# Aviation Investigation Final Report

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| **Location:** | Naples, Florida | **Accident Number:** | ERA21LA087 |
| **Date & Time:** | December 19, 2020, 12:16 Local | **Registration:** | N662TC |
| **Aircraft:** | Piper PA46 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Fuel starvation | **Injuries:** | 2 Minor |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

After takeoff from his home airport with about 50 gallons of fuel in each fuel tank, the pilot climbed to 7,000 ft and proceeded to his destination. When he was about halfway there, he switched from the right fuel tank to the left fuel tank. Immediately after switching fuel tanks, the engine started to sputter and lost power. The pilot switched back to the right fuel tank but there was no change. He then tried different power settings, adjusted the mixture to full rich and switched tanks again without regaining engine power. The pilot advised air traffic control (ATC) that he was having an engine problem and needed to land at the nearest airport. ATC instructed him contact the control tower at the nearest airport and cleared him to land. The pilot advised the controller that he was not going to be able to make it to the airport and that he was going to land in the water. During the water landing, the airplane came to a sudden stop. The pilot and his passenger then egressed, and the airplane sank.

An annual inspection of the airplane had been completed about 2 months prior to the accident and test flights associated with the annual inspection had all been done with the fuel selector selected to the right fuel tank, and this was the first time he had selected the left fuel tank since before the annual inspection.

The airplane was equipped with an engine monitor that was capable of recording engine parameters. Examination of the data revealed that around the time of the loss of engine power, exhaust gas temperature and cylinder head temperature experienced a rapid decrease on all cylinders along with a rapid decrease of turbine inlet temperature, which was indicative of the engine being starved of fuel.

Examination of the wreckage did not reveal any evidence of any preimpact failures or malfunctions of the airplane or engine that would have precluded normal operation.

During examination of the fuel system, the fuel selector was observed in the RIGHT fuel tank position and was confirmed to be in the right fuel tank position with low pressure air. However, when the fuel selector was positioned to the LEFT fuel tank position, continuity could not be established with low pressure air. Further examination revealed that a fuel selector valve labeled FERRY TANK was installed

in the left fuel line between the factory-installed fuel selector and the left fuel tank. The ferry tank fuel selector was observed to be in the ON position, which blocked continuity from the left fuel tank to the engine. Continuity could only be established when the ferry tank fuel selector was positioned to the OFF position. With low pressure air, no continuity could be established from the ferry tank fuel line that attached to the ferry tank's fuel selector.

The ferry tank fuel selector valve was mounted between the pilot and copilot seats on the forward side of the main wing spar in the area where the pilot and copilot would normally enter and exit the cockpit. This location was such that the selector handle could easily be inadvertently kicked or moved by a person or object. A guard was not installed over the ferry tank fuel selector valve nor was the selector valve handle safety wired in the OFF position to deactivate the valve even though a ferry tank was not installed.

Review of the airplane's history revealed that about 3 years before the accident, the airplane had been used for an around-the-world flight by the pilot and that prior to the flight, a ferry tank had been installed.

A review of maintenance records did not reveal any logbook entries or associated paperwork for the ferry tank installation and/or removal, except for a copy of the one-page fuel system schematic from the maintenance manual with a handwritten annotation ("Tank"), and hand drawn lines, both added to it in blue ink. A review of Federal Aviation Administration records did not reveal any record of a FAA Form 337 (Major Repair or Alteration) or a supplemental type certificate for installation of the ferry tank or the modification to the fuel system.

## Probable Cause and Findings

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

The inadvertent activation of the unguarded ferry tank fuel selector valve, which resulted in fuel starvation and a total loss of engine power.

### Findings

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| **Aircraft** | Fuel selector/shutoff valve - Unintentional use/operation |
| **Aircraft** | Fuel selector/shutoff valve - Design |
| **Personnel issues** | Use of equip/system - Pilot |
| **Personnel issues** | Knowledge of equipment - Pilot |

# Factual Information

## History of Flight

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| **Enroute** | Fuel starvation (Defining event) |
| **Enroute** | Loss of engine power (total) |
| **Enroute** | Emergency descent initiated |
| **Approach** | Ditching |

On December 19, 2020, about 1216 eastern standard time, a Piper PA-46-310P; N662TC, was substantially damaged when it was involved in an accident near Naples, Florida. The pilot and passenger sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The flight originated at Sarasota/Bradenton International Airport (SRQ), Sarasota, Florida destined for Key West International Airport (EYW), Key West, Florida.

The pilot reported he filed an instrument flight rules (IFR) flight plan for the flight to EYW and had the airplane towed to the fixed-base-operator's ramp, where he conducted a preflight inspection, which included draining both tanks to check for water. No water was visible, and each fuel tank contained about 50 gallons of fuel.

The fuel selector was on the right tank, and the engine started without any delay. The pilot then received his IFR clearance and took off at 1139.

After takeoff, the pilot was cleared by air traffic control (ATC) to climb to 7,000 ft above mean sea level (msl) and the flight continued until it was near Southwest Florida International Airport (RSW), Fort Myers, Florida and then was cleared direct to EYW. Until this point, the engine was running smooth and was leaned to 50° lean of peak. About 1213, the pilot switched the fuel selector to the left fuel tank.

Immediately after switching fuel tanks, the engine started to sputter and lost power. The pilot switched back to the right fuel tank but there was no change. He then tried different power settings, set the mixture to full rich and switched tanks again without regaining power.

The pilot then advised ATC that he was having an engine problem and needed to land at the nearest airport. ATC instructed him to contact the control tower at Naples Municipal Airport (APF), Naples, Florida. APF tower then cleared him to land on runway 5 but the pilot realized that he was already well below 5,000 ft msl, so he advised the tower that he could not make it to the airport. The pilot informed the controller that he was heading for the beach and would land in the water.

The pilot reported he focused on the airplane's attitude and airspeed. The airplane touched down in the water, came to a sudden stop, and floated. Apart from the propeller, he could see no visible damage. He unlatched his seatbelt and opened the upper part of the airstair door and egressed. He then helped his passenger to egress, and they both started swimming towards the beach.

The pilot saw a helicopter circling overhead, and after 10 to 15 minutes of swimming they were picked up by a boat. They were later transported to the hospital. The airplane eventually sank and came to rest in 6 ft of water and was later recovered.

The pilot advised that an annual inspection of the airplane had been completed on October 15, 2020, and test flights were all done on the right fuel tank, and this was the first time he had selected the left fuel tank since before the annual inspection.

The airplane was equipped with an Insight G4 Engine monitor. It was capable of monitoring engine parameters, including, but not limited to, cylinder head temperature (CHT), exhaust gas temperature (EGT), fuel flow information, and acceleration data. Data was stored on an SD memory card installed in the front panel of the device. Examination of the data revealed that about 1 hour of data was recorded for the accident flight. About 7 minutes before the end of the recorded data, exhaust gas temperature and cylinder head temperature indicated a rapid decrease in temperature on all cylinders along with a rapid decrease of turbine inlet temperature. This was indicative of the engine being starved of fuel.

Examination of the wreckage, revealed that the propeller, wings, and aft fuselage, had been substantially damaged. Further examination did not reveal any evidence of any preimpact failures or malfunctions of the airplane or engine.

During examination of the fuel system, the fuel selector was observed in the RIGHT fuel tank position and was confirmed to be in the right fuel tank position with low pressure air. During the fuel selector continuity check, about 3 ounces of a blue liquid consistent in color and odor of 100LL aviation type gasoline was recovered from the fuel line between the fuel selector and engine. The fuel return line to the right tank was clear of obstructions and the vapor return check valve was functional.

The fuel return line to the left fuel tank was clear of obstruction and the vapor return check valve was functional. When the fuel selector was positioned to the LEFT fuel tank position, continuity could not be established with low pressure air.

Further examination revealed that a fuel selector valve labeled FERRY TANK was installed in the left fuel line between the factory-installed fuel selector and the left fuel tank.

The ferry tank fuel selector was observed to be in the ON position, which blocked continuity from the left fuel tank to the engine. Continuity could only be established when the ferry tank fuel selector was positioned to the OFF position. With low pressure air no continuity could be established from the ferry tank fuel line that attached to the ferry tank's fuel selector.

The ferry tank fuel selector valve was mounted between the pilot and copilot seats on the forward side of the main wing spar in the area where the pilot and copilot would normally enter and exit the cockpit. No guard was installed over the ferry tank fuel selector valve, nor was the selector valve handle safety wired in the OFF position to deactivate the valve even though a ferry tank was not installed.

This configuration could not be found in the Piper Aircraft PA-46-310P/350P Maintenance Manual. And did not appear in the fuel system description or the fuel system schematic contained in Chapter 28 of the manual.

Review of the airplane's history revealed that in 2017, the airplane had been used for an around the world flight by the pilot. In addition to other modifications, prior to the flight commencing, a Turtle-PAC ferry tank had been installed.

A review of maintenance records provided by the pilot did not reveal any logbook entries or associated paperwork for the ferry tank installation and/or removal, except for a copy of the one-page Piper PA-46-310P fuel system schematic from the maintenance manual, with a handwritten annotation ("Tank"), and hand drawn lines, both added to it in blue ink. A review of Federal Aviation Administration (FAA) records also did not reveal any record of a FAA Form 337 (Major Repair or Alteration) or a supplemental type certificate for installation of the ferry tank or the modification to the fuel system.

## Pilot Information

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| **Certificate:** | Commercial | **Age:** | 73,Male |
| **Airplane Rating(s):** | Single-engine land; Single-engine sea; Multi-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | Lap only |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | |
| **Medical Certification:** | Class 2 With waivers/limitations | **Last FAA Medical Exam:** | October 29, 2019 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | November 8, 2019 |
| **Flight Time:** | 3462 hours (Total, all aircraft), 890 hours (Total, this make and model), 11 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft) | | |

## Passenger Information

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| **Certificate:** | | **Age:** | Female |
| **Airplane Rating(s):** | | **Seat Occupied:** | Right |
| **Other Aircraft Rating(s):** | | **Restraint Used:** | Lap only |
| **Instrument Rating(s):** | | **Second Pilot Present:** | No |
| **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

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| **Aircraft Make:** | Piper | **Registration:** | N662TC |
| **Model/Series:** | PA46 310P | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1985 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 468508095 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 6 |
| **Date/Type of Last Inspection:** | October 15, 2020 Annual | **Certified Max Gross Wt.:** | 4118 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3462 Hrs at time of accident | **Engine Manufacturer:** | CONT MOTOR |
| **ELT:** | C126 installed, not activated | **Engine Model/Series:** | TSIO-520-BE |
| **Registered Owner:** | | **Rated Power:** | 310 Horsepower |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KAPF,9 ft msl | **Distance from Accident Site:** | 3 Nautical Miles |
| **Observation Time:** | 11:53 Local | **Direction from Accident Site:** | 58° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 11 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 70° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.21 inches Hg | **Temperature/Dew Point:** | 22°C / 12°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Sarasota, FL (SRQ) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | Key West, FL (EYW) | **Type of Clearance:** | IFR |
| **Departure Time:** | 11:39 Local | **Type of Airspace:** | Class E |

## Airport Information

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| **Airport:** | NAPLES MUNI APF | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 8 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | 5 | **IFR Approach:** | None |
| **Runway Length/Width:** | 6600 ft / 150 ft | **VFR Approach/Landing:** | Forced landing |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Minor | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | 1 Minor | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Minor | **Latitude, Longitude:** | 26.130762,-81.817956(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Gunther, Todd | | |
| **Additional Participating Persons:** | Damian Galbraith; Piper Aircraft Corporation; Vero Beach, FL<br>Duff Barker; FAA / FSDO; Miramar, FL | | |
| **Original Publish Date:** | February 2, 2023 | **Investigation Class:** | 3 |
| **Note:** | The NTSB did not travel to the scene of this accident. | | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=102451 | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.