Aviation Investigation Final Report

Location:	Camden, South Carolina	**Accident Number:**	ERA16LA331
Date & Time:	September 30, 2016, 17:30 Local	**Registration:**	N39686
Aircraft:	Piper PA32RT	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

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

Aircraft	Magneto/distributor - Incorrect service/maintenance
Personnel issues	Installation - Other

Factual Information

History of Flight

Enroute	Loss of engine power (partial) (Defining event)
Emergency descent	Loss of engine power (total)
Landing	Off-field or emergency landing

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.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor; Private	**Age:**	45,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	August 23, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 20, 2016
Flight Time:	7200 hours (Total, all aircraft), 20 hours (Last 90 days, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N39686
Model/Series:	PA32RT 300T	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32R-7887143
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 1, 2015 100 hour	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	TIO-540
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KCDN,302 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	17:35 Local	**Direction from Accident Site:**	254°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	27°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	FLORENCE, SC (FLO)	**Type of Flight Plan Filed:**	IFR
Destination:	ASHEVILLE, NC (AVL)	**Type of Clearance:**	IFR
Departure Time:	17:30 Local	**Type of Airspace:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	34.305,-80.474441(est)

Administrative Information

Investigator In Charge (IIC):	Hill, Millicent
Additional Participating Persons:	Neil Baker; FAA/FSDO; West Columbia, SC Chad Bryant; Kelly Aerospace; Montgomery, AL
Original Publish Date:	May 24, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94123

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.