Aviation Investigation Final Report

Location:	Vaughn, New Mexico	**Accident Number:**	WPR20LA223
Date & Time:	July 15, 2020, 12:02 Local	**Registration:**	N8488Y
Aircraft:	Piper PA 30	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot stated that after an uneventful takeoff with a full fuel load, he proceeded to his destination. After the climb, he positioned the fuel selectors to the auxiliary tanks for about 45 minutes and then switched them back to the main fuel tank position. About 3 hours and 15 minutes into the flight, the right engine surged twice and subsequently quit producing power. He briefly tried switching to the auxiliary fuel tank, but the engine failed to restart. The pilot did not try the cross-feed selection. The pilot notified air traffic control that he was making an off-airport emergency landing because he was unable to maintain altitude and there were no nearby airports. The airplane touched down on desert terrain and during the landing roll, the right wing collided with a fence.

There was no fuel in the right main tank, minimal fuel in the right auxiliary tank, and fuel was found in the right fuel selector bowl. There was no evidence of leakage or blockage in the right fuel system. The left fuel tanks contained fuel. The manufacturer recommends that in the event of an engine emergency, the pilot should use the cross-feed option. Use of the cross-feed selection would have allowed fuel from the left-wing tanks to be fed to the right engine. It is likely that if the pilot had used the cross-feed, the right engine would have had sufficient fuel to run from the left fuel tanks.

The right engine was put on a test stand and was run at various rpms with no defects noted. A postaccident examination of the engine revealed no evidence of a mechanical malfunction or failure that would have precluded normal operation of the right engine or fuel system.

Probable Cause and Findings

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

The total loss of power in the right engine due to fuel starvation. Contributing to the accident was the pilot's failure to follow the manufacturer-recommended procedure after the loss of power in the right engine.

Findings

Personnel issues	Use of equip/system - Pilot
Aircraft	Fuel - Fluid management
Personnel issues	Use of policy/procedure - Pilot

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)

HISTORY OF FLIGHT

On July 15, 2020, at 1202 mountain daylight time, a Piper PA-30 (Twin Comanche) airplane, N8488Y, sustained substantial damage when it was involved in an accident near Vaughn, New Mexico. The pilot and passenger were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot, who was also an airframe and powerplant mechanic, stated that the airplane fuel tanks were topped off to full capacity (90 gallons) the day before the accident. After an uneventful takeoff, the pilot proceeded to his destination. After the climb, he positioned the fuel selectors to the auxiliary tanks for about 45 minutes and then switched them back to the main fuel tank position. About 3 hours and 15 minutes into the flight, at 8,500 feet mean sea level (msl), the right engine surged twice and quit producing power. The pilot reduced the power on the left engine in an attempt to counteract a yawing motion. He briefly tried switching to the auxiliary fuel tank, but the engine failed to restart; he did not try the cross-feed selection.

The airplane was unable to maintain altitude and there were no airports close to his location. The pilot notified air traffic control that he was making an off-airport emergency landing. The airplane touched down on desert terrain (about 6,300 ft msl) and during the landing roll, the right wing collided with a fence. After egressing the airplane, he looked in the right wing tank and noted that it was empty which he thought was a result of a leak in the system.

The pilot reported that the airplane's single engine service ceiling at the gross weight of 3,600 lbs, was 5,800 feet msl; the single-engine absolute ceiling was 7,100 ft msl. He further stated that the airplane was burning a total of about 17 gallons per hour. The left and right main fuel tanks hold 30 gallons (27 usable) of fuel each. The left and right auxiliary tanks hold a total of 15 gallons of fuel each, all of which is usable.

AIRPLANE INFORMATION

The Piper Twin Comanche Service Manual, section IX, Fuel System, provided the following system description:

The fuel system is contained in two independent units that allow each engine to have its own fuel supply. The systems are connected only by a crossfeed that will allow fuel to be drawn from one set of fuel cells to the engine of the opposite side, in the event of an emergency. For each

engine, fuel is taken from each cell through a screen located in the cell outlet fitting and then on to a shut-off selector valve. From the selector valve, fuel is drawn through an electrically operated auxiliary fuel pump and on to an engine driven pump where it is pumped to the injector unit. The fuel valves are operated through controls located in a panel, just ahead of the main spar, between the pilot seats.

The Piper Twin Comanche Owner's Handbook, section II, Design Information, stated the following about the fuel system:

For emergency single engine operation, a cross-feed is provided to increase the range. When using fuel from cells on the opposite side of the operating engine, move the fuel selector for the inoperative engine to the main or auxiliary position; then move the fuel selector for the operating engine to the cross-feed position. For single engine landing, fuel must be pumped from the main cell on the same side as the operating engine.

Section II of the owner's handbook, stated the following about the propellers:

The propellers are…constant-speed, controllable, full-feathering units. These are controlled entirely by use of the propeller control levers located in the center of the power control quadrant. Feathering of the propellers is accomplished by moving the controls fully aft through the low RPM detent into the feathering position. Feathering takes place in approximately three seconds.

TESTS AND RESEARCH

Engine Monitor

The airplane was equipped with a JPI EDM-760 Engine Monitor. The unit was sent to the NTSB Office of Research and Engineering for data extraction. The EDM-760 recorded exhaust gas temperatures (EGT), cylinder head temperatures (CHT), and battery voltage from the time between engine start and the accident.

The extracted data revealed that the EGT and CHT values varied in concert with one another throughout the initial portions of the flight over a period which correlated to the takeoff and climb. At 1154:16, about 3 hours and 14 minutes after takeoff, EGTs on the right engine momentarily dropped. The EGT’s dropped again about 36 seconds later and continued to decrease until the last recorded data at 1202:58. Battery voltage throughout the flight fluctuated and was notably higher immediately prior to the engine’s EGT drop.

Airplane

The right wing was removed for recovery purposes. The right fuel cap remained within the filler neck of the main fuel cell. No liquid was found within the main fuel cell; there was trace amounts of sand/dust at the bottom. The bladders were all intact and remained snapped in place. The fuel screen to the right main fuel cell was free of blockages, and the outlet was clear when tested with light air pressure. The fuel cell snaps remained attached to the upper wing skin. When examined visually and with light air pressure, the main cell air vent displayed no

blockages. The right auxiliary fuel cell contained some fuel, estimated to be about 0.5-1 inches deep. When tested with light air pressure, the fuel line appeared to contain some fuel and was not blocked. When examined visually and with light air pressure, the auxiliary cell air vent displayed no blockages.

Both fuel selector handles were observed in the OFF position. Both fuel selector bowls contained a liquid consistent in appearance and odor with 100LL AVGAS; water was not detected. All fuel lines to both fuel selectors were tight, and no fuel leakage was observed. Examination of the right fuel selector revealed no anomalies.

The right propeller blades were unfeathered. Both blades were bent aft slightly at the tips. There was no evidence of chordwise scoring or leading edge damage to either blade.

The right engine, engine mount, propeller, and all associated lines and accessories forward of the firewall had been removed (as one unit) for recovery. The external examination of the engine revealed no evidence of a catastrophic failure. Investigators removed all cylinders' rocker box covers and noted a light oil film on the rocker arms and valve assemblies. The cylinders' combustion chambers were examined through the upper spark plug holes utilizing a lighted borescope. The combustion chambers remained mechanically undamaged and there was no evidence of foreign object ingestion. Investigators achieved manual rotation of the crankshaft by rotation of the propeller. Thumb compression was established in all cylinders.

The engine was mounted onto a test stand to perform an engine run. The engine started on the first attempt and was run at various rpms with no defects noted. On shutdown, the propeller feathered with no difficulty.

Pilot Information

Certificate:	Airline transport	**Age:**	75,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; 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 With waivers/limitations	**Last FAA Medical Exam:**	October 11, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 15, 2019
Flight Time:	2595 hours (Total, all aircraft), 161 hours (Total, this make and model), 2327 hours (Pilot In Command, all aircraft), 6 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N8488Y
Model/Series:	PA 30 No Series	**Aircraft Category:**	Airplane
Year of Manufacture:	1967	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	30-1651
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 30, 2020 Annual	**Certified Max Gross Wt.:**	2381 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	4760 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-320 SERIES
Registered Owner:	On file	**Rated Power:**	160 Horsepower
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:	KCQC,7086 ft msl	**Distance from Accident Site:**	33 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	317°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.31 inches Hg	**Temperature/Dew Point:**	26°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Austin, TX (KAUS)	**Type of Flight Plan Filed:**	None
Destination:	Santa Fe, NM (SAF)	**Type of Clearance:**	VFR;Traffic advisory;VFR flight following
Departure Time:	09:00 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	34.598331,-105.1986

Administrative Information

Investigator In Charge (IIC):	Keliher, Zoe
Additional Participating Persons:	Ken Hand; Federal Aviation Administration; Albuquerque, NM Kathryn Whitaker; Piper Aircraft; Phoenix, AZ
Original Publish Date:	September 21, 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=101613