Aviation Investigation Final Report

Location:	Stafford Twp, New Jersey	**Accident Number:**	ERA15LA263
Date & Time:	July 12, 2015, 10:10 Local	**Registration:**	N315EC
Aircraft:	Cessna 210 5A(205A)	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Minor, 4 None
Flight Conducted Under:	Part 91: General aviation - Skydiving		

Analysis

The pilot reported that the accident flight was his second skydiving flight of the morning and that the airplane was performing "normally" as it had during the first flight. During climbout, he noted that the engine cylinder head temperatures were in the "normal" range. When the airplane reached about 4,000 ft mean sea level, the engine experienced a total loss of power, and, about 1 minute later, the propeller stopped windmilling. The pilot conducted an off-airport landing to a nearby highway. During the landing roll, and to avoid impacting vehicles on the highway, the pilot guided the airplane onto the median, and the wings and horizontal stabilizer impacted several road signs, which resulted in substantial damage to the airplane.

Disassembly and examination of the engine revealed that the crankshaft was fractured near the No. 2 main bearing. The No. 2 main bearing saddle mating surface exhibited extensive fretting, and the areas adjacent to the No. 2 bearing on the inside of the engine case exhibited rotational scoring, indicating that bearing movement had occurred before the crankshaft failure and that insufficient torque had been applied to the cylinder through bolts. Review of the maintenance logbooks revealed that, 19 days before the accident, a mechanic replaced the No. 2 cylinder. It is likely that the mechanic applied insufficient torque to the through bolts after replacing the No. 2 cylinder, which allowed the bearings to move and led to the eventual failure of the crankshaft.

Probable Cause and Findings

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

The total loss of engine power due to the failure of the crankshaft, which resulted from a mechanic's failure to properly torque the engine cylinder through bolts.

Findings

Personnel issues	Replacement - Maintenance personnel
Aircraft	Recip engine power section - Incorrect service/maintenance
Aircraft	Recip engine power section - Failure
Environmental issues	Sign/marker - Contributed to outcome
Aircraft	(general) - Incorrect service/maintenance

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Enroute-climb to cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Collision with terr/obj (non-CFIT)

On July 12, 2015, about 1010 eastern daylight time, a Cessna 210-5A, N315EC, was substantially damaged during a forced landing following a total loss of engine power during climbout from Eagles Nest Airport (31E), West Creek, New Jersey. The commercial pilot and 3 passengers were not injured, and 1 passenger received minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the skydiving flight. The airplane was owned by Seasky27 Productions LLC and operated by Skydive East Coast under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the pilot, the accident flight was the second flight of the morning. The airplane was performing "normally," just as it had performed during the first flight. During climbout, he noted the cylinder head temperatures were in the "normal" range. About 4,000 feet above mean sea level, the engine experienced a total loss of power, and about 1 minute later the propeller ceased windmilling. He attempted to restart the engine; however, was unsuccessful and elected to perform an off-airport landing to a nearby highway. During the landing rollout, and to avoid impacting automobile traffic on the highway, the pilot guided the airplane onto the median, impacting several road signs with the wings and horizontal stabilizer.

According to a New Jersey Department of Transportation traffic camera video, the airplane touched down on a momentarily vacant stretch of the westbound lanes of the highway, veered toward the left, and came to rest in the median.

Pilot Information

Certificate:	Commercial; Flight instructor; Private	**Age:**	30
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	April 8, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 28, 2014
Flight Time:	1151 hours (Total, all aircraft), 85 hours (Total, this make and model), 1075 hours (Pilot In Command, all aircraft), 92 hours (Last 90 days, all aircraft), 38 hours (Last 30 days, all aircraft), 10 hours (Last 24 hours, all aircraft)		

According to the pilot and FAA records, the pilot, age 30, held a commercial pilot certificate with a rating for single-engine land, multiengine land, and instrument airplane, with private pilot privileges for gliders. He also held a flight instructor certificate for airplane single-engine. He held a first-class medical certificate which was issued on April 8, 2015 with no limitations. The pilot reported 1151 total hours of flight experience and 85 of those hours were in the accident airplane make and model.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N315EC
Model/Series:	210 5A(205A)	**Aircraft Category:**	Airplane
Year of Manufacture:	1963	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2050494
Landing Gear Type:	Tricycle	**Seats:**	1
Date/Type of Last Inspection:	June 19, 2015 100 hour	**Certified Max Gross Wt.:**	2899 lbs
Time Since Last Inspection:	68 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	7237.37 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-520-FCA
Registered Owner:	SEASKY27 PRODUCTIONS LLC	**Rated Power:**	285 Horsepower
Operator:	Skydive East Coast	**Operating Certificate(s) Held:**	None

The high-wing airplane, serial number 2050494, was manufactured in 1963. It was powered by a Continental Motors IO-520-FCA 285-hp engine and driven by a Hartzell model PHC-C3YF-LRF controllable-pitch propeller. Review of the aircraft maintenance logbook records revealed a 100-hour inspection was completed on June 19, 2015, at a recorded tachometer reading of 848.5 hours and an annual inspection was completed on March 18, 2015, at a recorded tachometer reading of 758.5 hours. The tachometer was observed at the accident site and indicated 916.47 hours; which correlated to an airframe total time of 7,237.37 hours and an engine time since major overhaul of 1,893.57 hours.

The engine maintenance logbook further revealed that on March 18, 2015, the engine was converted from an IO-520-F to an IO-520-A as required by STC [Supplemental Type Certificate] SA09467SC. The alteration was accomplished utilizing the provisions in FAA Type Certificate E5CE and TCM [Teledyne Continental Motors] Service Bulletin M75-6R1, which changed the engine designation to IO-520-FCA. The last two entries in the engine maintenance logbook were dated June 23, 2015 and July 6, 2015 respectively. The June 23, 2015 entry indicated that Cylinder No.2 was removed and replaced with an overhauled unit at a recorded tachometer reading of 852.4 hours. The recorded differential compression check was recorded as 78/80. The entry did not list what necessitated the cylinder change. It should be further noted that on June 19, 2015, and 3.9 flight hours earlier, the differential compression check on the No. 2 cylinder was recorded as 77/80. The most recent entry, in the engine maintenance logbook, dated July 6, 2015, indicated a recorded tachometer time of 894.33, and that the engine oil was changed and the pressure screen was cleaned.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KACY,67 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	09:54 Local	**Direction from Accident Site:**	223°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	27°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	WEST CREEK, NJ (31E)	**Type of Flight Plan Filed:**	None
Destination:	WEST CREEK, NJ (31E)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

The 0954 recorded weather observation at Atlantic City International Airport (ACY), Atlantic City, New Jersey, located 20 miles to the southwest of the accident location included calm wind, visibility 10 miles, clear skies, temperature 27 degrees C, dew point 19 degrees C, and barometric altimeter 30.06 inches of mercury.

Airport Information

Airport:	EAGLES NEST 31E	**Runway Surface Type:**	
Airport Elevation:	37 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor, 3 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 4 None	**Latitude, Longitude:**	39.697223,-74.264724

According to a Federal Aviation Administration (FAA) inspector and local police photographs, the airplane came to rest upright in the median of a divided highway. The airplane was recovered to the operator's hangar and examination of the airplane revealed damage to both wings. Exterior examination of the engine did not reveal any abnormalities, and the engine was rotated by hand, utilizing the propeller. Further examination revealed that the crankshaft was not rotating at the rear accessory gears, and no motion was observed on the piston heads for Cylinders No. 1 and 2; however, motion was observed on all other cylinder pistons during the manual rotation of the propeller.

The engine was removed from the aircraft and shipped to the engine manufacturer facility for further examination. The engine was disassembled under the supervision of an NTSB investigator. External examination revealed that a deck stud on Cylinder No. 1 was pushed out and the nut was loose. No torque putty was observed on any cylinder nuts or through bolts. The engine backbone and its affiliated hardware, from the data plate forward, was covered with what appeared to be a thick, two-part epoxy. The epoxy was also covering the crankcase breather tube seam. The oil sump was removed and contained residual oil, metallic debris, and sheared remains of a bolt. The oil screen remained secured to the bottom of the engine and metallic debris was noted adhering to the screen. During the disassembly no torque value was obtained on any of the through bolts.

The engine exhibited substantial internal damage in the area of the No. 2 main bearing. The adjacent areas around the No. 2 main bearing exhibited scoring and fretting on the inside of the engine case, as well as bearing saddle damage, lock slot wear, and bearing extrusion. The crankshaft was observed fractured in the immediate vicinity of the No. 2 main bearing. According to Continental Motors personnel, a crankshaft failure associated with a bearing shift will usually fail in fatigue and this crankshaft failure exhibited failure signatures consistent with fatigue.

Administrative Information

Investigator In Charge (IIC):	Etcher, Shawn
Additional Participating Persons:	Daryl K Fortner; FAA/FSDO; Philadelphia, PA Nicole L Charnon; Continental Motors; Mobile, AL
Original Publish Date:	January 21, 2016
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=91541