Aviation Investigation Final Report

Location:	Las Vegas, Nevada	**Accident Number:**	WPR21LA030
Date & Time:	October 29, 2020, 09:39 Local	**Registration:**	N101G
Aircraft:	Cessna 310	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed in the twin-engine airplane for the cross-country flight. About 1 mile south of the airport, at an altitude of 2,800 ft, the pilot requested a destination change from air traffic control to a nearby airport. The pilot further requested a direct heading to the airport and stated he needed to shut down one engine. As the airplane flew toward the new destination airport, a witness observed the airplane fly over powerlines and then pitch down. The airplane maintained its altitude briefly then nosed down again before it rolled sharply to the left. The airplane impacted the ground about 8 nautical miles northwest of the airport and a postcrash fire ensued. The witness stated that the left engine appeared to be inoperable as the propeller was not spinning. Recorded footage from a witness video confirmed the lack of power from the left engine and power being produced on the right engine.

Recorded automatic dependent surveillance–broadcast data indicate the airplane's airspeed was approximately 86 knots at the time the turn to the new destination airport was initiated. The airspeed briefly increased to 97 knots over the next minute then gradually decreased to a final airspeed of 78 knots when the data was lost. The airplane's minimum controllable airspeed (V_{MC}) was 80 knots; therefore, as the airspeed decreased below V_{MC}, the pilot was likely unable to maintain control of the airplane while maneuvering with one engine inoperative.

A postaccident examination of the left engine revealed two holes in the crankcase above cylinder Nos. 3 and 4. The No. 2 connecting rod was separated from the crankshaft and no indication of lubrication was noted in the crankcase. The lack of lubrication, combined with signatures of thermal damage on many of the crankshaft journals and bearings, indicated the likelihood of an oil pressure problem, which resulted in a loss of engine power.

About 10 months before the accident, the engine was disassembled and inspected for a low oil pressure problem. During the maintenance, the main bearings and rod bearings were replaced, as well as the alternator, oil cooler, and starter adapter. The airplane flew about 40 hours after the maintenance was completed; an annual inspection was performed about 6 months before the accident. During the inspection, cylinder compression was noted between 61-65 pounds per square inch (psi) on each cylinder. FAA guidance states cylinder compression less than 60 psi requires removal and inspection of the cylinder. While the cylinder compressions were just above the limit requiring removal, their low compression readings should have indicated a problem to maintenance personnel that needed to be addressed.

The low compression readings only 40 hours after engine disassembly and the failure to identify or correct the reason for the low compression indicates inadequate maintenance.

Toxicology testing detected ethanol in the pilot's liver and muscle tissue but not in his brain tissue. The ethanol concentration in his liver was over ten times higher than the concentration detected in his muscle tissue. Extensive trauma increases the risk of postmortem ethanol production. Given the differing ethanol tissue concentrations and the trauma received by the body from the crash, it is likely that the identified ethanol was from sources other than ingestion. Thus, the identified ethanol did not contribute to the accident.

Additionally, although toxicology testing detected the sedating antihistamine diphenhydramine in the pilot's urine and liver tissue, the amounts were too low to quantify. Based on the circumstances of this accident, including the pilot's appropriate decision to land after an engine failure, it is unlikely that effects from the pilot's use of diphenhydramine contributed to this accident.

Probable Cause and Findings

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

The pilot's failure to maintain the airplane's minimum controllable airspeed while maneuvering with one engine inoperative. Also causal was the loss of power in the left engine due to oil starvation. Contributing to the accident were inadequate maintenance that failed to correct an ongoing problem with the engine in the months preceding the accident.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Oil - Fluid level
Personnel issues	Scheduled/routine maintenance - Maintenance personnel

Factual Information

History of Flight

Enroute-climb to cruise	Loss of engine power (partial) (Defining event)
Emergency descent	Engine shutdown
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On October 29, 2020, about 0939 Pacific daylight time, a Cessna 310, N101G was destroyed when it was involved in an accident near Henderson, Nevada. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Automatic dependent surveillance–broadcast (ADS-B) data indicate that the airplane departed from runway 12 at North Las Vegas Airport (VGT), Las Vegas, Nevada, at 0929 and proceeded to fly on a southeast heading for about 1 minute before turning toward the southwest. The pilot's intended destination was Gillespie Field Airport (SEE), San Diego/El Cajon, California. At 0930, approximately 1 mile south of VGT at an altitude of 2,800 ft, the pilot contacted Las Vegas Term Terminal Radar Control and requested a change of destination to Henderson Executive Airport (HND), Henderson, Nevada.

At 0935, the pilot requested to proceed direct to HND and stated that he needed to shut down one engine. The controller approved the request and transferred communication to HND tower controllers. No further communication was received from the pilot. ADS-B data indicate that, about the time of the pilot's request to proceed to HND, the airplane turned to the east then southeast before data was lost at 0938. When the airplane began the turn to the east, the airspeed was approximately 86 knots. The airspeed briefly increased to 97 knots over the next minute, then gradually decreased to a final airspeed of 78 knots when the data was lost.

The final portion of the accident flight was captured by a video taken on a cell phone by a witness and another video from a home security camera. The security camera video showed the airplane rolled to the left before ground impact followed by a postcrash fire. Examination of the cell phone video at the National Transportation Safety Board's (NTSB) Vehicle Recorders Laboratory found the left propeller was not turning before ground impact and the right propeller was turning.

Another witness later reported observing the airplane fly south as it crossed a highway. According to the witness, it appeared as if the airplane attempted to gain altitude (while losing airspeed) as it avoided hitting powerlines that ran across the highway. The airplane appeared to nose down after crossing the powerlines then maintained its altitude for approximately 1,000 ft. Shortly after, the airplane nosed down again, rolled "hard left," and impacted the

ground. The witness stated that the left engine appeared to be inoperable as the propeller was not spinning. Additionally, the airplane was flying about 15° to 20° right wing down before it rolled to the left and impacted the ground.

A postaccident examination of the left engine revealed it separated from the airframe upon impact; visual examination of the engine revealed extensive thermal and impact damage. It also revealed two holes in the crankcase above cylinder Nos. 3 and 4.

Both magnetos remained attached to their respective installation points; however, the impulse coupling assembly exhibited extensive thermal and impact damage and could not be tested for sparks. Both magnetos were disassembled, and no anomalies were noted. The spark plugs all remained installed in their respective cylinders and were undamaged. The top spark plugs were removed and visually inspected; their electrodes all appeared to have normal wear. The fuel pump was removed and examined. The fuel drive coupling was intact; however, the fuel pump could not be rotated by hand due to the impact damage. The oil pump remained secured to its respective installation point, and no anomalies were noted with the pump.

All six cylinders remained attached to the engine and sustained damage consistent with the impact and thermal exposure. A borescope inspection performed on each cylinder revealed the intake and exhaust valve heads on each cylinder displayed normal operating and combustion signatures. The top and bottom throughbolts on cylinder No. 5, as well as the top throughbolt on cylinder No. 3, exposed threads between the respective nuts and the corresponding cylinder decks. The No. 2 connecting rod was separated from the crankshaft. All six piston faces displayed normal operating and combustion signatures and all the piston rings were undamaged and free in their respective grooves.

The crankcase was opened, and indications of fretting were present on main bearing Nos. 2 and 3. Additionally, no indication of lubrication was noted. The No. 2 main bearing was laterally displaced, indicating there was some bearing movement.

The left engine three-blade propeller separated at the crankshaft propeller flange. Two of the blades remained straight with no bending or twisting deformation. One blade was slightly bent as a result of the impact.

Examination of the right engine revealed signatures of power at the time of the accident.

The following components from the left engine were sent to the NTSB Materials Laboratory for further examination: inserts for main bearing Nos. 1 – 5, inserts for connecting rod bearings Nos. 1, 2, 3, 5, and 6, and a thrust bearing. The components were manufactured by both Continental Motors and Superior Air Parts. Several of the inserts exhibited features consistent with heat exposure. The number 4 main bearing inserts exhibited heavy rubbing damage and metal had filled in much of the bearing groove, obstructing five of the six oil through-holes. All of the main bearing left inserts exhibited features consistent with melted and resolidified metal near the insert end face.

Examination of maintenance records revealed an entry dated January 29, 2020, stating the left engine was “disassembled and inspected for low oil pressure.” The entry stated: “alternator failure – metal caused oil pressure problem.” According to the entry, the connecting rod nuts and bolts were replaced, and the main bearings and rod bearings were replaced. Additionally, the alternator, oil cooler, and starter adapter were replaced with overhauled units. The engine was reassembled, test run, and reinstalled on the airplane on January 31, 2020, at a Hobbs time of 1,157.1 hours, and 1,002.2 hours since major overhaul.

The most recent annual examination was completed on April 18, 2020, at a Hobbs time of 1,197.2 hours. The entry in the logbook for the examination indicated cylinder compressions were: 1/62, 2/61, 3/64, 4/65, 5/62, and 6/64. The entry also stated the engine magneto to engine timing was checked and adjusted, and the spark plugs were serviced.

The last entry in the left engine logbook was dated August 3, 2020, for an oil change. The last Hobbs time recorded at the oil change was 1,250.4 hours.

Examination of the pilot’s logbook revealed he flew the accident airplane 24.6 hours since the oil change.

Federal Aviation Administration (FAA) Advisory Circular (AC) No. 43.13-1B, “Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair,” states in part: “If cylinder has less than a 60/80 reading on the differential test gauges on a hot engine, and procedures in paragraphs 8-15b(5)(i) and (j) fail to raise the compression reading, the cylinder must be removed and inspected.” According to the AC, when performing a differential compression test, cylinders should be pressurized to 80 pounds per square inch (psi).

The minimum controllable speed (V_{MC}), as defined by the FAA Airplane Flying Handbook (FAA-H-8083-3B), is the minimum speed at which directional control can be maintained (under a specific set of circumstances), with the critical engine inoperative. The V_{MC} for the Cessna 310 is 80 knots.

A fuel receipt provided by personnel at VGT revealed the pilot purchased 115 gallons of 100LL fuel at 0912 on the morning of the accident.

The Clark County, Nevada Coroner performed an autopsy on the pilot. The autopsy listed the cause of death as “blunt trauma.” Toxicology testing performed by the forensic pathologist detected ethanol in the pilot’s liver tissue at 0.200 grams per hectogram (gm/hg).

Toxicology testing performed at the FAA Forensic Sciences Laboratory detected ethanol in the pilot’s muscle tissue at 0.015 gm/hg; ethanol was not detected in his brain tissue. The antihistamine diphenhydramine was detected in the pilot’s urine and liver tissue.

Ethanol is a social drug commonly consumed by drinking beer, wine, or liquor. It acts as a central nervous system depressant; it impairs judgment, psychomotor functioning, and

vigilance. Ethanol can also be produced after death by microbial activity. Diphenhydramine is a sedating antihistamine (commonly marketed as Benadryl) and is available over the counter in many products used to treat colds, allergies, and insomnia. Diphenhydramine carries the warning that use of the medication may impair mental and physical ability to perform potentially hazardous tasks, including driving or operating heavy machinery.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	73,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	December 2, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 7, 2020
Flight Time:	12233 hours (Pilot In Command, all aircraft), 73.2 hours (Last 90 days, all aircraft), 21.7 hours (Last 30 days, all aircraft)		

Passenger Information

Certificate:		**Age:**	
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N101G
Model/Series:	310 R	**Aircraft Category:**	Airplane
Year of Manufacture:	1975	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	310-0017
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	April 18, 2020 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	10386.3 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:		**Engine Model/Series:**	IO-520-M
Registered Owner:	On file	**Rated Power:**	
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:	KLAS,2180 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	09:56 Local	**Direction from Accident Site:**	28°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	20°C / -7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Las Vegas, NV (VGT)	**Type of Flight Plan Filed:**	VFR
Destination:	San Diego, CA (SEE)	**Type of Clearance:**	VFR
Departure Time:	09:29 Local	**Type of Airspace:**	Class D

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.026127,-115.19351

Administrative Information

Investigator In Charge (IIC):	Smith, Maja
Additional Participating Persons:	Richard Ramirez; Las Vegas FSDO; Las Vegas, NV
Original Publish Date:	December 6, 2022
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=102215