



Aviation Investigation Final Report

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|--------------------------------|--------------------------------------|-------------------------|-------------|
| Location: | Morgan, Utah | Accident Number: | WPR23LA149 |
| Date & Time: | April 8, 2023, 19:37 Local | Registration: | N17NK |
| Aircraft: | STEVENS KELLY C RV-7 | Aircraft Damage: | Substantial |
| Defining Event: | Part(s) separation from AC | Injuries: | 1 None |
| Flight Conducted Under: | Part 91: General aviation - Personal | | |

Analysis

The pilot reported he noticed an odor of burning oil shortly after takeoff. About a minute later, the airplane began to shake, oil covered the windscreen, and the propeller separated from the crankshaft. The pilot performed a forced landing in a snowy field, and during the landing roll the airplane nosed over and came to rest inverted. The propeller assembly was found in a field about two miles away.

The most recent condition inspection was completed by the pilot one week before the accident flight, and the airplane had accrued three flight hours since the inspection. Although brass flakes were observed in the engine oil during the condition inspection, engine data recovered from the airplane's multi-function display was consistent with normal engine operation.

Five of the six propeller bolts were recovered and examined after the accident. The examination revealed fatigue cracks in multiple areas on each bolt that progressed until each bolt failed in overstress. Additionally, two of the recovered bolts displayed more extensive fatigue features than the other three bolts that were examined.

The pilot documented that he had removed, inspected, and reinstalled the propeller during the condition inspection. Given this information, it is likely that the pilot/builder had not torqued all the propeller attachment bolts to the correct value, resulting in the progressive fatigue failure of the bolts.

Probable Cause and Findings

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

The pilot/builder improperly torqued the propeller attachment bolts while reinstalling the propeller, which resulted in the fatigue failure of the bolts and the separation of the propeller assembly.

Findings

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| Personnel issues | Installation - Owner/builder |
| Aircraft | Propeller assembly - Incorrect service/maintenance |

Factual Information

History of Flight

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| Prior to flight | Aircraft maintenance event |
| Enroute-cruise | Part(s) separation from AC (Defining event) |
| Landing | Nose over/nose down |

On April 8, 2023, at about 1937 mountain daylight time, an experimental amateur-built Van’s RV-7, N17NK, was substantially damaged when it was involved in an accident near Morgan, Utah. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot/builder, the airplane departed for a local flight about 1916. About 10 minutes into the flight, the pilot noticed the odor of burning oil when the cabin heater was turned on, so he turned back to the departure airport. About one minute later, the pilot noted “some light but not normal vibration in the airframe.” Seconds later, the airplane shuddered, oil covered the windscreen, and the engine lost all power. The pilot estimated the nearest airport was beyond the glide range of the airplane, so he chose to land in an open field. During the landing roll, the airplane’s main wheels sunk into deep snow, and the airplane nosed over. As a result, the airplane sustained substantial damage to the fuselage and empennage.

Photos of the airplane at the accident site revealed the propeller assembly had separated from the engine. The propeller assembly was later recovered from a field about two miles from the accident site.

Data retrieved from two panel mounted flight displays revealed the cylinder head temperature, exhaust gas temperature, oil temperature, oil pressure, fuel pressure, and rpm were consistent with normal engine operation until 19:28:15. Between 19:28:15 and 19:28:18, engine rpm increased from about 2,300 rpm to 2,841 rpm before decreasing to 0 rpm 2 seconds later, as seen in Figure 1.

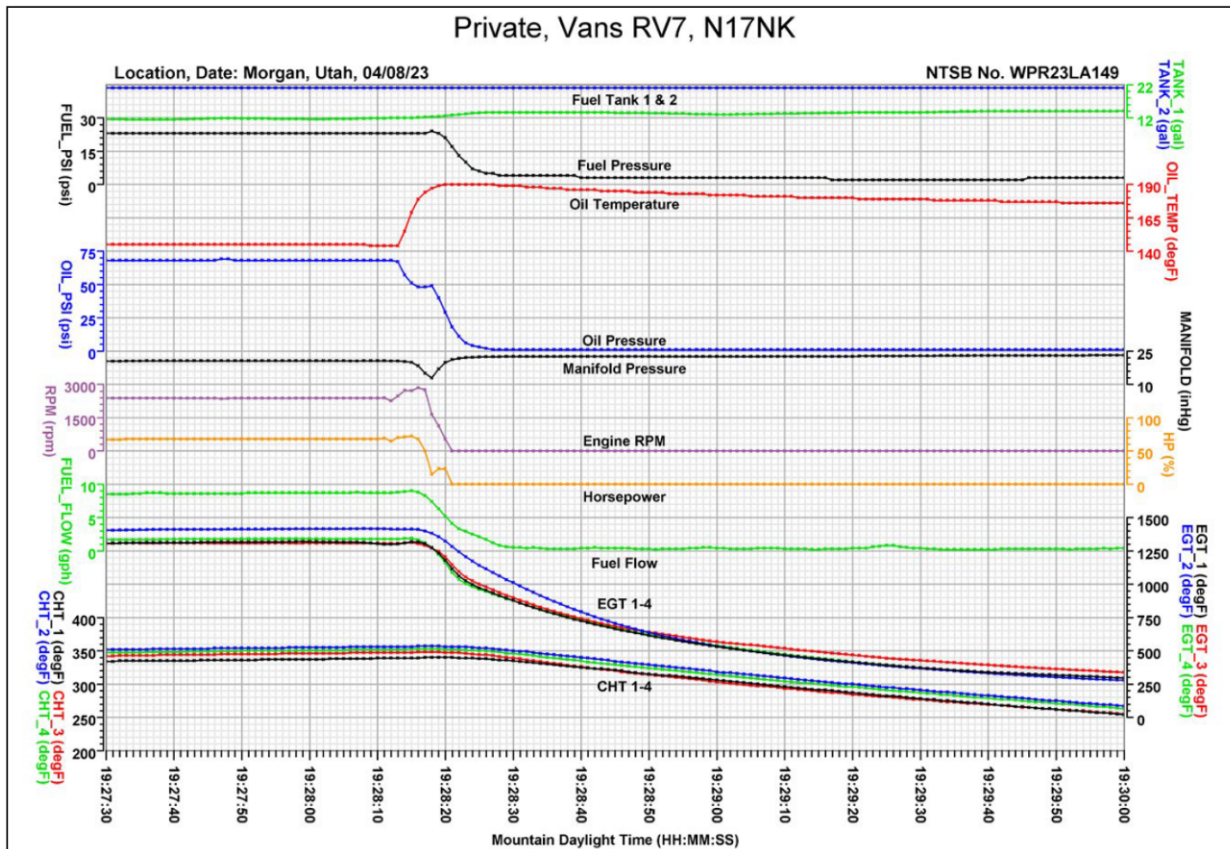


Figure 1: A portion of recorded engine data.

A National Transportation Safety Board materials laboratory examination showed that five of the six propeller attachment bolts remained connected with safety cable within the bolt holes in the hub. The sixth bolt was missing. The fracture surfaces of all five remaining bolts exhibited features consistent with progressive cracking, crack arrest marks, ratchet marks, and multiple thumbnail shaped cracks. Two bolts displayed multiple fatigue crack initiation sites. Further examination with a scanning electron microscope did not reveal any corrosion pits or voids, and although there were some dissimilar materials observed, they were inconsistent with inclusions during the manufacturing process. Overall, the fracture surfaces were consistent with fatigue that had initiated in multiple sites on each bolt and propagated across the bolt cross sections until the remaining material succumbed to overstress fracture. Two of the five examined bolts displayed more extensive fatigue than observed on the other bolts.

Review of the airplane's maintenance records revealed it had flown three hours since its most recent condition inspection. During the condition inspection, which was performed by the pilot/builder, brass flakes were found in the oil sump and filter. After correspondence with a maintenance consultant, the pilot intended to fly the airplane an additional 10 hours to monitor the engine's performance.

The pilot stated that during the condition inspection, he removed the propeller to clean sludge from the end of the crankshaft. He stated that he did not see any defects when he visually inspected the propeller and attachment bolts. He re-installed the propeller, torqued the attachment bolts with a torque wrench, and used a ratcheting safety cable tool to install .32-inch safety cable in the bolts.

The pilot stated he referenced the MT Propellers technical data included with the purchase of the propeller. He could not recall the torque value he used during the installation of the propeller. According to MT Propellers Operation and Installation Manual E-124, torque values for propeller attachment bolts are 63-66 ft/lbs.

Pilot Information

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| Certificate: | Airline transport | Age: | 62, Male |
| Airplane Rating(s): | Single-engine land; Multi-engine land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | 4-point |
| Instrument Rating(s): | Airplane | Second Pilot Present: | No |
| Instructor Rating(s): | None | Toxicology Performed: | |
| Medical Certification: | Class 1 Without waivers/limitations | Last FAA Medical Exam: | February 24, 2023 |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | December 8, 2023 |
| Flight Time: | (Estimated) 20000 hours (Total, all aircraft), 145 hours (Total, this make and model), 15 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft) | | |

Aircraft and Owner/Operator Information

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|--------------------------------------|---|---------------------------------------|----------|
| Aircraft Make: | STEVENS KELLY C | Registration: | N17NK |
| Model/Series: | RV-7 | Aircraft Category: | Airplane |
| Year of Manufacture: | 2021 | Amateur Built: | Yes |
| Airworthiness Certificate: | Experimental (Special) | Serial Number: | 73089 |
| Landing Gear Type: | Tailwheel | Seats: | 2 |
| Date/Type of Last Inspection: | April 1, 2023 Condition | Certified Max Gross Wt.: | 1800 lbs |
| Time Since Last Inspection: | 3 Hrs | Engines: | 1 |
| Airframe Total Time: | 133.95 Hrs as of last inspection | Engine Manufacturer: | |
| ELT: | C126 installed, activated, did not aid in locating accident | Engine Model/Series: | |
| Registered Owner: | On file | Rated Power: | |
| Operator: | On file | Operating Certificate(s) Held: | None |

Meteorological Information and Flight Plan

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| Conditions at Accident Site: | Visual (VMC) | Condition of Light: | Day |
| Observation Facility, Elevation: | KSLC, 4227 ft msl | Distance from Accident Site: | 19 Nautical Miles |
| Observation Time: | 19:54 Local | Direction from Accident Site: | 222° |
| Lowest Cloud Condition: | Few / 10000 ft AGL | Visibility | 10 miles |
| Lowest Ceiling: | | Visibility (RVR): | |
| Wind Speed/Gusts: | 5 knots / None | Turbulence Type Forecast/Actual: | Unknown / None |
| Wind Direction: | 350° | Turbulence Severity Forecast/Actual: | Unknown / N/A |
| Altimeter Setting: | 30.08 inches Hg | Temperature/Dew Point: | 14°C / 3°C |
| Precipitation and Obscuration: | No Obscuration; No Precipitation | | |
| Departure Point: | Bountiful, UT (BTF) | Type of Flight Plan Filed: | None |
| Destination: | Bountiful, UT (BTF) | Type of Clearance: | None |
| Departure Time: | 19:16 Local | Type of Airspace: | Class G |

Wreckage and Impact Information

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|----------------------------|--------|-----------------------------|---------------------------|
| Crew Injuries: | 1 None | Aircraft Damage: | Substantial |
| Passenger Injuries: | N/A | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 1 None | Latitude, Longitude: | 41.008125,-111.68074(est) |

Administrative Information

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| Investigator In Charge (IIC): | Basti, Paymaun |
| Additional Participating Persons: | James Hill; FAA; Salt Lake City, UT |
| Original Publish Date: | February 26, 2025 |
| Last Revision Date: | |
| Investigation Class: | Class 3 |
| Note: | The NTSB did not travel to the scene of this accident. |
| Investigation Docket: | https://data.nts.gov/Docket?ProjectID=107032 |

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](#).