



# Aviation Investigation Final Report

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<b>Location:</b>	Jupiter, Florida	<b>Accident Number:</b>	ERA21LA261
<b>Date &amp; Time:</b>	June 18, 2021, 18:32 Local	<b>Registration:</b>	N2797E
<b>Aircraft:</b>	Cessna 172	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	1 Serious, 1 Minor
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

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## Analysis

During a local instructional flight, about 2,700 ft above ground level, the engine lost total power. The instructor was unable to restart the engine and attempted to land on a grass field; however, the airplane overflew the field and collided with a fence and trees before coming to rest nose-down in a creek. Review of flight track data revealed that the airplane overflew several fields, ranging in length from approximately 1,500 ft to 2,500 ft before the collision.

Examination of the wreckage revealed that the single-drive, dual output magneto had separated from the rear accessory section of the engine. The nuts, clamps, and lock washers that secured the magneto to the studs were not recovered and the studs did not exhibit any stripping or damage of the threads. Cuts in the magneto housing were consistent with the magneto vibrating over time, possibly due to tightening at an angle between the two studs. The magneto was removed and reinstalled as part of an inspection completed about 3 months (215 hours) before the accident. The mechanic who completed the inspection and reinstalled the magneto stated that the reinstallation included clamps and nuts that were used, but serviceable, and new lock washers. The mechanic added that there were no defects noted at the time of the inspection.

An annual inspection of the airplane was completed about 1 month (74 flight hours) before the accident. The mechanic that completed the annual inspection stated he followed the *Code of Federal Regulations* Part 43 checklist, which does not specifically include magnetos; however, he checked with his hand (by trying to wiggle all the accessories) that the magneto was secure.

## Probable Cause and Findings

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

The flight instructor’s failure to obtain the proper touchdown point during a forced landing. Contributing to the accident was the improper service and subsequent inadequate inspection of the single-drive, dual magneto, which resulted in a total loss of engine power.

**Findings**

<b>Personnel issues</b>	Incorrect action performance - Pilot
<b>Aircraft</b>	Descent/approach/glide path - Incorrect use/operation
<b>Personnel issues</b>	Installation - Maintenance personnel
<b>Personnel issues</b>	Scheduled/routine maintenance - Maintenance personnel
<b>Aircraft</b>	Magneto/distributor - Incorrect service/maintenance

## Factual Information

### History of Flight

<b>Initial climb</b>	Loss of engine power (total) (Defining event)
<b>Emergency descent</b>	Off-field or emergency landing
<b>Emergency descent</b>	Collision with terr/obj (non-CFIT)

On June 18, 2021, about 1832 eastern daylight time, a Cessna 172N, N2797E, was substantially damaged when it was involved in an accident near Jupiter, Florida. The flight instructor sustained serious injuries and the student pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 instructional flight.

Due to his injuries, the instructor was unable to provide a statement. Attempts to contact the student pilot were unsuccessful. According to a Federal Aviation Administration (FAA) inspector, about 10 minutes after takeoff, at 2,700 ft mean sea level, the airplane experienced a total loss of engine power. The instructor was unable to restart the engine and attempted to land on a grass field; however, the airplane overflew the field and collided with a fence and trees before coming to rest nose-down in a creek. Review of automatic dependent surveillance – broadcast (ADS-B) data revealed that the airplane overflew several fields, ranging in length from approximately 1,500 ft to 2,500 ft, before the collision.

Examination of the wreckage by an FAA inspector and representative from the airframe manufacturer revealed oil streaks along the fuselage. Further examination revealed that the single-drive, dual output magneto had separated from the rear accessory section of the engine. The nuts, clamps, and lock washers that secured the magneto to the studs were not recovered and the studs did not exhibit any stripping or damage of the threads. Additionally, cuts in the magneto housing were consistent with the magneto vibrating over time, possibly due to tightening at an angle between the two studs.

Review of maintenance records revealed that the magneto was serviced on March 4, 2021, and the airplane's most recent annual inspection was completed on May 17, 2021. The airplane had been operated about 215 hours and 74 hours since those dates, respectively. Additionally, a 100-hr inspection was performed on April 9, 2021.

The mechanic that serviced the magneto on March 4 stated that he did so as part of a pre-buy inspection. The mechanic had advised the seller that Airworthiness Directive (AD) 96-12-07 was superseded by AD 2005-12-06, which was not applicable to the model and serial number magneto; however, the mechanic was requested to perform the original AD anyway, to satisfy the buyer. The original AD was a 500-hr inspection of the magneto impulse couplings. The

mechanic removed and reinstalled the magneto as part of the AD. The reinstallation included clamps and nuts that were used, but serviceable, and new lock washers. The mechanic added that there were no defects noted at the time of the inspection.

The mechanic who performed the subsequent annual inspection on May 17, 2021, stated that, when the magneto was previously removed and replaced, that mechanic (using a torque wrench) would tighten its two steel nuts and each nut has a star lock washer. The mechanic added that during the annual inspection he followed the CFR Part 43 checklist, which does not specifically include magnetos; however, he checked with his hand (by trying to wiggle all the accessories) that the magneto was secure. The Cessna checklist includes magnetos, but it is up to the operator to request that checklist be used, as it results in more labor during inspections and thus more cost for the inspection.

### Flight instructor Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	22, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	June 9, 2021
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	February 1, 2021
<b>Flight Time:</b>	(Estimated) 1000 hours (Total, all aircraft)		

### Student pilot Information

<b>Certificate:</b>	None	<b>Age:</b>	23, Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>		<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	None	<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3 hours (Total, all aircraft), 3 hours (Total, this make and model), 3 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N2797E
<b>Model/Series:</b>	172 N	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1978	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	17271324
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	May 17, 2021 Annual	<b>Certified Max Gross Wt.:</b>	2300 lbs
<b>Time Since Last Inspection:</b>	74 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	13164 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C91 installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	O-320
<b>Registered Owner:</b>	Palm Beach Flyers	<b>Rated Power:</b>	160 Horsepower
<b>Operator:</b>	Aamro Aviation	<b>Operating Certificate(s) Held:</b>	Pilot school (141)

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KPBI, 19 ft msl	<b>Distance from Accident Site:</b>	17 Nautical Miles
<b>Observation Time:</b>	18:53 Local	<b>Direction from Accident Site:</b>	170°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 19000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>	90°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	30.06 inches Hg	<b>Temperature/Dew Point:</b>	29°C / 23°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	West Palm Beach, FL (F45)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	West Palm Beach, FL (F45)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	18:20 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious, 1 Minor	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>		<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Serious, 1 Minor	<b>Latitude, Longitude:</b>	26.9675,-80.154722

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Gretz, Robert
<b>Additional Participating Persons:</b>	Juan Garcia; FAA/FSDO; Miramar, FL Casey Love; Textron Aviation; Wichita, KS James Childers; Lycoming; Williamsport, PA
<b>Original Publish Date:</b>	February 24, 2023
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=103301">https://data.nts.gov/Docket?ProjectID=103301</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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](#).