# Aviation Investigation Final Report

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| **Location:** | El Cajon, California | **Accident Number:** | WPR24LA135 |
| **Date & Time:** | April 28, 2024, 18:15 Local | **Registration:** | N8800V |
| **Aircraft:** | Bellanca 17-31ATC | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Loss of engine power (total) | **Injuries:** | 1 Minor |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot was conducting a test flight following the completion of an annual inspection. During the takeoff climb, the pilot observed an abnormal oil pressure indication and elected to return to the airport. While returning to the airport, the engine sustained a complete loss of oil pressure followed by a loss of all power. Unable to maintain altitude, the pilot elected to make an off-airport landing to a nearby road. During the landing, the airplane struck a power line and a utility pole before it impacted the ground and came to rest upright.

A serviceable engine-driven vacuum pump had been installed on the airplane about 25 days before the accident by a mechanic trainee. After the installation, an engine test ground run was completed and the airplane was returned to service. A mechanic with airframe, powerplant, and inspection authorization (A&P IA) was present but did not verify that the engine-driven vacuum pump had been properly installed or set to any specific torque value.

Postaccident examination of the engine revealed a crack in the engine case between cylinder Nos. 5 and 6, as well as no presence of oil in the oil sump. Internal thermal discoloration and damage identified during the engine teardown were consistent with lubrication deprivation.

Additionally, the engine-driven vacuum pump remained attached to but not secured to its mounting pad. All four of the mounting studs were loose, which allowed for forward and aft movement, or “play,” in the vacuum pump of about 1/8 inch with minimal resistance. The vacuum pump accessory mounting pad has a drilled passage that can supply pressurized lubricating oil. In the accident installation, this oil passage was blocked off by mechanical clamping force and a gasket. Absent sufficient clamping force, the oil would leak out until the oil sump is depleted of oil.

## Probable Cause and Findings

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

Maintenance personnel's improper installation of an engine-driven vacuum pump, which resulted in oil starvation to the engine and a subsequent total loss of engine power. Contributing to the accident was the A&P IA's lack of supervision.

### Findings

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| **Aircraft** | Recip eng oil sys - Malfunction |
| **Personnel issues** | Installation - Maintenance personnel |
| **Personnel issues** | Decision making/judgment - Maintenance personnel |

# Factual Information

## History of Flight

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| **Enroute-cruise** | Loss of engine power (total) (Defining event) |

On April 28, 2024, about 1815 Pacific daylight time, a Bellanca 17-31ATC, N8800V, was substantially damaged when it was involved in an accident near El Cajon, California. The pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that an annual inspection had just been completed on the airplane and the intent of the accident flight was to conduct a test flight in the local area to ensure everything was functioning properly. He conducted a preflight inspection of the airplane, verified engine oil level to be about 10 quarts, and noted the oil appeared to be new. During the takeoff climb, he observed the engine oil pressure decreasing. Concerned about the oil pressure indication, he elected to return to the airport. Shortly thereafter, he observed a complete loss of engine oil pressure followed by a total loss of engine power. Unable to make it to the airport, the pilot elected to make an off-airport landing to a nearby road. During the landing sequence, the airplane struck a power line and impacted a utility pole before coming to rest upright.

A review of the airplane's maintenance records revealed that an annual inspection was completed on April 3, 2024. According to the engine maintenance logbook a serviceable vacuum pump was installed during the annual inspection.

According to the A&P IA, a mechanic trainee performed the maintenance on the accident airplane, and as the A&P IA, he oversaw the work performed by the trainee. He discussed the work scope with the trainee and would periodically check on the maintenance performed. The A&P IA then verified the work conducted; however, he did not verify that the hardware on the engine-driven vacuum pump was tight or set to any specific torque value. After the work was completed, an engine test run was completed and the airplane was returned to the owner.

Postaccident examination of the recovered wreckage revealed that the nose landing gear was fracture separated and the fuselage near the main landing gear exhibited buckling. The left wing was separated at the wing root by recovery personnel to facilitate recovery. The right wing was separated at the wing root and was fractured into numerous sections. The fuselage undercarriage contained oil residue extending along the fuselage to the empennage.

Examination of the engine revealed that it remained attached to the engine mounts. All six cylinders and all engine accessories remained attached. Cracking on the top of engine

crankcase was observed between cylinder Nos. 5 and 6. The oil level dipstick did not register any oil within the oil sump.

The engine-driven vacuum pump remained attached to the engine accessory case but was loosely secured to the mounting pad, which allowed for movement between the mounting pad and the vacuum pump. The vacuum pump moved forward and aft on the mounting studs about 1/8 in with minimal resistance. All four of the vacuum pump mounting studs were loose and had backed off from the vacuum pump.

The No. 6 cylinder and piston were removed and a cracked section of the engine crankcase separated with the cylinder. Damage to the interior crankcase near cylinder Nos. 5 and 6 was observed. The cam shaft was fractured at the rotating plane of the No. 6 cylinder connecting rod. The No. 6 connecting rod was separated at the journal end. Dark discoloration, consistent with thermal damage, was observed to the No. 6 connecting rod end and journal. The thermal discoloration and damage were consistent with lubrication deprivation.

The airplane was equipped with a “dry” vacuum pump. However, according to the engine manufacturer, the vacuum pump accessory mounting pad has a drilled passage that supplies pressurized lubricating oil under normal operating conditions for use when utilizing a “wet” vacuum pump. In the case of “dry” pump applications, this oil passage is blocked off by the mechanical clamping force and gasket of the dry pump. If the mechanical clamping force is not maintained, lubricating oil will leak out until the oil sump is depleted of oil.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 65,Male |
| **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 3 With waivers/limitations | **Last FAA Medical Exam:** | January 6, 2023 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | March 24, 2023 |
| **Flight Time:** | | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Bellanca | **Registration:** | N8800V |
| **Model/Series:** | 17-31ATC | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1973 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 74-31085 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | April 3, 2024 Annual | **Certified Max Gross Wt.:** | 3325 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3999 Hrs as of last inspection | **Engine Manufacturer:** | Lycoming |
| **ELT:** | C91 installed | **Engine Model/Series:** | IO-540-K1E5 |
| **Registered Owner:** | On file | **Rated Power:** | 300 Horsepower |
| **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:** | KSEE,387 ft msl | **Distance from Accident Site:** | 2 Nautical Miles |
| **Observation Time:** | 18:23 Local | **Direction from Accident Site:** | 286° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 7 knots / None | **Turbulence Type Forecast/Actual:** | None / None |
| **Wind Direction:** | 260° | **Turbulence Severity Forecast/Actual:** | N/A / N/A |
| **Altimeter Setting:** | 29.93 inches Hg | **Temperature/Dew Point:** | 21°C / 9°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | El Cajon, CA | **Type of Flight Plan Filed:** | None |
| **Destination:** | El Cajon, CA | **Type of Clearance:** | None |
| **Departure Time:** | | **Type of Airspace:** | Class D |

## Airport Information

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| **Airport:** | GILLESPIE FLD SEE | **Runway Surface Type:** | |
| **Airport Elevation:** | 387 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | Forced landing;Straight-in |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Minor | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | N/A | **Aircraft Fire:** | None |
| **Ground Injuries:** | | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Minor | **Latitude, Longitude:** | 32.815172,-116.92691(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Gutierrez, Eric |
| **Additional Participating Persons:** | Roger C Messick; FAA; San Diego, CA<br>Mark Platt; Lycoming Engines Inc.; Williamsport, PA |
| **Original Publish Date:** | November 21, 2024 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class 3 |
| **Note:** | The NTSB did not travel to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=194164 |