National Transportation Safety Board
Aviation Accident Final Report

Location:	Phoenix, AZ	**Accident Number:**	WPR14FA111
Date & Time:	02/04/2014, 1150 MST	**Registration:**	N312PA
Aircraft:	PIPER PA 28-181	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Serious, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Instructional		

Analysis

The student and flight instructor were conducting touch-and-go landings. The student flew an approach that required slipping the airplane and maintaining a low engine power setting. During the climb after the touch-and-go landing, the airplane's engine lost power about 200 ft above ground level. The flight instructor stated that the engine's rpm was decreasing and he decided to turn toward the airport area. Subsequently, the flight instructor initiated a forced landing to a field near the airport. During the landing sequence, the airplane struck and breached the airport's perimeter fence and then nosed over; a postaccident fire ensued. The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

During the examination of the airplane wreckage, the fuel selector was found in an intermediate position. Ground testing of a similar model airplane revealed that the engine could run several minutes with the fuel selector positioned in this intermediate position. The student and the instructor stated that the student switched the fuel selector about 9 miles from the airport per operator requirements to switch fuel tanks every 30 minutes. Because of the location of the fuel selector, the flight instructor could not visually confirm its position. It is likely that the student inadvertently positioned the airplane's fuel selector in an intermediate setting, which restricted the engine's fuel supply. Further, the engine's low power setting during the approach allowed the engine to run for several minutes on the fuel remaining in the return line and operate until shortly after the completion of the touch-and-go landing. Subsequently, during the climb, when the engine power was advanced, it is likely that the remaining fuel in the return line was exhausted and led to the engine power loss.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's inadvertent positioning of the fuel selector in an intermediate position, which resulted in a loss of engine power due to fuel starvation.

Findings

Aircraft	Fuel - Fluid management (Cause)
Personnel issues	Use of equip/system - Student pilot (Cause)

Factual Information

On February 4, 2014, about 1150 mountain standard time, a Piper PA-28-181, N312PA, sustained substantial damage during a forced landing following a reported loss of engine power shortly after takeoff from the Phoenix Deer Valley Airport (DVT) Phoenix, Arizona. The airplane was registered to Bird Acquisition L.L.C. and operated by TransPac Aviation Academy under the provisions of Title 14 Code of Federal Regulations Part 91. The student pilot and certified flight instructor (CFI) were seriously injured. A passenger, who was also a CFI, sustained minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the instructional flight. The local flight departed DVT about 1105.

In a written statement, the CFI reported that the engine lost power about 200 feet above ground level, during climb out from runway 07L, after performing a touch and go landing. The CFI further stated that the engine's rpm was decreasing and the engine experienced a brief surge of power but it was not sustained. He decided to turn and initiated a forced landing to a field in the vicinity of the airport. During the landing sequence, the airplane struck the airport's perimeter fence, breached it, and subsequently nosed over where a postaccident fire ensued.

During interviews with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the CFI and student pilot stated that just prior to descent, the fuel selector was switched about 9 miles from the airport, in accordance with their company fuel procedures that required the tanks to be switched every 30 minutes. The student pilot did not recall which tank was selected and the CFI said he could not visually confirm the fuel selector position. The student pilot did not remember touching the fuel selector after switching fuel tanks. This was the first approach flown at the airport since returning from practice area work. A simulated high energy approach was flown that required slipping the airplane, with the throttle positioned at a low power setting. When the engine lost power; the CFI took control of the airplane and stated that he looked for a place to land and did not have time to run any emergency procedures checklist items including changing the fuel selector position.

PERSONNEL INFORMATION

The CFI pilot, age 27, held a commercial pilot certificate with an airplane single engine, multi-engine, instrument, instructor single-engine, and instructor multi-engine ratings. The CFI was issued a first-class airman medical certificate on September 28, 2010, with no limitations stated. The CFI stated that he had accumulated a total of 3,019 flight hours; 68 hours within the preceding 90 days, 28 hours within the preceding 30 days, and no logged flight hours within the previous 24 hours. The total time logged in the accident type airplane was 2,418 hours.

The student pilot, age 21, was issued a third-class medical on October 2, 2013 with no limitations stated. The student pilot stated that he had accumulated a total of 61 flight hours; 50 hours within the preceding 90 days, 30 hours within the preceding 30 days, and no logged flight hours within the previous 24 hours. The total time logged in the accident make type airplane was 61 hours.

AIRCRAFT INFORMATION

The four-seat, low-wing, fixed-gear airplane, serial number (S/N) 2843509, was manufactured in 2002. It was powered by a Lycoming-360-A4M engine, serial number L-22500-36A, rated at 180 horsepower. The airplane was also equipped with a Sensenich model 76EM8S14-0-62,

serial number 101187K, fixed pitch propeller. Reviews of copies of the maintenance logbook show an approved inspection program was completed on January 21, 2014, at an airframe total time of 14,186 hours.

A review of the fueling records indicated that the airplane had been refueled the night before to their company standard load or "tabs," which was about 17 gallons per wing tank. The accident flight was the airplane's first flight of the day.

METEOROLOGICAL INFORMATION

A review of recorded data from the Phoenix Deer Valley Airport, Phoenix, Arizona, automated weather observation station located at the accident site, revealed at 1153 conditions were wind from 200 degrees at 8 knots, visibility 10 statute miles, clear sky, temperature 12 degrees Celsius, dew point -1 degrees Celsius, and an altimeter setting of 30.05 inches of mercury.

AIRPORT INFORMATION

Phoenix Deer Valley Airport (DVT) is a towered airport with a reported field elevation of 1,478 feet. The airport was equipped with parallel asphalt runways, runway 07R/25L (8,196 feet long by 100 feet wide); runway 07L/25R (4,500 feet long by 75 feet wide). Airport remarks have runway 07L/25R designated as the training runway.

WRECKAGE AND IMPACT INFORMATION

The NTSB IIC, examined the airplane at the accident site. The examination revealed that the airplane impacted an airport perimeter fence about half a mile southeast of runway 7L. All major structural components of the airplane were present at the wreckage site. Tire marks in the dirt of about 300 feet lead to the area of the fence where the airplane struck and breeched it.

The airplane came to rest upright on its right side on a heading of about 130 degrees magnetic approximately 42 feet from the fence. Examination of the airframe revealed that the fuselage was thermally damaged and that both wings were separated from the fuselage. The left wing was thermally damaged, while the right wing sustained some thermal damage but was mostly intact. The empennage section was thermally damaged but the upper tail section separated from the empennage and was mostly intact.

The rudder remained attached to its respective attach points and the bottom half was consumed by thermal damage. The elevators were intact and remained attached at all the respective attach points.

The instrument control panel and cabin area were consumed by the post impact fire.

The postaccident examination of the airframe revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The wreckage was recovered to a secure location for further examination.

TESTS AND RESEARCH

Examination of the airframe and engine revealed that the left wing separated from the fuselage and about 4 feet of the wing tip separated. The right wing separated from the fuselage and some fuel remained in the fuel tank during the recovery. In the empennage section, the right horizontal surface tip was bent upwards. The stabilizer trim had 1 ½ visible threads that were observed that corresponded to a nose down trim setting. Flight control continuity was

established with the flight controls through the cables.

The fuel selector valve (FSV) was located in the cabin area. The area sustained thermal damage and the FSV was scorched. The FSV separated as fire consumed its supporting structure and associated metal fuel lines. There are three positions; OFF, left, and right for the FSV, with OFF at the 9 o'clock position, left at the 12 o'clock position, and right at the 3 o'clock position. The position of the valve was determined by the position of the "D" ring in the fuel valve stem. The flat portion of the valve stem goes towards the bottom side of the selector handle and the rounded portion correlates with the position of the pointer on the handle. The fuel valve was observed about 20 degrees to the right, from the 12 o'clock position, off from the left tank detent. This intermediate position was between the left and right fuel tank positions. According to the manufacturer, in this position, an undetermined amount of fuel would flow through the valve from the main tanks.

Examination of the Lycoming O-360-A4M engine, serial number l-22500-36A revealed that it remained attached to the airframe by the engine mount and sustained thermal damage. The engine accessories remained attached to the engine via their respective mounts. All rocker covers were removed and the cylinder overhead areas were lubricated and unremarkable. The crankshaft was rotated by hand utilizing the propeller and rotational continuity was established throughout the engine and valve train. During crankshaft rotation thumb compression and suction was attained on all cylinders. A borescope inspection of the cylinders revealed normal operational conditions.

The left magneto had been replaced with an Electroair Electronic ignition EIS-4000 system which had been installed in accordance with a Supplemental Type Certificate (STC). Thermal damage to the unit prevented any function testing. The right magneto was removed and a spark was produced at all the respective leads during hand rotation. The sparkplugs were removed and all sparkplug electrodes exhibited normal wear signatures when compared to the Champion Check-A-Plug comparison chart.

The carburetor was removed and disassembled for examination. The carburetor did not discharge any fuel at the accelerator discharge port during actuation of the throttle lever. The needle valve and float assemblies were intact. The fuel inlet screen was free of debris. No fuel was observed in the carburetor fuel bowl and accelerator pump chamber.

The engine driven fuel pump was removed for examination. The fuel pump was observed to be free of internal mechanical malfunction and obstruction to fuel flow and the diaphragm remained intact. The electric fuel pump was removed for examination. The electric pump sustained external thermal damage but was observed free of internal malfunction and no obstructions to fuel flow were noted. An external battery source was used to supply power to the pump and upon application of power, the motor was functional.

The two-bladed propeller remained attached to the crankshaft flange. The spinner was attached to the propeller and was intact. Marks and abrasions were observed on the spinner, that were nearly chord-wise in direction.

The examination of the engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

ADDITIONAL INFORMATION

A Federal Aviation Administration inspector, ground tested a similar Piper model PA28-181,

for fuel consumption that was available in the fuel return line. After warming up the engine, the fuel selector was positioned to an intermediate setting (as per the position the accident airplane's fuel selector was found). The engine ran for about 8 to 9 minutes at 2200 rpm, with the electric fuel pump in the on position, before it began to sputter, dropping from 150 -200 rpm and back up to 2200 rpm. The fuel pressure was indicating zero on the gauge with the fuel selector in this position. The ground test was attempted again with the electric fuel pump in the off position and the engine stopped operating in this position.

History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Landing-landing roll	Collision with terr/obj (non-CFIT)

Flight Instructor Information

Certificate:	Flight Instructor; Commercial; Private	**Age:**	27, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without Waivers/Limitations	**Last Medical Exam:**	09/28/2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	09/20/2013
Flight Time:	(Estimated) 3019 hours (Total, all aircraft), 2418 hours (Total, this make and model), 2921 hours (Pilot In Command, all aircraft), 68 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Student Pilot Information

Certificate:	Student	**Age:**	21, Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without Waivers/Limitations	**Last Medical Exam:**	10/02/2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 61 hours (Total, all aircraft), 61 hours (Total, this make and model), 10 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	PIPER	**Registration:**	N312PA
Model/Series:	PA 28-181 181	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	2843509
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	01/21/2014, AAIP	**Certified Max Gross Wt.:**	2550 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	14186 Hours	**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-360 SERIES
Registered Owner:	BIRD ACQUISITION LLC	**Rated Power:**	180 hp
Operator:	TransPac Aviation Academy	**Air Carrier Operating Certificate:**	Pilot School (141)
Operator Does Business As:		**Operator Designator Code:**	173S

Meteorological Information and Flight Plan

Observation Facility, Elevation:	DVT, 1478 ft msl	**Observation Time:**	1153 MST
Distance from Accident Site:	1 Nautical Miles	**Condition of Light:**	Day
Direction from Accident Site:	95°	**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:	Clear	**Temperature/Dew Point:**	12°C / -1°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	8 knots, 200°	**Visibility (RVR):**	
Altimeter Setting:	30.05 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Phoenix, AZ (DVT)	**Type of Flight Plan Filed:**	None
Destination:	Phoenix, AZ (DVT)	**Type of Clearance:**	Traffic Advisory; VFR
Departure Time:	1105 MST	**Type of Airspace:**	Class D

Airport Information

Airport:	PHOENIX DEER VALLEY (DVT)	**Runway Surface Type:**	Asphalt
Airport Elevation:	1478 ft	**Runway Surface Condition:**	Dry; Rough
Runway Used:	07L	**IFR Approach:**	None
Runway Length/Width:	4499 ft / 75 ft	**VFR Approach/Landing:**	Forced Landing

Wreckage and Impact Information

Crew Injuries:	2 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious, 1 Minor		

Administrative Information

Investigator In Charge (IIC):	Albert P Nixon	**Adopted Date:**	02/29/2016
Additional Participating Persons:	Dan Gilligan; FAA; Scottsdale, AZ Charles Little; Piper Aircraft, Inc.; Vero Beach, FL Mark Platt; Lycoming Engines; Williamsport, PA David Morse; TransPac Aviation Academy; Phoenix, AZ		
Publish Date:	02/29/2016		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=88768		