Aviation Investigation Final Report

Location:	El Cajon, California	**Accident Number:**	WPR18LA049
Date & Time:	December 17, 2017, 09:56 Local	**Registration:**	N8884H
Aircraft:	North American Navion	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	3 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a cross-country flight. He reported that the takeoff was normal and that, shortly after takeoff, the engine experienced a sudden loss of all power. The pilot banked the airplane to return to the airport but determined that the airplane would be unable to reach the airport. Subsequently, the pilot initiated an off-airport landing to a parking lot, where the airplane landed hard and slid into an embankment near a fence. A postimpact fire ensued.

A postaccident examination of the airframe and engine found that the fuel manifold valve had thermal discoloration of its housing. The valve was disassembled, and the plunger internal parts (the collar, valve, and spring) were found separated in the plunger cavity. The plunger internal parts likely did not separate during flight; such a condition would have resulted in a rich-running engine, which would not have caused a significant loss of engine power and would have been revealed as a sooty residue on the spark plug electrode areas. The examination of the spark plugs revealed light amounts of deposits, consistent with normal fuel-air mixture and operation. Thus, the separation of the plunger internal parts was consistent with thermal exposure during the postimpact fire.

The melted plastic material found in the fuel selector valve cavity during the disassembly was likely the material that made up the internal control shaft. The throttle control rod end remained secured to the throttle control arm, but the rod end could slide about ½ inch along the bolt that attached the rod end to the control arm. It is unlikely that this movement caused the loss of power during flight given that the pilot did not report an engine control problem.

The examination of the airframe and engine did not reveal any preimpact anomalies that would have precluded continued flight and caused the loss of engine power.

Probable Cause and Findings

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

A total loss of engine power for reasons that could not be determined because postaccident examination of the airframe and engine did not reveal any anomalies that would have precluded normal operation.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Emergency descent	Controlled flight into terr/obj (CFIT)

HISTORY OF FLIGHT

On December 17, 2017, about 0956 Pacific standard time, a North American Navion airplane, N8884H, experienced a sudden loss of power during takeoff from the Gillespie Field Airport (SEE), San Diego/El Cajon, California. The pilot subsequently made an off-airport forced landing to a parking lot. The private pilot, pilot-rated passenger, and passenger sustained serious injuries; the airplane sustained substantial damage. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the cross-country flight. The flight was destined for John Wayne-Orange County Airport (SNA), Santa Ana, California.

The pilot reported that he and the same two passengers had flown without incident earlier that day from SNA to SEE, where they stopped and had breakfast. The pilot reported that the departure from runway 27R at SEE was normal. He retracted the landing gear and flaps without incident and continued a normal climb at 100 mph. About 400 ft above ground level (agl) the engine experienced a sudden and complete loss of power. The pilot immediately pitched the airplane down and checked the engine controls, in which he stated, "…all appeared to be correctly set for proper flight." The fuel selector handle was not checked or manipulated during or after power loss, but the pilot reported that it was checked three times during the preflight and each time was confirmed to be in the 'main' position.

After the power loss and initial control checks, the pilot then banked the airplane left in an attempt to return to the airport. He determined that he would be unable to reach the airport and initiated a forced off-airport landing. He lowered the landing gear and flaps and identified a parking lot about 1/3 mile south of SEE, where the airplane landed hard and came to rest on an embankment near a fence. After the pilot and passengers egressed the airplane, a postimpact fire ensued.

According to the pilot, the engine was recently overhauled and installed in the airplane in August of 2017.

PERSONAL INFORMATION

The pilot, age 47, held a private pilot certificate with an airplane single engine land and instrument airplane ratings, issued on December 30, 2003. An FAA third-class airman medical certificate was issued on March 10, 2017, with limitations that he must have eye glasses available for near vision. The pilot reported that he had accumulated 461 total flight hours including 32 hours in make and model.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable tricycle-gear airplane was manufactured in 1947. It was powered by a Continental IO-520B, 285-horsepower engine, equipped with a constant-speed McCauley propeller. The last annual inspection was completed on December 1, 2016, and 29 flight hours later, a 100-hour inspection was completed on September 28, 2017, when the engine was removed, field-overhauled and reinstalled. At that time, the airframe had accumulated approximately 1,963 total hours of operation and the engine had 721 hours since remanufacture. According to the owner, the airplane had been operated for about 35 hours from the time of the last inspection until the accident.

According to the maintenance records, the airplane was in storage since 1985 till April 30, 2008. On June 5, 2008, a one-time inspection of the entire fuel system and repetitive functional tests of certain fuel selector valves was conducted as per the Navion Airworthiness Directive (AD), 2008-05-14. This AD is to detect and correct fuel system leaks or improper operating fuel selector valves, which could result in the disruption of fuel flow to the engine. During this inspection, Brittan wing tip tanks and an IO-520B engine was installed. On June 5, 2008, a new Osborne fuel valve 4090 (fuel selector valve) was installed.

METEOROLOGICAL INFORMATION

A review of the SEE automated weather observation data, revealed that at 0947, conditions were calm wind, visibility of 10 miles, temperature 14° C, dew point 6° C, and an altimeter setting of 29.91 inches of mercury.

AIRPORT INFORMATION

According to FAA information, runway 27R/9L was the longest runway at SEE and measured 5,342 ft by 100 ft. Airport elevation was listed as 359 ft above mean sea level.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in a warehouse parking lot 1/3 mile south of the departure end of runway 27R at SEE. The wreckage came to rest on an embankment near a fence. The cabin area, inboard wing areas and forward fuselage were mostly consumed by postimpact fire.

The examination of the recovered airframe and engine was conducted at a secure facility by the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) and a representative from Continental Motors Group (CMG). Impact damage was evident to both wings and forward fuselage. The left wing tip tank separated from the wing and had impact damage. The right tip tank remained attached to the wing and had thermal damage and impact damage.

The fuel selector valve and fuel strainer had thermal damage and remained attached to the airframe. The fuel selector valve handle remained secured to the selector valve and was set to the main tank position. The surrounding airplane structure was thermally damaged. The mounting plate below and surrounding the handle was deformed upward on the forward side, forming around the forward side (pointed end) of the valve handle, capturing it in position. The fuel selector valve was removed from the main wreckage and disassembled. During the removal of the valve, all fuel line b-nuts were found to be tight. A melted plastic material was found in the selector valve cavity during the disassembly. The fuel strainer was

removed from the main wreckage and disassembled. During the removal of the strainer, all fuel line b-nuts were found to be tight. The outer surface areas of the fuel strainer had thermal discoloration. The screen was intact, and no debris was noted in the bowl. The bowl's rubber seal had thermal damage. The fuel transfer lines and surrounding structure aft of the main tank areas had thermal damage and missing material. The main fuel tanks, header tank and baggage tank were removed from the main wreckage. During the removal of the tanks, all fuel line b-nuts were found to be tight. The main tanks showed a 'pillowing' signature, consistent with fuel presence in the tank during the accident sequence. The electric driven pump was not found during the examination. The surrounding structure and lines in the area of the electric driven pump were mostly consumed by postimpact fire. The baggage tank fuel cap was not found during the examination.

The propeller assembly remained attached to the engine and had similar curling at each of the blade tips, multidirectional scoring, and scratches on the cambered faces. The propeller spinner was crushed at the tip. The engine had thermal discoloration to the top side and thermal damage to the sump area, induction tubes and accessory section. The upper spark plugs were removed, and the electrode areas had a light amount of deposits consistent with normal operation. The electrodes had "normal-worn out" wear conditions when compared to a Champion AV-27 comparison chart. The magnetos had thermal discoloration to their housing and spark was attained from each unit. The crankshaft was rotated by hand: engine gear and valve continuity were confirmed, and cylinder thumb compressions were attained on all cylinders.

The engine driven fuel pump was removed from the engine and disassembled. The drive coupler was intact, and no anomalies were noted during the disassembly. The fuel injectors were removed and were clear of debris. The fuel control valve and throttle body had significant impact and thermal damage. The throttle control rod end remained secured to the throttle control arm; however, the rod end was capable of sliding approximately ½ inch along the bolt that attaches the rod end to the control arm. The fuel manifold valve had thermal discoloration to its housing and was disassembled. The inlet screen had light amounts of debris and the diaphragm was undamaged. Thermal discoloration was visible in the chamber area. The plunger's internal parts (collar, valve and spring), separated and were found in the plunger cavity. The separation of the plunger internal parts is consistent with thermal exposure to postimpact fire.

The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. For more information on the engine examination, see the CMG Engine Examination Report and the NTSB Engine and Airframe Examination Summary in the public docket for this accident.

Pilot Information

Certificate:	Private	**Age:**	47,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 None	**Last FAA Medical Exam:**	March 10, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 12, 2016
Flight Time:	461.2 hours (Total, all aircraft), 32.4 hours (Total, this make and model), 413 hours (Pilot In Command, all aircraft), 15.6 hours (Last 90 days, all aircraft), 6.5 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	44,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	October 1, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Passenger Information

Certificate:		**Age:**	23,Male
Airplane Rating(s):		**Seat Occupied:**	Rear
Other Aircraft Rating(s):		**Restraint Used:**	Lap only
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:			

Aircraft and Owner/Operator Information

Aircraft Make:	North American	**Registration:**	N8884H
Model/Series:	Navion UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	1947	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	NAV-4-884
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	
Airframe Total Time:		**Engine Manufacturer:**	
ELT:		**Engine Model/Series:**	
Registered Owner:	On file	**Rated Power:**	
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:	KSEE,387 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	17:47 Local	**Direction from Accident Site:**	84°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	14°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	El Cajon, CA (SEE)	**Type of Flight Plan Filed:**	None
Destination:	SANTA ANA, CA (SNA)	**Type of Clearance:**	VFR
Departure Time:	10:00 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	GILLESPIE FIELD SEE	**Runway Surface Type:**	Asphalt
Airport Elevation:	387 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27R	**IFR Approach:**	None
Runway Length/Width:	5342 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Serious	**Latitude, Longitude:**	32.825,-116.984443(est)

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew
Additional Participating Persons:	Brian Brown; FAA-FSDO; San Diego, CA Kurt Gibson; Continental Motors; Mobile, AL
Original Publish Date:	February 5, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96489