



Aviation Investigation Final Report

Location:	Conroe, Texas	Accident Number:	CEN23LA081
Date & Time:	January 14, 2023, 14:25 Local	Registration:	N512P
Aircraft:	Pitts Model 12	Aircraft Damage:	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	Injuries:	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and passenger were conducting a local flight to practice maneuvers and landings. About 3 to 4 minutes after takeoff, and 2,000 ft above ground level, the pilot noticed a master warning light on instrument panel but did not notice any anomalies or problems. The pilot elected to return to the airport, and about 1 minute later the engine sustained a series of power loss fluctuations. The pilot attempted to troubleshoot the problem but was unsuccessful and the engine lost total power. Unable to reach the airport or a field due to a high descent rate, the pilot performed a forced landing to a nearby roadway. During the landing, the airplane impacted a powerline and terrain before coming to rest inverted. The airplane sustained substantial damage to the wings, fuselage, and empennage.

Postaccident examination of the airplane revealed non-ferrous metallic debris throughout the entire fuel system; the source of the debris was unable to be determined. Due to a leak noted during a functional test, the engine-driven fuel pump was disassembled. Scratches and scoring marks were noted on the pressure relief valve seat, which allowed fuel into the air side cavity of the fuel pump. It is likely the fuel pump air cavity filled with fuel, which equalized the pump pressure and restricted fuel flow to the engine. The restricted fuel flow resulted in a total loss of engine power.

Probable Cause and Findings

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

The failure of the engine-driven fuel pump, which resulted in a total loss of engine power. Contributing to the failure of the fuel pump was an unknown non-ferrous metallic debris that was noted throughout the airplane's fuel system.

Findings

Aircraft	(general) - Damaged/degraded
Aircraft	Fuel pump - Failure
Aircraft	Fuel - Fluid condition

Factual Information

History of Flight

Maneuvering	Sys/Comp malf/fail (non-power) (Defining event)
Maneuvering	Fuel starvation
Emergency descent	Collision with terr/obj (non-CFIT)

On January 14, 2023, about 1425 central standard time, a Pitts Model 12 airplane, N512P, sustained substantial damage when it was involved in an accident near Conroe, Texas. The pilot sustained minor injuries and the passenger sustained serious injuries. The airplane was operated as a *Code of Federal Regulations* Part 91 personal flight.

According to the pilot, he and the passenger were conducting a local flight to practice maneuvers and landings and the airplane contained about 40 gallons of fuel in the main fuel tank. About 3 to 4 minutes after takeoff, and at an altitude of 2,000 ft above ground level, the pilot noticed that a master warning light on the instrument panel illuminated but did not notice any anomalies or problems. The warning light then turned off, all indications were normal, and the engine was operating without issue. The pilot elected to return to the airport.

The pilot stated that, about 1 minute later, the engine sustained a series of power fluctuations; “like someone was turning the [magnetos] off and on.” When the pilot turned on the fuel boost pump, the engine produced a burst of power, and then lost power. The pilot switched from the main fuel tank to the auxiliary tank with no change noted to engine power, then switched back to the main fuel tank. Unable to reach the airport or a field due to a high descent rate, the pilot performed a forced landing to a nearby roadway. During the landing, the airplane impacted a powerline and terrain before coming to rest inverted. The airplane sustained substantial damage to the wings, fuselage, and empennage (see Figure 1).



Figure 1. Accident airplane as it came to rest (Source: Federal Aviation Administration)

The airplane is equipped with a main fuel tank in the forward fuselage and a wing tank in the upper wing with a total capacity of 54 gallons. An aluminum header or inverted tank with a pickup (flop) tube is located beneath the main tank and provides the fuel supply for inverted flight.

Postaccident examination of the airplane and engine revealed small particles of non-ferrous metal debris were noted throughout the airplane's fuel system when fuel system components and fuel lines were removed. The airframe's inverted fuel tank pickup tube was removed, and an o-ring at the end of the tube was not present. No evidence of the o-ring was noted in the fuel tank or fuel system. The engine was removed for a functional test in a test cell.

The engine fuel pump was removed, flushed, and functionally bench tested before the functional engine test due to the presence of metal debris in the fuel system. During the functional test, a leak was noted at the pump's rear pressure relief valve and rear diaphragm. Although the leak was present, the fuel pump flows were normal at idle and cruise power settings. The fuel pump was reinstalled on the engine for the engine functional test. During the engine prime procedure, the engine fuel pump leaked from the rear pressure relief valve and diaphragm, as observed during the bench test. Due to the potential fire and safety concerns,

the pump was removed and replaced with a slave pump. The accident fuel pump was disassembled; scratches and scoring marks were noted on the pressure relief valve seat, which allowed fuel into the air side cavity of the fuel pump (see Figure 2). The diaphragm was pliable and undamaged. Blue stains, consistent with aviation fuel, were noted on the external pump housing.



Figure 2. Engine fuel pump pressure relief valve with diaphragm

After the fuel pump was replaced, the engine started on the test cell without issue. Around 800 rpms, a vertical vibration was observed with the engine and test cell stand. The functional test was terminated at that time due to the abnormal vibrations.

Pilot Information

Certificate:	Airline transport; Flight engineer; Flight instructor	Age:	65, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Rear
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	November 22, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	August 11, 2022
Flight Time:	34000 hours (Total, all aircraft), 230 hours (Total, this make and model), 32000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Pitts	Registration:	N512P
Model/Series:	Model 12	Aircraft Category:	Airplane
Year of Manufacture:	2013	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	291
Landing Gear Type:	Tailwheel	Seats:	2
Date/Type of Last Inspection:	November 27, 2022 Annual	Certified Max Gross Wt.:	2250 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	146.5 Hrs at time of accident	Engine Manufacturer:	Vedeneyev
ELT:	C91 installed, activated, did not aid in locating accident	Engine Model/Series:	M-14P
Registered Owner:	On file	Rated Power:	421 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:	KCXO, 228 ft msl	Distance from Accident Site:	4 Nautical Miles
Observation Time:	14:53 Local	Direction from Accident Site:	35°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	150°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.22 inches Hg	Temperature/Dew Point:	17°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Conroe, TX	Type of Flight Plan Filed:	None
Destination:	Conroe, TX	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class D

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	1 Serious	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	1 Serious, 1 Minor	Latitude, Longitude:	30.306237,-95.462724(est)

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Robert McGee; FAA FSDO; Houston, TX
Original Publish Date:	March 28, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106584

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).