Analysis

The airline transport pilot and passenger were breaking in the newly overhauled engine on a cross-country flight in accordance with the engine manufacturer's break-in procedures. About 20 minutes after departure, during cruise flight at 75% power, the engine began running "mildly rough" and then began "cutting in and out." The pilot chose to divert to another airport, and about 5 miles from that airport, the engine experienced a total loss of power. The pilot subsequently performed a forced landing to a field, during which the wings and fuselage sustained substantial damage.

When the single-drive dual magneto was placed on a test stand, the left side of the magneto did not produce spark. Internal examination of the magneto revealed that the left and right capacitor fastenings were not properly torqued, which resulted in intermittent arcing and melting of the cam follower and the subsequent loss of power. It could not be determined when the magneto's capacitor fasteners had last been torqued.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A total loss of engine power due to the improper torqueing of the magneto, which led it to its malfunctioning in flight.
## Findings

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Magneto/distributor - Incorrect service/maintenance (Cause)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel issues</td>
<td>Installation - Other/unknown (Cause)</td>
</tr>
</tbody>
</table>
Factual Information

On September 30, 2016, about 1730 eastern daylight time, a Piper PA-32, N39686, was substantially damaged during a forced landing following a total loss of engine power. The airline transport pilot and passenger sustained minor injuries. An instrument flight plan was filed for the personal flight that originated at Florence Regional Airport (FLO), Florence, South Carolina, destined for Asheville Regional Airport (AVL), Asheville, North Carolina. Visual meteorological conditions prevailed for the personal flight conducted under Title 14 Code of Federal Regulations Part 91.

The pilot reported that the engine had just been overhauled and reinstalled. The pilot conducted a test flight September 26, during which he noted the No. 5 cylinder head temperature was high and there was light smoke coming from the engine. The No. 5 cylinder head temperature probe was replaced before the next flight.

The purpose of the accident flight was to break in the engine in accordance with the engine manufacturer’s published break-in procedures. The airplane departed FLO and climbed to 8,000 feet mean sea level (msl). The airplane was in level flight at 75% power, about 20 minutes after departure when the engine began running "mildly rough." The pilot stated that he descended the airplane to a lower altitude and planned to return to FLO. The engine then began "cutting in and out", he declared an emergency, and attempted to land at Woodward Field Airport (CDN), Camden, South Carolina. About 5 miles from CDN, the engine lost all power and the pilot performed a forced landing in a field.

Examination of the airplane’s wings and fuselage revealed that they had sustained substantial damage, and the right wing separated from the main spar at the wing root. The propeller blades were bent aft. Examination of the engine confirmed engine control continuity from the cockpit to the respective engine components. The propeller was manually rotated, thumb compression was obtained on all cylinders. The fuel lines were secured, there was no staining observed. The fuel screen and fuel drained from the throttle body was free of debris.

The single drive dual magneto was placed on a test stand, the left side of the magneto did not produce spark. During initial testing the right side produced spark on four of the six leads when rotated by hand. When planed on a test stand the right side produced spark on all leads. Internal examination of the magneto revealed that the left side cam follower was melted, preventing opening of the points. The left and right capacitor fastenings were not properly torqued, the left nut was loosened by hand and the right nut was loosened easily with a wrench and removed by hand. The cam follower also displayed melting and signatures of intermittent arcing, consistent with inadequate torque observed on the capacitor fastenings.

The pilot held an airline transport pilot certificate with a rating for airplane single engine land, multi engine land, instrument airplane, and a flight instructor certificate. The pilot held a second class medical certificate and reported 7,200 total hours of flying experience.
The six seat, low wing, retractable tricycle landing gear-equipped airplane, was manufactured in 1978. It was powered by a Lycoming TIO-540, 300 horsepower engine driving a McCauley two-blade, constant-speed propeller.

The closest weather reporting facility was Woodward field Airport (CDN), Camden, South Carolina, about 5 miles west of the accident site. At 1725, the weather reported at HVS included wind 220° at 5 knots; visibility 10 statute miles; sky condition, clear; temperature, 27° C; dew point, 13° C; and a barometric altimeter setting of 29.96 inHg.

<table>
<thead>
<tr>
<th>History of Flight</th>
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<tbody>
<tr>
<td>Enroute</td>
</tr>
<tr>
<td>Loss of engine power (partial) (Defining event)</td>
</tr>
<tr>
<td>Emergency descent</td>
</tr>
<tr>
<td>Loss of engine power (total)</td>
</tr>
<tr>
<td>Landing</td>
</tr>
<tr>
<td>Off-field or emergency landing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pilot Information</th>
<th>Certificate: Airline Transport; Flight Instructor; Commercial; Private</th>
<th>Age: 45, Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Airplane Rating(s): Multi-engine Land; Single-engine Land</td>
<td>Seat Occupied: Left</td>
</tr>
<tr>
<td></td>
<td>Other Aircraft Rating(s): None</td>
<td>Restraint Used: 3-point</td>
</tr>
<tr>
<td></td>
<td>Instrument Rating(s): Airplane</td>
<td>Second Pilot Present: No</td>
</tr>
<tr>
<td></td>
<td>Instructor Rating(s): Instrument Airplane</td>
<td>Toxicology Performed: No</td>
</tr>
<tr>
<td></td>
<td>Medical Certification: Class 2 Without Waivers/Limitations</td>
<td>Last FAA Medical Exam: 08/23/2016</td>
</tr>
<tr>
<td></td>
<td>Occupational Pilot: Yes</td>
<td>Last Flight Review or Equivalent: 02/20/2016</td>
</tr>
<tr>
<td></td>
<td>Flight Time: 7200 hours (Total, all aircraft), 20 hours (Last 90 days, all aircraft)</td>
<td></td>
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</tbody>
</table>
Aircraft and Owner/Operator Information

Aircraft Make: PIPER
Model/Series: PA32RT 300T
Year of Manufacture: 1978
Airworthiness Certificate: Normal
Landing Gear Type: Retractable - Tricycle
Date/Type of Last Inspection: 09/01/2015, 100 Hour
Airframe Total Time: 
ELT: Installed, not activated
Registered Owner: On file
Operator: On file

Aircraft Category: Airplane
Serial Number: 32R-7887143
Seats: 6
Certified Max Gross Wt.: 3600 lbs
Engines: 1 Reciprocating
Engine Manufacturer: Lycoming
Engine Model/Series: TIO-540
Rated Power: 300 hp
Operating Certificate(s) Held: None

Meteorological Information and Flight Plan

Conditions at Accident Site: Visual Conditions
Observation Facility, Elevation: KCDN, 302 ft msl
Observation Time: 1735 EDT
Lowest Cloud Condition: Clear
Lowest Ceiling: None
Wind Speed/Gusts: 5 knots /
Wind Direction: 220°
Altimeter Setting: 29.96 inches Hg
Precipitation and Obscuration: No Obscuration; No Precipitation
Departure Point: FLORENCE, SC (FLO)
Destination: ASHEVILLE, NC (AVL)
Departure Time: 1730 EDT
Type of Flight Plan Filed: IFR
Type of Clearance: IFR
Type of Airspace: Unknown

Wreckage and Impact Information

Crew Injuries: 1 Minor
Passenger Injuries: 1 Minor
Ground Injuries: N/A
Total Injuries: 2 Minor
Aircraft Damage: Substantial
Aircraft Fire: None
Aircraft Explosion: None
Latitude, Longitude: 34.305000, -80.474444 (est)
Administrative Information

<table>
<thead>
<tr>
<th>Investigator In Charge (IIC):</th>
<th>Millicent M Hill</th>
<th>Adopted Date:</th>
<th>05/24/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Participating Persons:</td>
<td>Neil Baker; FAA/FSDO; West Columbia, SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chad Bryant; Kelly Aerospace; Montgomery, AL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publish Date:</td>
<td>05/24/2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>The NTSB did not travel to the scene of this accident.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigation Docket:</td>
<td><a href="http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=94123">Link</a></td>
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The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.