Aviation Investigation Final Report

Location:	Napa, California	**Accident Number:**	WPR10LA111
Date & Time:	January 14, 2010, 14:41 Local	**Registration:**	N2332H
Aircraft:	Ercoupe 415-D	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Almost immediately after takeoff, at 100 feet above ground level (agl), the engine of the single engine airplane began to lose power, surged two times, then lost all power. The pilot landed in an open field off the end of the runway. During the landing the nose wheel sank into the soft ground, collapsed, and the airplane nosed into the ground. The pilot reported that both wing fuel tanks were full and the engine run up was normal. During the post accident airplane examination fuel was identified in both wing tanks, the fuselage header tank, and the main fuel valve was observed rotated to the 2 o'clock position. The valve was a two position valve; "off" when positioned to 9 o'clock, and "on" when positioned to 12 o'clock. Investigators observed that the valve had no positive stops and could be rotated past the 9 o'clock or 12 o'clock positions. The valve was located on the far left bottom side of the instrument panel, about knee level, which was not the standard location for the valve. During the post accident examination of the engine, investigators were able to run the engine up to 2,500 rpm, and noted that if the operator in the left seat moved his left knee to the left, it would push on the fuel valve, rotating it to the 2 o'clock position. With the fuel valve at the 2 o'clock position, fuel flow to the carburetor was reduced to a "trickle," and the engine slowly lost power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to fuel starvation as a result of the unintentional movement of the fuel selector valve beyond its stops during takeoff initial climb resulting in restricted fuel flow.

Findings

Aircraft	Fuel selector/shutoff valve - Unintentional use/operation
Aircraft	Fuel - Fluid management

Factual Information

History of Flight

Initial climb	Loss of engine power (total) (Defining event)

HISTORY OF FLIGHT

On January 14, 2010, at 1441 Pacific standard time, a Ercoupe 415-D, N2332H, experienced a loss of engine power after takeoff and landed in a field off the end of runway 36R at Napa County Airport, Napa, California. The commercial pilot operated the airplane under the provisions of Title 14 Code of Federal Regulations, Part 91. The pilot was uninjured and the airplane was substantially damaged. Visual meteorological conditions prevailed, and a flight plan had not been filed.

The pilot reported to the Safety Board investigator that both wing fuel tanks were full and the engine run up was normal. Almost immediately after takeoff, at 100 feet above ground level (agl), the engine began to lose power, surged two times, and then lost all power. The pilot landed in an open field off the end of the runway. During the landing the nose wheel sank into the soft ground and collapsed.

PERSONNEL INFORMATION

The pilot, age 23, held a commercial pilot certificate with ratings for airplane single engine land, airplane multi-engine land, and instrument airplane, issued April 30, 2008. He held a third-class medical certificate issued on May 16, 2008, with no limitations or waivers. The pilot reported that he had 410 hours of total time, and 13 hours in the Ercoupe. His most recent flight review was dated April 30, 2008.

AIRCRAFT INFORMATION

The two seat, low wing, fixed-gear airplane, serial number (S/N) 2957, was manufactured in 1946. It was powered by a Teledyne Continental Motors (TCM) O-200, 100-hp engine, and equipped with a McCauley fixed pitch propeller. Examination of the aircraft maintenance logbooks showed that the total airframe time was 1,608 hours, and that an overhauled O-200 TCM engine had been installed on August 1, 2009, per Supplemental Type Certificate (STC) SA2628WE requirements, with zero time on the engine. The STC specifies an electric fuel pump be installed, however, the airplane had retained the standard engine driven mechanical fuel pump installation. A new tachometer was installed with zero time indicated, and the hobbs meter indicated 1,608.83. The fuel selector valve was located on the bottom far left side of the instrument panel, about 2 inches from the left side of the interior of the cockpit fuselage. The airplane owner stated that he purchased the airplane with the fuel valve located in its

current position. The Ercoupe Approved Airplane Flight Manual states that the main fuel valve should be located halfway between the brake handle (just below the throttle handle) and the left yoke control wheel directly behind the instrument panel.

The fuel system consists of a nine gallon tank in each wing and a six gallon fuselage tank. The engine driven fuel pump moves gasoline from the wing tanks to the six gallon fuselage tank. Excess fuel drains from the fuselage tank overflow back to the wing tanks. Fuel is gravity fed from the fuselage tank to the engine, through the main fuel valve. The main fuel valve is a two position valve, on and off.

WRECKAGE AND IMPACT INFORMATION

The airplane was located about a 1/4 mile north of the departure end of runway 36 right, in a grass field, positioned nose down into the ground, with the tail oriented at a 30-degree up angle. The nose wheel had collapsed back into the underside of the airplane. Photographs of the cockpit show the main fuel valve in the 2 o'clock position. The fuel valve plate was labeled "fuel on" at the 12 o'clock position, and "fuel off" at the 9 o'clock position. The airplane was removed and taken to a facility in Pleasant Grove, California, for further examination.

TESTS & RESEARCH

On February 3, 2010, a Safety Board investigator and a technical representative from Teledyne Continental Motors examined the airplane. A visual examination revealed that the fuselage fuel tank (header tank) fuel indicator was at the bottom of the sight gauge. The tank contained about an inch of liquid, and the indicator wiggled when the airplane was shaken. The intake manifold fractured and separated above the carburetor mounting pad. The carburetor had blue staining around the carburetor bowl gasket and the inlet filter. The throttle, mixture, and carburetor heat controls moved freely from stop to stop. The carburetor accelerator pump squirted fluid with movement of the throttle.

Investigators drained a blue fluid that smelled like aviation fuel from the gascolator, right wing sump, and left wing sump; additionally, the carburetor was reattached to the engine with a replacement manifold.

The main fuel valve was located on the bottom left side of the instrument panel, the valve was positioned to the 4 o'clock position. On the first attempt after some cranking, the engine started and ran up to 1,200-1,300 rpm. The engine shut down on its own after about 1 minute. Investigators added 2 gallons of fuel to the header tank. The second attempt to start the engine had the same results.

Investigators removed the fuel line from the shutoff valve to the carburetor. A limited amount of fuel flowed (trickled) through the line. Movement of the shutoff valve to the 12 o'clock position resulted in a steady stream of fuel. Either side of 12 o'clock resulted in restricted fuel flow (at the 9-10 o'clock and the 2-4 o'clock position) down to a dribble. It was noted that the

valve had no positive stops in either the ‘off’ position or the ‘on’ position.

Investigators performed another engine run with the shutoff valve in the 12 o’clock position. The engine was run up to 1,800 rpm and a magneto check was performed, with corresponding drops of 75 rpm for the left and right magneto. It was then run up to 2,500 rpm without difficulty; the rpm stabilized, and then followed throttle movement as investigators varied the rpm between 1,800-2,500. While the engine was operating at 2,500 rpm, the operator moved his left knee to the left, which moved the fuel shutoff lever to the 2 o’clock position. The engine ran about 1 minute and then the rpm dropped to 1,700-1,800. The engine sputtered and backfired, and stayed at 1,700-1,800 for 15-20 seconds. The operator reduced the throttle to idle, and the engine smoothed out; shut down was unremarkable.

Pilot Information

Certificate:	Commercial; Private	**Age:**	23,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	May 16, 2008
Occupational Pilot:		**Last Flight Review or Equivalent:**	April 30, 2008
Flight Time:	410 hours (Total, all aircraft), 13 hours (Total, this make and model), 361 hours (Pilot In Command, all aircraft), 27 hours (Last 90 days, all aircraft), 13 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Ercoupe	**Registration:**	N2332H
Model/Series:	415-D	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2957
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	August 1, 2009 Annual	**Certified Max Gross Wt.:**	1400 lbs
Time Since Last Inspection:	39 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2800 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-200
Registered Owner:	BLACKSETH KIM ROBERT	**Rated Power:**	100 Horsepower
Operator:	Joshua Gray	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KAPC,35 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	13:54 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.28 inches Hg	**Temperature/Dew Point:**	14°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Napa, CA (KAPC)	**Type of Flight Plan Filed:**	None
Destination:	Calaveras Count, CA (KCPU)	**Type of Clearance:**	VFR
Departure Time:	14:40 Local	**Type of Airspace:**	

Airport Information

Airport:	Napa County Airport KAPC	**Runway Surface Type:**	Asphalt
Airport Elevation:	35 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	36R	**IFR Approach:**	None
Runway Length/Width:	2510 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	38.213054,-122.280555(est)

Administrative Information

Investigator In Charge (IIC):	McKenny, Van
Additional Participating Persons:	Andrew Swick; Teledyne Continental Motors; Sacramento, CA Brook B Stewart; Federal Aviation Administration; Sacramento, CA
Original Publish Date:	December 20, 2010
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=75269