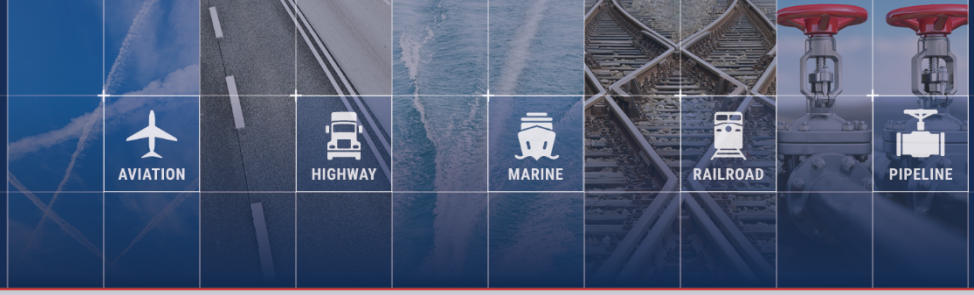


# Aviation Investigation Final Report

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|---|---|---|---|
| **Location:** | Santa Paula, California | **Accident Number:** | WPR09LA452 |
| **Date & Time:** | September 16, 2009, 14:50 Local | **Registration:** | N326DW |
| **Aircraft:** | Cessna 140 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Loss of engine power (total) | **Injuries:** | 1 Minor |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot performed a preflight inspection, which included a visual confirmation of the fuel in each tank. Using a fuel quantity stick that the pilot had calibrated, she estimated that both the left and right wing fuel tanks contained about 6 gallons of fuel. She performed two uneventful touch-and-go landings, followed by a full-stop landing. While turning the airplane into the left crosswind after the fourth takeoff, the engine lost all power. The pilot force-landed the airplane in an adjacent dry riverbed, where it sustained substantial damage to the firewall, fuselage, and tail. Postaccident examination revealed a residual quantity of fuel in the left fuel tank; however, damage to the airplane and its subsequent inverted attitude could have caused fuel to drain from this tank prior to inspection. Additionally, fuel was observed in the fuel line leading to the carburetor. The pilot reported the total duration of the flight to be 0.2 hours. Data was not available to confirm the airplane's fuel consumption during takeoff and climb phases. Further examination of the engine and airframe did not reveal obvious anomalies that would have explained the loss of engine power.

## 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 during takeoff for undetermined reasons.

## Findings

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| **Not determined** | (general) - Unknown/Not determined |

# Factual Information

## History of Flight

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|---|---|
| **Takeoff** | Loss of engine power (total) (Defining event) |
| **Emergency descent** | Off-field or emergency landing |

HISTORY OF FLIGHT

On September 16, 2009, about 1450 Pacific daylight time, a Cessna 140, N326DW, lost engine power and nosed over after a forced landing near Santa Paula Airport, Santa Paula, California. The pilot/owner was operating the airplane under the provisions of 14 Code of Federal Regulations Part 91. The commercial pilot sustained minor injuries. The airplane sustained substantial damage to the fuselage and tail. The local personal flight departed Santa Paula, about 1430. Visual meteorological conditions prevailed, and no flight plan had been filed.

The pilot reported that prior to departure she performed a preflight inspection, which included a visual check of the fuel in each tank using a calibrated fuel tube. She confirmed that both the left and right wing fuel tanks contained about 6 gallons of fuel. She then performed an uneventful engine run-up, which included a check of the magnetos and carburetor heat. She then departed the airport with the intention of performing practice landings.

She performed two uneventful touch-and-go landings, followed by a full-stop takeoff and landing. While turning left crosswind after the fourth takeoff, she felt the engine power reduce, "gradually but completely." She confirmed the throttle and mixture controls were set full forward, and that the primer was in and locked. She then checked the fuel tank gauges, and both tanks appeared to contain the same amount of fuel. She confirmed the fuel selector was set to the left fuel tank. She continued the turn to downwind, and pulled the carburetor heat to the on position. Unable to make the runway, she elected to land in a dry riverbed adjacent to the airport. Just prior to landing, she pulled the throttle and mixture control to the full out position, and turned the fuel selector to off. The pilot then landed the airplane in a river bed; during the landing sequence, the airplane nosed over sustaining substantial damage to the firewall, aft fuselage, and empennage. After landing, she further secured the airplane by turning the magneto and master switch to the off position.

The pilot reported that the engine tachometer advanced 0.2 hours from the time of the engine start to the time of the accident.

A Federal Aviation Administration (FAA) inspector responded to the accident site, arriving on scene about 1 hour 40 minutes after the accident. He performed an initial examination noting that the carburetor had sustained impact damage, and had become separated from the inlet manifold; additionally the gascolator bowl had become dislodged from its mount. He observed

fuel leaking from the right wing fuel cap.

Recovery personnel repositioned the airplane onto its main landing gear about 4 hours after the accident. At that time, the FAA inspector noted about 5 gallons of fuel in the right tank and residual quantities of fuel in the left tank. The left fuel tank filler cap vent line had become separated from the cap. Removal of the carburetor revealed the presence of fuel at the inlet line.

The airplane was recovered to a storage facility at Santa Paula, where the FAA inspector continued the examination. He tested the fuel selector valve functionality by adding fuel to the tanks and observing fuel flow to the carburetor inlet line at each tank position. He disassembled the carburetor, and noted residual quantities of fuel in the carburetor bowl and accelerator pump chamber.

## AIRCRAFT INFORMATION

The high-wing, tailwheel airplane was manufactured in 1946, and equipped with a Teledyne Continental Motors (TCM) O-200-A engine. A review of the airplane's logbooks revealed that at the last annual inspection on August 9, 2009, 4 flight hours prior to the accident, it had accumulated a total airframe time of 3,314.7 hours. According to the pilot, the engine had accumulated 814 flight hours since overhaul.

## TESTS AND RESEARCH

The airplane was further examined by the NTSB investigator-in-charge, and a representative from TCM.

### Engine

The engine controls were continuous from their respective cabin controls through to the firewall. The carburetor heat line was observed cut by recovery personnel, but intact at its respective control arm. The carburetor heat box had sustained crush damage, and as such its operation could not be confirmed. The air filter was free of debris.

The carburetor was manufactured by Precision Airmotive Corporation, and was of type MA-3SPA. Examination of the inlet screen revealed that it was free of debris. The float was of the brass type, and scoring was observed on the inner surface of the carburetor float bowl, at an area adjacent to the float pivot cotter pin. Immersion of the float in fuel revealed it to be free of leaks.

Mechanical rotational continuity was established throughout the engine and valve train when the crankshaft was rotated by hand using the propeller. Thumb compression was obtained on all four cylinders in proper firing order. The cylinders were examined internally using a lighted borescope. The piston heads, chambers, and valves exhibited light grey deposits, and no

evidence of catastrophic internal failure was noted. The number 2 and 4 exhaust valve heads exhibited asymmetrical thermal discoloration, and the external fins surrounding the number 2 exhaust valve sustained pink discoloration.

Removal of the upper spark plugs revealed wear signatures consistent with a short service life when compared to the Champion AV-27 chart. Plugs number 1 and 3 exhibited light grey deposits, and plugs 2 and 4 were oil soaked.

The ignition switch and its associated electrical cables were tested for continuity and short circuits; no anomalies were noted.

The right magneto remained firmly attached to the engine at its mount. The left magneto had become separated at its mounting flange, which was fractured and still attached to the engine. The fracture surfaces of the flange were grainy in appearance, and an indentation on the firewall corresponded to the position of the magneto. Rotation of both magneto drive shafts by hand produced sparks at their respective spark plug leads. The damaged left magneto was noted to produce a spark intermittently at two plug output leads simultaneously.

ADDITIONAL INFORMATION

The pilot reported that she used a Cessna 152 dipstick, which she had recalibrated for use in a Cessna 140. Examination of the dipstick revealed that it was a clear plastic tube fuel gauge, calibrated for a Cessna 152 with 12-gallon tanks. A white mark was noted at the 4.5-gallon point, which the pilot stated was calibrated by comparing it with the half-full indication on the wing mounted fuel quantity gauge.

When inserted into the Cessna 140 fuel tank, the 12-gallon mark was observed to line up with the top of the fuel tank.

The pilot stated that the airplane typically consumes between 5.32 and 6.5 gallons of fuel per hour. Data was not available to confirm the airplanes fuel consumption during takeoff and climb phases.

The airplane is equipped with two wing mounted fuel tanks with an individual capacity of 12.5 gallons.

## Pilot Information

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| **Certificate:** | Commercial; Flight instructor | **Age:** | 56,Female |
| **Airplane Rating(s):** | Single-engine land; Single-engine sea | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane single-engine | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 With waivers/limitations | **Last FAA Medical Exam:** | March 20, 2009 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | March 20, 2009 |
| **Flight Time:** | 2936 hours (Total, all aircraft), 438 hours (Total, this make and model), 2887 hours (Pilot In Command, all aircraft), 62 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

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|---|---|---|---|
| **Aircraft Make:** | Cessna | **Registration:** | N326DW |
| **Model/Series:** | 140 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 11220 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | August 9, 2009 Annual | **Certified Max Gross Wt.:** | 1450 lbs |
| **Time Since Last Inspection:** | 4 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3319 Hrs at time of accident | **Engine Manufacturer:** | CONT MOTOR |
| **ELT:** | C91A installed, activated, did not aid in locating accident | **Engine Model/Series:** | O-200 SERIES |
| **Registered Owner:** | WILLIAMS DIANNE E | **Rated Power:** | 100 Horsepower |
| **Operator:** | WILLIAMS DIANNE E | **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:** | CMA,77 ft msl | **Distance from Accident Site:** | 8 Nautical Miles |
| **Observation Time:** | 14:55 Local | **Direction from Accident Site:** | 191° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 9 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 260° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.9 inches Hg | **Temperature/Dew Point:** | 25°C / 16°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Santa Paula, CA (SZP ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Santa Paula, CA (SZP ) | **Type of Clearance:** | None |
| **Departure Time:** | 14:30 Local | **Type of Airspace:** | |

## Airport Information

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| **Airport:** | Santa Paula SZP | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 243 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | 22 | **IFR Approach:** | None |
| **Runway Length/Width:** | 2713 ft / 60 ft | **VFR Approach/Landing:** | Touch and go;Traffic pattern |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Minor | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Minor | **Latitude, Longitude:** | 34.346668,-119.057502(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Simpson, Eliott |
| **Additional Participating Persons:** | Patrick J OBrien; Federal Aviation Administration FSDO; Van Nuys, CA<br>Andrew Swick; Teledyne Continental Motors; Mobile, AL |
| **Original Publish Date:** | May 28, 2010 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=74746 |