Aviation Investigation Final Report

Location:	Grass Valley, California	**Accident Number:**	WPR25FA146
Date & Time:	May 1, 2025, 08:20 Local	**Registration:**	N52156
Aircraft:	Cessna 177RG	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane entered the airport traffic pattern, and,.shortly after turning onto the left base leg, the pilot transmitted on the common traffic advisory frequency (CTAF) that the airplane had lost all engine power. The pilot then discontinued the base-to-final turn and instead turned the airplane away from the airport likely in an attempt to land in an open area. The airplane subsequently struck 60-ft trees, which separated the stabilator, then descended uncontrolled to the ground adjacent to the road.

Fuel was recovered from the wreckage, and a postaccident examination of the engine revealed that the B-nut fitting on the inlet line into the fuel flow divider was over 1/2 a turn loose, and the area surrounding the B-nut fitting exhibited blue dye staining, consistent with fuel leakage. No impact damage to the B-nut on the line or to the fitting on the fuel flow divider was observed, and there was no evidence of any other preimpact anomaly that would have precluded normal engine operation.

It is likely that the B-nut fitting on the inlet line to the fuel flow divider was not properly tightened, which allowed it to continue to loosen due to normal engine vibration, resulting in fuel leakage from the fitting and insufficient fuel delivery to the engine (fuel starvation). Further, data from the engine data management system indicated that the engine was running normally until the last few seconds of the flight. The data showed that, during those final seconds, the cylinder head temperatures (CHTs) and exhaust gas temperatures (EGTs) for all four cylinders spiked briefly before dropping rapidly, consistent with a loss of engine power due to fuel starvation.

The airplane’s last annual inspection was completed 10 days before the accident, and, since then, the airplane was operated for about 2.5 hours (including the accident flight). Per the

applicable regulation, annual and 100-hour inspections, “Each person performing an annual or 100-hour inspection shall inspect engine lines, hoses, and clamps for leaks, improper condition, and looseness.”

Probable Cause and Findings

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

An improperly tightened B-nut fitting at the fuel flow divider, which resulted in a fuel leak and loss of engine power due to fuel starvation, and the inadequate maintenance inspection, which failed to detect and correct the discrepancy.

Findings

Aircraft	Fuel distribution - Incorrect service/maintenance
Aircraft	Fuel distribution - Inadequate inspection
Personnel issues	Installation - Maintenance personnel
Personnel issues	Post maintenance inspection - Maintenance personnel
Personnel issues	Scheduled/routine inspection - Maintenance personnel

Factual Information

History of Flight

Approach-VFR pattern base	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing

History of Flight

On May 1, 2025, about 0820 Pacific standard time, a Cessna 177RG airplane, N52156, was substantially damaged when it was involved in an accident near Grass Valley, California. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

According to ADS-B data for the flight, the airplane departed Auburn Municipal Airport (AUN), Auburn, California, at 0805 and climbed to about 4,400 ft en route to Nevada County Airport (GOO), Grass Valley, California.

A review of archived audio from the GOO CTAF and a witness report revealed that the pilot first reported the airplane's position about 4 miles south of GOO at traffic pattern altitude. About 3 minutes later, the pilot reported that his position was about 1/2 mile south of the airport and that he would be crossing midfield and entering the left downwind for runway 07. The pilot subsequently reported his left downwind and left base turns for the runway. About 30 seconds after reporting his left base turn, the pilot reported, "Nevada County, mayday, mayday, mayday, I have lost engine." The witness that heard the pilot make radio calls noted that there was no indication of engine trouble until the mayday call was made. The witnesses said that in every transmission the pilot seemed calm and professional and had good situational awareness.

The ADS-B data showed that the airplane's flight track discontinued the left base-to-final turn and instead made a right turn to the south, away from the airport and likely toward a clear area to conduct an emergency landing. The accident site was located about 1 mile west of the airport, adjacent to the road.

Pilot Information

The pilot held a private pilot certificate with an airplane single-engine land rating. At the time of the accident, he had accumulated 311.6 total hours of flight experience since he first began flying in 1979, which included 64.1 hours of flight experience in the accident airplane. He received 3.7 hours of dual instruction in the accident airplane in March 2024. No flight review endorsement was observed in the pilot's logbook.

Aircraft Information

A review of maintenance records revealed that the airplane's most recent annual inspection was signed off on April 21, 2025. During the annual inspection, a J.P.I Instruments (JPI) engine data management system and JPI fuel flow transducer were installed, and the right tank's fuel sending unit gasket was replaced.

ADSB and engine monitoring data show that the pilot flew two separate flights with a total flight time of 1.5 hours after the annual inspection. Pilot records showed that, on the day of the accident, the airplane departed AUN for the flight to GOO with 34 gallons of fuel: 18 gallons in the left wing tank and 16 gallons in the right wing tank.

Flight Recorder Information

The airplane was not equipped nor required to be equipped with any flight recorder. It was equipped with a JPI engine data management system capable of recording various engine operation parameters, including CHT and EGT.

The JPI unit was sent to the NTSB Vehicle Recorder Laboratory for data download. Data from the engine monitoring instrument indicated that, for the accident flight, engine startup occurred about 42 minutes before takeoff. The data showed that the engine was running normally until the last few seconds of the flight. During those final seconds, the CHTs and EGTs for all four cylinders spiked briefly before dropping rapidly.

Wreckage and Impact Information

The main wreckage came to rest, inverted about 250 ft from some damaged, 60-ft trees. The stabilator was found separated and in three pieces along the debris line between the damaged trees and the main wreckage. The stabilator's leading edge showed tree-impact damage on the right and left sides, and tree debris was found with the stabilator pieces. The propeller and propeller hub remained attached to the engine, and both propeller blades were bent aft about midspan.

Postaccident examination of the airframe revealed that both wings sustained significant impact damage, and both wing fuel tanks were breached. About 6 gallons of fuel was found in the left tank, and about 1 cup of fuel was found in right tank. The fuel selector valve handle and the fuel valve were found in the "Both" position.

Postaccident examination of the engine revealed that the B-nut on the fuel line from the fuel servo to the fuel flow divider was more than 1/2 turn loose. Blue fuel staining was observed in the area surrounding the loose fitting. Also, the B-nut attached to the outlet of the fuel strainer was finger tight, and the fitting on the inlet side of the fuel flow transducer was loose and rotated freely. No evidence of any other preimpact anomaly was observed that would have precluded normal engine operation.

Additional Information

Tile 14 *CFR* Part 43, Appendix D, “Scope and Detail of Items (as Applicable to the Particular Aircraft) to be Included in Annual and 100-hour Inspections,” specified in paragraph (d) that “each person performing an annual or 100-hour inspection shall inspect…components of the engine and nacelle group,” to include inspecting the engine section “for visual evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks,” and inspecting “lines, hoses, and clamps for leaks, improper condition, and looseness.”

Pilot Information

Certificate:	Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed Unknown	**Last FAA Medical Exam:**	May 1, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	311 hours (Total, all aircraft), 64 hours (Total, this make and model), 232 hours (Pilot In Command, all aircraft), 9.3 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N52156
Model/Series:	177RG	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	177RG1180
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 21, 2025 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	6370.4 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-360 A1B6D
Registered Owner:	On file	**Rated Power:**	180 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:	KGOO,3153 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	08:15 Local	**Direction from Accident Site:**	88°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots / None	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	18°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Auburn, CA (AUN)	**Type of Flight Plan Filed:**	None
Destination:	Grass Valley, CA (GOO)	**Type of Clearance:**	Unknown
Departure Time:	08:05 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Nevada County KGOO	**Runway Surface Type:**	
Airport Elevation:	3158 ft msl	**Runway Surface Condition:**	Vegetation
Runway Used:		**IFR Approach:**	Unknown
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.223303,-121.0361

Preventing Similar Accidents

Ensure B-nuts Are Properly Secured (SA-086)

The Problem

A B-nut is a common term for a nut that provides the clamping force to create a reliable seal in lines (such as fuel, oil, or air lines on a reciprocating or turbine engine) installed on an aircraft. If a B-nut is improperly secured (either torqued too much or not enough), a loss of engine power or an engine fire could result. Uner- or over-torqued B-nuts could cause fuel, oil, or air leaks depending on where the B-nuts are installed; over torqued B-nuts could also result in deformation and damage to a line. Fuel or oil leaked onto a hot engine could result in a fire.

B-nuts are exposed to vibration and thermal expansion and contraction during aircraft operations; therefore, it is critical that maintenance personnel ensure that the B-nuts are properly secured.

What can you do?

- Ensure that the proper type of B-nut is used for the maintenance task and that the B-nut does not have any pre-existing damage, especially to the threads or the sealing surfaces. If a B-nut (or any hardware) appears questionable, remove it from service—when in doubt, throw it out!
- Follow procedures from the maintenance manual and the manufacturer's guidance (including service bulletins and letters) to ensure that all steps are taken to complete a task or inspection. Remember that some B-nuts may be in hard-to-access locations; as a result, additional time and effort might be needed for the task.
- Ensure that the proper tools are used for tightening B-nuts and that torque wrenches are calibrated; check to confirm that the calibration is current.
- Develop a process to ensure that B-nuts that have been tightened during mainteance are also torqued as part of the task. Ensure that proper torquing practices are followed. Use appropriate checklists.
- During maintenance work and inspection intervals, inspect B-nuts for indications of slippage, cracking, misalignment, looseness, and leakage and ensure that the B-nuts are intact and safety wired (if required).
- Make every effort to avoid distractions while performing maintenance. Set a reminder about the remaining checklist items if you need to step away from a task before completing it.
- Perform the required leak checks after the task is completed.
- Properly apply torque stripe paint to the B-nuts, after they have been tightened and torqued, to provide a visual aid for identifying a B-nut that has become loose or is

otherwise not properly secured. Remove any previous torque stripe paint before applying the new torque stripe paint.
- Upon completion of a maintenance task, inspect the work. If another mechanic is available, ask them to inspect the work as well.
- Seek out industry best practices for tightening and torquing B-nuts.
- For maintenance management personnel, incorporate procedures for properly securing B-nuts into maintenance training programs and safety management systems.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-086.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Joyce, Stacia
Additional Participating Persons:	David Machado; Federal Aviation Administration; Sacramento, CA Mark Platt; Lycoming; Phoenix , AZ Jennifer Barclay; Textron Aviation; Witchita, KS
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