

Aviation Investigation Final Report

Location:	Marathon, Florida	Accident Number:	ERA22LA097
Date & Time:	December 29, 2021, 16:22 Local	Registration:	N1596U
Aircraft:	Cessna 207	Aircraft Damage:	Minor
Defining Event:	Loss of engine power (total)	Injuries:	1 Serious, 2 Minor
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

Shortly after departure, the engine lost total power and the pilot was forced to ditch in open water; the occupants egressed and were subsequently rescued by a recreational vessel.

Examination of the engine revealed a fracture hole near the No. 2 cylinder, which was likely the result of the No. 2 cylinder connecting rod fracturing in fatigue as a result of high heat and high stress associated with failure of the No. 2 bearing. The fatigue fracture displayed multiple origins consistent with relatively high cyclic stress, which likely occurred as excessive clearances developed between the bearing and the crankshaft journal.

The No. 2 connecting rod bearing may have failed due to a material defect in the bearing itself or due to a disruption in the oil lubrication supply to the bearing/journal interface. Either situation can cause similar damage patterns to develop, including excessive heating and subsequent bearing failure.

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 failure of the No. 2 bearing, which resulted in the No. 2 connecting rod failing due to fatigue, high heat, and stress.

Findings

Aircraft	Recip engine power section - Failure
Aircraft	Recip eng oil sys - Failure

Factual Information

History of Flight

Enroute	Loss of engine power (total) (Defining event)
Landing	Ditching

On December 29, 2021, at 1622 eastern standard time, a Cessna 207 airplane, N1596U, sustained minor damage when it was involved in an accident in the Florida Bay near Marathon, Florida. The pilot sustained serious injuries and the two passengers sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 on-demand air carrier flight.

The flight was being operated by ExecAir of Naples at the time of the accident. According to the pilot, the first flight of the day was without incident from Naples Municipal Airport (APF), Naples, Florida, to The Florida Keys Marathon International Airport (MTH), Marathon, Florida. The accident occurred on the return flight to APF. The preflight, engine start-up, run-up, takeoff, and initial climb were uneventful, and the flight progressed on-course over the water. After the airplane reached about 3,800 ft mean sea level (msl), the airplane “began to shake and lose power.” The pilot observed normal engine instrument readings and saw that the oil pressure was “still good”; however, power was not restored despite checking and adjusting throttle, propeller, and mixture controls.

The pilot established best glide airspeed, transmitted a mayday call, and turned back toward MTH. During the descent, she noticed that oil was leaking from the engine cowling area, and while descending through about 1,000 ft msl, she realized that she would need to perform a forced ditching given the airplane’s distance from land. After landing in open water, the airplane remained upright, and the occupants egressed. Shortly after the accident, a passing recreational vessel rescued the occupants.

The airplane was subsequently recovered from the water and examined by the National Transportation Safety Board (NTSB). A large fracture hole and loose internal engine components were observed at the top aft portion of the engine case, in the area of the No. 2 cylinder. The engine showed little sign of impact damage. Saltwater corrosion was present throughout the engine and its accessories, consistent with the engine being submerged in the ocean for multiple days while awaiting recovery. Figure 1 provides an overview of the engine damage.



Figure 1: View of the engine damage originating at the No. 2 cylinder area.

All six cylinders were examined with a borescope and no other damage was visible to the valves or pistons.

The No. 2 cylinder connecting rod crankshaft end was found to be heavily fragmented and had broken into several pieces. Several fragments of the connecting rod were located in the oil pan and bearing material belonging to the No. 2 cylinder connecting rod attachment area was also located in the oil pan.

The crankshaft journal for the No. 2 connecting rod and its oil transfer hole displayed wear marks, heat transfer, and deformation of the oil transfer hole. There was a small fragment of debris located in the oil transfer hole that was consistent in color to the fragmented bearing material located in the oil pan. This oil transfer hole displayed no other deformation or blockage at the other end of the oil entry hole. All other oil transfer holes along the entirety of the crankshaft appeared normal.

The No. 2 connecting rod assembly and its bearing pieces, and bearings from the Nos. 1 and 3 connecting rods were sent to the NTSB Materials Laboratory for forensic examination.

The examination found that the crankshaft end of the No. 2 connecting rod was tinted black, consistent with exposure to high heat during operation, and its bearing was thinned, fractured, and severely deformed with dark heat tinting. The bearing halves for the No. 3 connecting rod were darkened near the middle of the bearing around the circumference with displaced and

smears of babbitt material observed on the interior surfaces. The bearing halves for the No. 1 connecting rod had a nominal appearance with no indication of abnormal wear or damage.

Portions of the No. 2 connecting rod and its connecting rod bolts exhibited areas of substantial post-fracture damage; however, both components exhibited features consistent with fatigue. Figure 2 provides an overview of the crankshaft oil transfer hole at the No. 2 connecting rod/ bearing attachment area and an overview of the submitted components to the NTSB Materials Laboratory.

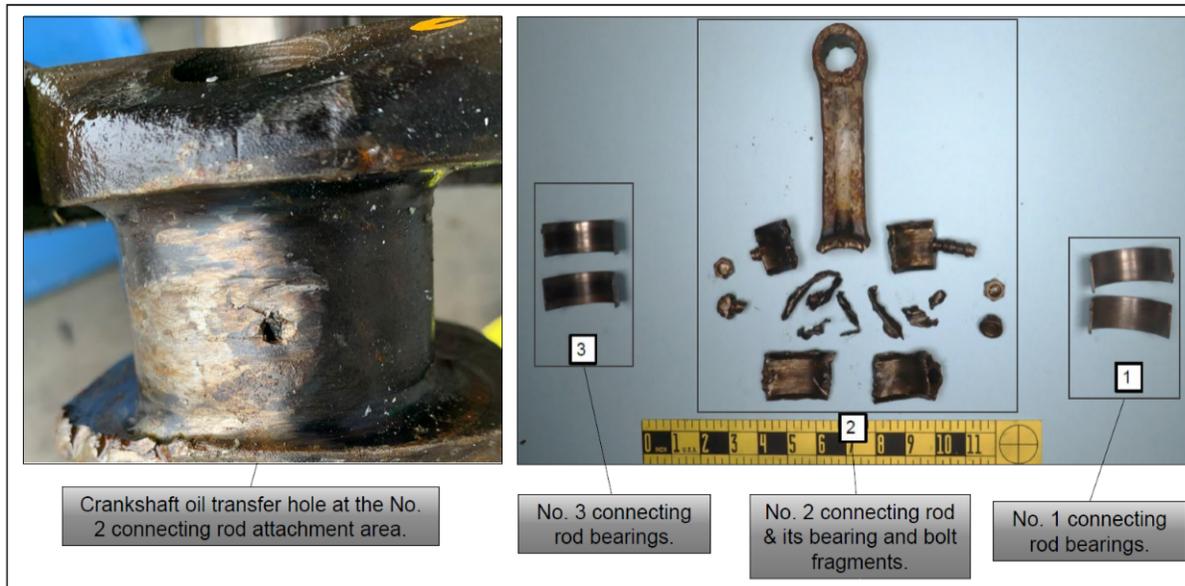


Figure 2: View of the crankshaft oil transfer hole at the No. 2 connecting rod/ bearing attachment area and view of the No. 2 connecting rod and Nos. 1 and 3 connecting rod bearings.

According to the maintenance records, the total airframe time was 13,496 hours, the engine total time since new was 3,728 hours, and the total time since major engine overhaul was 861 hours. The most recent engine overhaul occurred on December 10, 2014, and the engine was subsequently installed on the airplane January 20, 2016.

Two recent maintenance events occurred shortly before the accident. On November 23, 2021, 7.1 hours before accident, the Nos. 2 and 6 cylinders were removed and replaced with new Superior Cylinders (P/N SA52006-A20P cylinder kits). The oil was also changed, and the left exhaust collector was removed and replaced with a new unit.

According to the mechanic who performed the work, the No. 2 cylinder was replaced due to “excessive ring blow by.” The No. 6 cylinder was replaced due to an exhaust stud that had fractured during the work on the No. 2 cylinder, so instead of making repairs, the entire cylinder and left exhaust collector was replaced.

On December 23, 2021, an overhauled propeller and propeller governor were reinstalled, 2.2 hours before the accident.

The mechanic further reported that no oil contamination was observed during any of the recent work, with the exception of excessive carbon. No recent oil analysis had been performed on any oil sample.

Pilot Information

Certificate:	Commercial	Age:	69,Female
Airplane Rating(s):	Single-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):	None	Toxicology Performed:	
Medical Certification:	Class 2 Without waivers/limitations	Last FAA Medical Exam:	November 22, 2021
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	October 13, 2021
Flight Time:	1463 hours (Total, all aircraft), 176 hours (Total, this make and model), 73 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N1596U
Model/Series:	207 Undesignated Series	Aircraft Category:	Airplane
Year of Manufacture:	1971	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	20700196
Landing Gear Type:	Tricycle	Seats:	7
Date/Type of Last Inspection:	September 27, 2021 Annual	Certified Max Gross Wt.:	3600 lbs
Time Since Last Inspection:	2 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	13496 Hrs at time of accident	Engine Manufacturer:	CONTINENTAL MOTORS
ELT:	C126 installed, activated, did not aid in locating accident	Engine Model/Series:	IO-520F
Registered Owner:	TWO ZERO SEVEN INC	Rated Power:	300 Horsepower
Operator:	ExecAir of Naples	Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	ExecAir of Naples	Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	MTH,8 ft msl	Distance from Accident Site:	11 Nautical Miles
Observation Time:	16:53 Local	Direction from Accident Site:	161°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	140°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	26°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Marathon, FL (MTH)	Type of Flight Plan Filed:	Company VFR
Destination:	Naples, FL (APF)	Type of Clearance:	VFR flight following
Departure Time:	16:10 Local	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Minor
Passenger Injuries:	2 Minor	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	1 Serious, 2 Minor	Latitude, Longitude:	24.898611,-81.115333(est)

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam		
Additional Participating Persons:	Juan Garcia; FAA/FSDO; Miami, FL Henry Soderlund; Textron Aviation; Wichita, KS		
Original Publish Date:	May 10, 2023	Investigation Class:	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=104454		

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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).