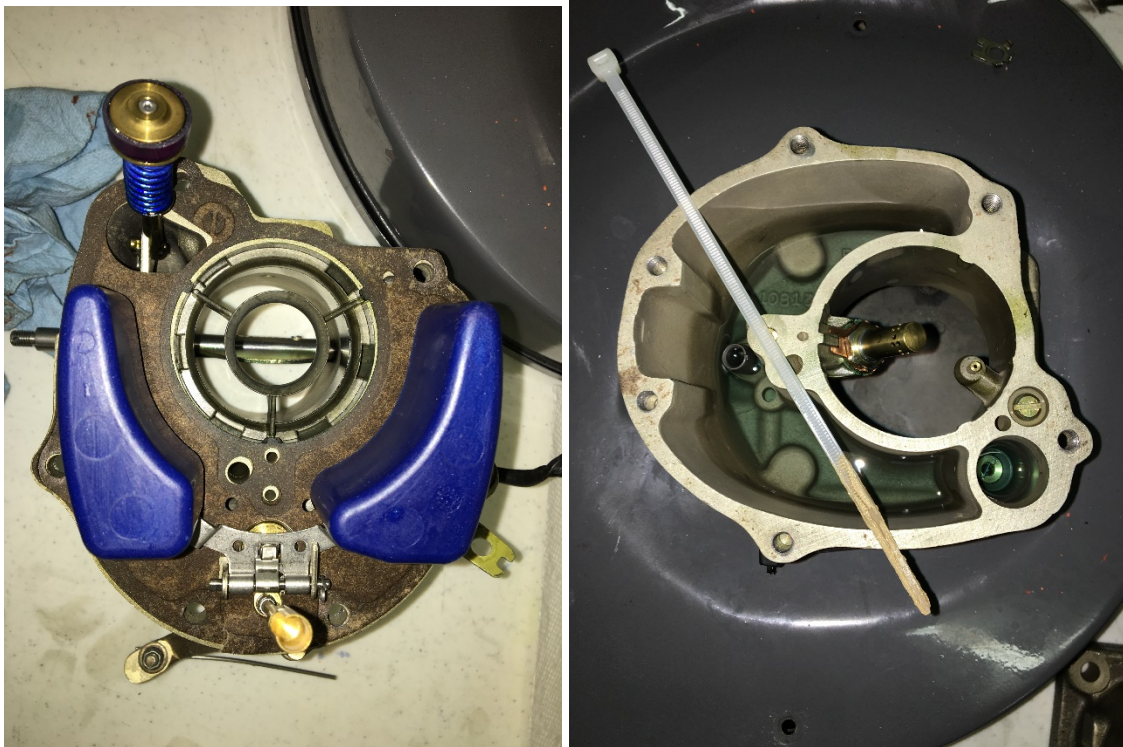
### Oil Filter

The oil filter remained attached to the engine, was removed, and disassembled. There was no debris in the oil filter.



### **Carburetor**

The carburetor was removed from the engine and disassembled. Fuel was noted flowing out of the fuel line connected to the carburetor and the carburetor contained fuel. The fuel in the carburetor was tested with water finding paste and no water was present. The throttle valve was near the half-open position and no obstructions were noted. The fuel screen was removed and no debris was noted. The foam floats remained attached and intact. There were no anomalies noted with the carburetor.



Picture 8. View of Carburetor

## **SUMMARY**

The examination revealed that the crankshaft gear bolt was not secure, which resulted in the crankshaft gear not engaging the accessory gears of the engine and subsequent loss of power.

## **FUTURE ACTIVITIES**

The wreckage will remain in storage at Anglin Air Recovery in Clayton, Delaware, until it is released by the National Transportation Safety Board IIC.<sup>1</sup>

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<sup>1</sup> Wreckage released on November 1, 2018.  
ERA17LA116 – Engine Examination