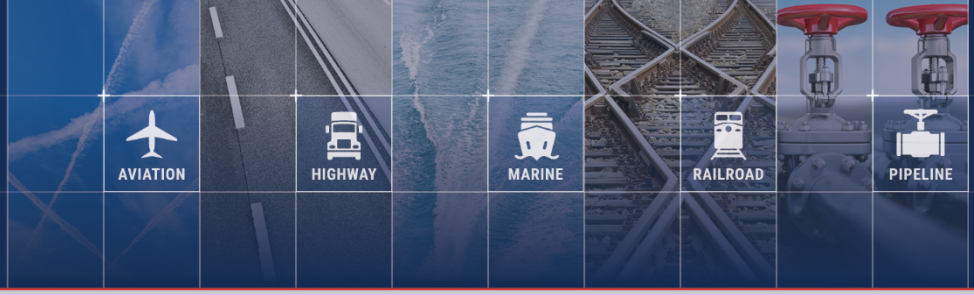

Aviation Investigation Final Report

Location:	Haines, Alaska	**Accident Number:**	WPR17FA108
Date & Time:	May 27, 2017, 11:01 Local	**Registration:**	N7376Y
Aircraft:	Piper PA 30	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to the surviving passenger, he, the pilot, and pilot-rated passenger departed on a cross-country flight over water; the pilot shut down the right engine to demonstrate how to restart an engine during flight. The pilot was unable to restart the engine using the starter due to a lack of electrical power. He then made several attempts to air start the engine by gaining altitude and diving the airplane down to use airflow to assist in rotating the engine. After two unsuccessful attempts, the pilot decided to descend to a lower altitude, fly to a remote airstrip, and use the handheld battery booster located in the baggage compartment after landing to start the engine. As the airplane approached the airstrip, the pilot made a low-level pass to check the condition of the runway surface. A witness saw the airplane at treetop level. As it reached the end of the airstrip, it dropped in altitude, banked to the right, and impacted the shoreline in a right-wing down, nose-down attitude.

Instead of deciding to perform a low-level pass to an airstrip with one inoperable engine, the pilot should have handled the inoperative engine as a critical situation that necessitated landing the airplane immediately with minimal maneuvering. It is likely that, after the low-level pass, the pilot attempted to turn the airplane to maneuver for the runway and failed to adequately maintain sufficient airspeed or compensate for the asymmetrical thrust when he turned toward the inoperative engine which led to an aerodynamic stall and a loss of control.

The examination of the wreckage revealed that, according to the positions of the landing gear, flaps, and their controls, the airplane had insufficient electrical power during flight.

A friend who flew with the pilot on the day before the accident recalled that the pilot had installed a battery that had insufficient electrical power. The pilot then parked his motor vehicle near the airplane, plugged in the airplane's jumper cables, and successfully jumpstarted both engines from the vehicle's battery to continue that day's flight. It is likely that the battery was not replaced before the accident flight.

The postaccident examination also found that the left engine alternator belt was not attached to the

alternator, and no belt was recovered within the confines of the engine cowling. The alternator drive pulley was damaged and had a residue, indicating that the belt had not been attached to the left engine alternator for some time. Thus, the left alternator was not operational.

The right engine alternator drive shaft rotated freely by hand, but the drive belt remained stationary with the crankshaft. The alternator drive belt was loose and excessively worn on the pulley contact area. The right engine inlet cowling section had rubber filings in the forward right interior surface. Rubber filings were also found on the back side of the starter ring gear and surrounding areas. The rubber filings were likely due to the loose fit of the belt on the pulley during engine operation. Given this evidence, the right engine alternator was probably intermittent with a loose belt.

The airframe maintenance logbook indicated that the last annual inspection was accomplished 2 years and 9 months before the accident. The engine maintenance logbooks were not located; thus, it could not be determined when maintenance personnel last inspected the engine. Due to a modification to the cowling, it did not permit a visual examination of the front side of the engine and the alternator belts during a preflight walk-around inspection unless the upper cowling was removed. It is likely that the pilot was not aware that the alternators were inoperative and that the airplane was operating on battery power when he shut down the right engine in flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to turn toward the inoperative engine after conducting a low-level pass, which resulted in an aerodynamic stall at too low an altitude to recover. Contributing to the accident was the pilot's decision to perform the flight and the engine shut down demonstration with an inadequate airplane charging system and a known weak battery.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Lateral/bank control - Incorrect use/operation
Aircraft	Alternator-generator drive sys - Inoperative
Aircraft	Alternator-generator drive sys - Fatigue/wear/corrosion
Aircraft	Battery/charger - Damaged/degraded
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Scheduled/routine maintenance - Pilot

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Maneuvering-low-alt flying	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On May 27, 2017, about 1101 Alaska daylight time, a Piper PA-30, airplane, N7376Y, collided with the ground shortly after a low-level pass over a remote airstrip at Glacier Point, which is located 12 miles southeast of Haines, Alaska. The pilot and a pilot-rated passenger in the right front seat were fatally injured, and a rear-seated passenger was seriously injured. The airplane was registered to the pilot who was operating it under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident, and a flight plan was not filed. The flight originated from Juneau International Airport (PAJN), Juneau, Alaska, about 1015 and was destined for Haines Airport (PAHN), Haines, Alaska.

An eyewitness located across Chilkat Inlet, which was about 2 miles east of the shoreline of Glacier Point, and using binoculars saw the accident airplane flying northbound at tree level near the airstrip. He stated that, as the airplane reached the end of the airstrip, it dropped in altitude, banked to the right, and impacted the shoreline in a right-wing-down, nose-down attitude. The airplane came to rest near the edge of a canal about 1/4-mile northeast of the north end of the airstrip (See Figure 1). The eyewitness and three other people responded to the accident site by boat and called local authorities when cell coverage was available when they were about halfway across the canal. According to the eyewitness, as they arrived at the accident site, the rear-seated passenger was the only airplane occupant who was responsive, but he could not be removed from the airplane. Within minutes, tidal water was surrounding and flooding the airplane. A tractor brought to the site from a local tour facility was used to drag the airplane to shallow water. Local authorities arrived soon after and extricated the passengers.

Figure 1-Aerial Image of the Accident Site

According to the rear-seated passenger aboard the accident airplane, about 20 minutes into the flight, the pilot intentionally shut down the right engine to demonstrate how to restart the engine during flight. Despite several attempts, the engine would not restart with electrical power. The pilot then made several attempts to air start the engine by gaining altitude and then diving the airplane down to use airflow to assist in rotating the engine. After two unsuccessful attempts to air start the engine, the pilot decided to descend to a lower altitude, fly to the airstrip at Glacier Point, and use the battery booster (which was located in the baggage compartment) after landing to start the engine. As the airplane approached the airstrip, the pilot made a low-level pass to check the condition of the airstrip surface; this was the last thing the passenger remembered about the flight.

A friend of the pilot reported that he flew with the accident pilot in the accident airplane on the day before the accident. The friend stated that he and the pilot were preparing to depart PAJN for a planned flight to Gustavus Airport (PAGS), Gustavus, Alaska. As the airplane was taxiing to depart, the left engine "stalled" on the taxiway, and the pilot could not restart the engine using the starter due to low electrical power from the battery. They taxied back to the pilot's hangar, where they removed a battery

from his hangered floatplane and installed it in the accident airplane. Despite these actions, both engines could not be started. The friend said that the floatplane battery did not supply enough electrical power to start the airplane engine. The pilot then parked his motor vehicle near the airplane, plugged in the airplane's jumper cables, and successfully jumpstarted both engines from the vehicle's battery. The pilot and his friend departed PAJN on an uneventful flight to PAGS. The friend stated that the pilot told him that he normally had a handheld battery booster in the airplane but that he had loaned it to the ground personnel at PAJN because they had a hard time starting the airport's fuel truck.

Pilot Information

Certificate:	Private	**Age:**	29,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3	**Last FAA Medical Exam:**	January 30, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Pilot-rated passenger Information

Certificate:	Private	**Age:**	29,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3	**Last FAA Medical Exam:**	April 12, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	81 hours (Total, all aircraft)		

Passenger Information

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

The pilot, age 29, held a private pilot certificate with multiengine land and single-engine land and sea ratings. The pilot's most recent FAA third-class airman medical certificate was issued on January 30, 2013, with no limitations. On his medical application, the pilot reported that his total flight experience during the previous 6 months was 0 hours. The pilot's logbook was not located during the investigation.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N7376Y
Model/Series:	PA 30 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1964	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	30-430
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	2381 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-320 SERIES
Registered Owner:	On file	**Rated Power:**	0 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane, which was manufactured in 1964, was an all-metal multiengine airplane that incorporated a semi-monocoque fuselage and empennage design. The airplane was equipped with fully cantilevered wings, electrically operated wing flaps, and electrically operated retractable tricycle landing gear.

The airplane was powered by a Lycoming IO-320-B1A reciprocating engine on the left wing and a

Lycoming LIO-320-B1A reciprocating engine on the right wing, and each was rated at 160 horsepower. The engines had 4 cylinders, 320-cubic-inch displacement, and fuel injection. The right engine had a counter-rotating kit installed. Each engine drove a Hartzell 2-blade, single-acting, hydraulically operated, constant-speed propeller with feathering capability.

The airplane's electrical power was supplied by a 12-volt, direct-current, negative-ground system. The primary electrical source came from two 12-volt, 50-ampere alternators controlled by an overvoltage relay and voltage regulator. The overvoltage relay and voltage regulator were mounted on the aft bulkhead of the nose section. Secondary power was provided by a 12-volt, 35-ampere hour battery that supplies power for starting and was a reserve power source in the event of an alternator failure. The battery was mounted in a battery box located immediately aft of the baggage compartment. The amp/voltmeter instrument was installed in the instrument panel. Alternator isolation switches were mounted on the instrument panel.

According to FAA records, the airplane's charging system was modified on December 8, 1993, by the removal of the generators and installation of an alternator charging system in accordance with Supplement Type Certificate (STC) SA334SW. If both alternators were inoperative, the airplane battery would be the only remaining source of electrical power. If the airplane battery were depleted and electrical power was not available, the Piper Twin Comanche PA-30 Pilot's Operating Handbook (POH) stated that the pilot must land with the flaps in the retracted position and must initiate the manual gear extension procedure and that the final approach landing speed must not exceed 100 mph or 87 knots.

The airplane was also modified with LoPresti front engine cowlings in accordance with STC SA3302SO. The cowling modification would not have permitted a visual examination of the front side of the engine and the alternator belts during a preflight walk-around inspection unless the upper cowling was removed.

The last entry in the airframe maintenance records was on August 20, 2014, when the last annual inspection was accomplished. At that time, the airplane had accumulated a total of 4,769 flight hours. No engine maintenance records were found. The airplane's Hobbs meter was not found in the wreckage. Due to impact damage to the cabin's digital instruments, the tachometer time at the time of the accident could not be determined.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAHN,16 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	18:54 Local	**Direction from Accident Site:**	336°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.22 inches Hg	**Temperature/Dew Point:**	11°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	JUNEAU, AK (JNU)	**Type of Flight Plan Filed:**	Unknown
Destination:	Haines, AK (PAHN)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

At 1054, PAHN, located about 12 miles north of the accident site, reported the following conditions: wind from 150° at 7 knots, 10 miles visibility, clear skies, temperature 11°C, dew point 6°C, and an altimeter setting of 30.23 inches of mercury.

Airport Information

Airport:	Glacier Point Airstrip UNK	**Runway Surface Type:**	Gravel
Airport Elevation:	2 ft msl	**Runway Surface Condition:**	Dry;Rough;Vegetation
Runway Used:	33	**IFR Approach:**	None
Runway Length/Width:	200 ft / 50 ft	**VFR Approach/Landing:**	Unknown

The airstrip at Glacier Point is a remote airstrip near Davidson Glacier, on the west bank of the Chilkat Inlet. The airstrip was located at an elevation of about 2 ft mean sea level (msl). The runway was aligned north to south and was about 2,000 ft long. The runway surface was gravel and was in fair condition.

PAHN is 12 miles northwest of the accident site, was situated at an elevation of 15 ft above mean sea level. It was equipped with a single paved runway, designated 8/26, which measured 4,000 ft by 100 ft. PAHN was not equipped with an air traffic control tower.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	59.093887,-135.376663(est)

The impact site was located on the western tidal flats of the Chilkat Inlet, about 1/4-mile northeast of the north end of the airstrip at Glacier Point.

The initial on-scene examination of the airplane by the NTSB-IIC and a Federal Aviation Administration inspector revealed impact damage consistent with a right-wing-down, nose-down attitude during ground impact. The airplane remained intact, all flight control surfaces were accounted for, and cable control continuity was confirmed. The landing gear was in the down position, and the landing gear position switch was in the down position. The landing gear extension motor release arm was found in the disengaged position. The emergency landing gear extension handle was removed from its stowed position and installed in a socket on the emergency disengage control. The flaps were in the up position and the flap lever was in the down position.

Both engines separated from their wing mounts and remained partially attached to their wings by control cables and tubing. One of the left propeller blades was in a feathered/high pitch position and the other blade was rotated toward a high pitch position that was beyond the feathered position. Both blades exhibited leading edge gouging, twisting toward high pitch and bending in the forward/thrust direction. Heavy chordwise/rotational scoring damage was isolated to the face side of both blades. One blade tip had fractured and separated; the separated tip was recovered at the crash site. The right propeller was found with both blades in the feathered position. One blade was bent rearward with no remarkable twisting, and one blade had no remarkable damage. The elevator trim actuator was found in the full nose-down position and the rudder trim indicator was in the nose-left position.

The wreckage was relocated to a hangar at PAGS, and examination of the wreckage showed that the right engine crankshaft propeller flange was bent to one side and that the rocker covers had impact damage. The right engine's exterior surfaces had a dark oily residue. Oil residue was observed in the area of the alternator pulley and belt. The right engine alternator was undamaged and secure, and no signatures suggested that the alternator was repositioned during the accident sequence. The alternator electrical wiring remained secure at the terminals. The alternator drive pulley rotated freely by hand, and the drive belt remained stationary with the crankshaft. The right engine alternator drive belt was loose when examined and was subsequently removed from the engine. The belt was excessively worn on the pulley contact area as shown in Figure 2. A spare alternator drive belt was found stowed to the engine; the stowed belt shared the same part numbers as the worn belt (Napa Premium XL 25-7365). According to the alternator STC installation instructions, a Franklin (P/N 14883) or a Goodyear 5L380 belts should be used.

Figure 2-Right Engine Alternator Belt

The right engine inlet cowling section had rubber filings in the forward right interior surface. Rubber filings were also found on the back side of the starter ring gear and surrounding areas.

The left engine alternator was undamaged and secure, and no signatures suggested that the alternator was repositioned during the accident sequence. The alternator electrical wiring remained secure at each terminal. No belt was attached to the alternator pully, and no belt was recovered within the confines of the engine cowling. The alternator drive pulley forward face had impact damage, bending the edge of the forward face aft into the location where the drive belt would be positioned. There was no corresponding damage to the engine cowling in the area of the alternator pulley that would have resulted in damage to the alternator pulley. The alternator drive shaft rotated freely by hand. The alternator housing was covered in surface corrosion consistent to being submerged in salt water. A dark residue covered the forward side of the alternator and the drive pulley. The belt contact area in the alternator drive belt pulley and the crankshaft pulley was also covered in a dark residue.

The airplane battery separated from the main wreckage and remained in the battery box. The battery housing had impact damage revealing internal components. The terminal connections remained attached to the battery. A date of "6/15" was written on the top of the battery.

The amp/voltmeter instrument was removed from the instrument panel. The amp/volt selection toggle switch was damaged and found in the amp position.

The alternator isolation switches were found in the "ON" position. There were no annunciator lights or warning system that would have indicated either alternator had stopped working during operations.

A multimeter and battery jump-starter unit was found within the wreckage.

Medical and Pathological Information

The State Medical Examiner's Office in Anchorage, Alaska, conducted autopsies on the pilot and pilot-rated passenger. The pilot's cause of death was reported as "Blunt impacts ..." The pilot-rated passengers cause of death was also reported as blunt impacts.

Toxicology testing performed at the FAA Forensic Sciences Laboratory were negative on both the pilot and pilot-rated passenger for drugs, carbon monoxide and volatiles.

Additional Information

The FAA's *Airplane Flying Handbook* states the following:

The basic difference between operating a multiengine airplane and a single-engine airplane is the potential problem involving an engine failure. The penalties for loss of an engine are twofold: performance and control. The most obvious problem is the loss of 50 percent of power, which reduces climb performance 80 to 90 percent, sometimes even more. The other is the control problem caused by the remaining thrust, which is now asymmetrical. Attention to both these factors is crucial to safe one engine inoperative (OEI) flight. The performance and systems redundancy of a multiengine airplane is a safety advantage only to a trained and proficient pilot.

Although it is a natural desire among pilots to save an ailing engine with a precautionary shutdown, the engine should be left running if there is any doubt as to needing it for further safe flight. Catastrophic failure accompanied by heavy vibration, smoke, blistering paint, or large trails of oil, on the other hand, indicate a critical situation. The affected engine should be feathered and the Securing Failed Engine checklist completed. The pilot should divert to the nearest suitable airport and declare an emergency

with ATC for priority handling.

There are two different sets of bank angles used in OEI flight.

1. To maintain directional control of a multiengine airplane suffering an engine failure at low speeds (such as climb), momentarily bank at least 5° and a maximum of 10° towards the operative engine as the pitch attitude for VYSE [best rate of climb speed with OEI] is set. This maneuver should be instinctive to the proficient multiengine pilot and take only 1 to 2 seconds to attain. It is held just long enough to assure directional control as the pitch attitude for VYSE is assumed.

2. To obtain the best climb performance, the airplane must be flown at VYSE and zero sideslip with the failed engine feathered and maximum available power from the operating engine. Zero sideslip is approximately 2° of bank toward the operating engine and a one-third to one-half ball deflection also toward the operating engine. The precise bank angle and ball position varies somewhat with make and model and power available. If above the airplane's single-engine ceiling, this attitude and configuration results in the minimum rate of sink.

In OEI flight at low altitudes and airspeeds such as the initial climb after takeoff, pilots must operate the airplane so as to guard against the three major accident factors: (1) loss of directional control, (2) loss of performance, and (3) loss of flying speed. All have equal potential to be lethal. Loss of flying speed is not a factor, however, when the airplane is operated with due regard for directional control and performance.

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew
Additional Participating Persons:	Jon Percy; FAA-FSDO; Juneau, AK Charles Little; Piper Aircraft; Chino Hills, CA Mark Platt; Lycoming Engines; Gilbert, AZ Les Doud; Hartzell Propellers; Piqua, OH
Original Publish Date:	November 6, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95241