



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Descanso, California	<b>Accident Number:</b>	WPR18FA237
<b>Date &amp; Time:</b>	August 22, 2018, 16:15 Local	<b>Registration:</b>	N1682G
<b>Aircraft:</b>	Champion 7KCAB	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

## Analysis

The flight instructor and the pilot receiving instruction were conducting an instructional flight for spin training. About 15 minutes into the flight, the radar data showed the airplane in a slight left turn at about 2,400 ft agl, then enter a right 360° decreasing turn before dropping off radar. The last radar hit was about 1,500 ft above the accident site. The airplane's final maneuver and rapid descent are consistent with a spin entry.

The FAA Advisory Circular AC 61-67C, Stall and Spin Awareness Training, provides information that reports spin avoidance, incipient spins, actual spin entry, spin, and spin recovery techniques should be practiced from an altitude above 3,500 feet AGL.

Examination of the accident site revealed the airplane impacted terrain in a right wing and nose down attitude. Examination of the wreckage revealed no anomalies with the airframe or engine that would have precluded normal operation. Damage to the airplane's fuel tanks indicated that they contained fuel at the time of impact. Damage to the propeller revealed varying degrees of impact damage consistent with some degree of engine power at the time of impact.

According to the weight and balance calculations, the airplane exceeded its maximum gross weight at takeoff by 73 lbs and the center of gravity was outside the acrobatic flight envelope. This could have affected the spin and recovery characteristics and may have degraded or enhanced the spin maneuver. It was not determined if either pilot was aware of the weight and balance of the airplane.

Although the flight instructor had postmortem evidence of atherosclerotic disease that could pose a risk to flight safety, there was no evidence of an acute cardiac event. For both pilots, toxicology testing showed small amounts of ethanol in cavity blood and muscle, but not in brain tissue. Thus, it is likely that the ethanol is due to postmortem production and not consumption of ethanol prior to the 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 enter a spin without sufficient altitude to recover. Also causal to the accident was the pilot's inadequate preflight weight and balance calculations, which placed the airplane outside the normal and acrobatic category flight envelope, effecting the spin and recovery characteristics.

### Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Weight/balance calculations - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Altitude - Incorrect use/operation
Aircraft	CG/weight distribution - Capability exceeded

# Factual Information

## History of Flight

Enroute-cruise	Loss of control in flight (Defining event)
Enroute-cruise	Collision with terr/obj (non-CFIT)

On August 22, 2018, about 1615 Pacific daylight time, a Champion 7KCAB, N1682G, was substantially damaged when it was involved in an accident about 8 miles northwest of Descanso, California. The flight instructor (FI), and a pilot receiving instruction (PRI) were fatally injured. The airplane was operated by the FI as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

A review of radar data showed the airplane depart Gillespie Field Airport (SEE), San Diego/El Cajon, California and proceed in a northeasterly heading, climbing to about 3,200 ft above ground level (agl) across rising terrain. About 15 minutes into the flight, the radar data showed the airplane in a slight left turn at about 2,400 ft agl then enter a right 360<sup>o</sup> decreasing turn before dropping off radar. The last radar hit was about 1,500 ft above the accident site. (See Figure 1)

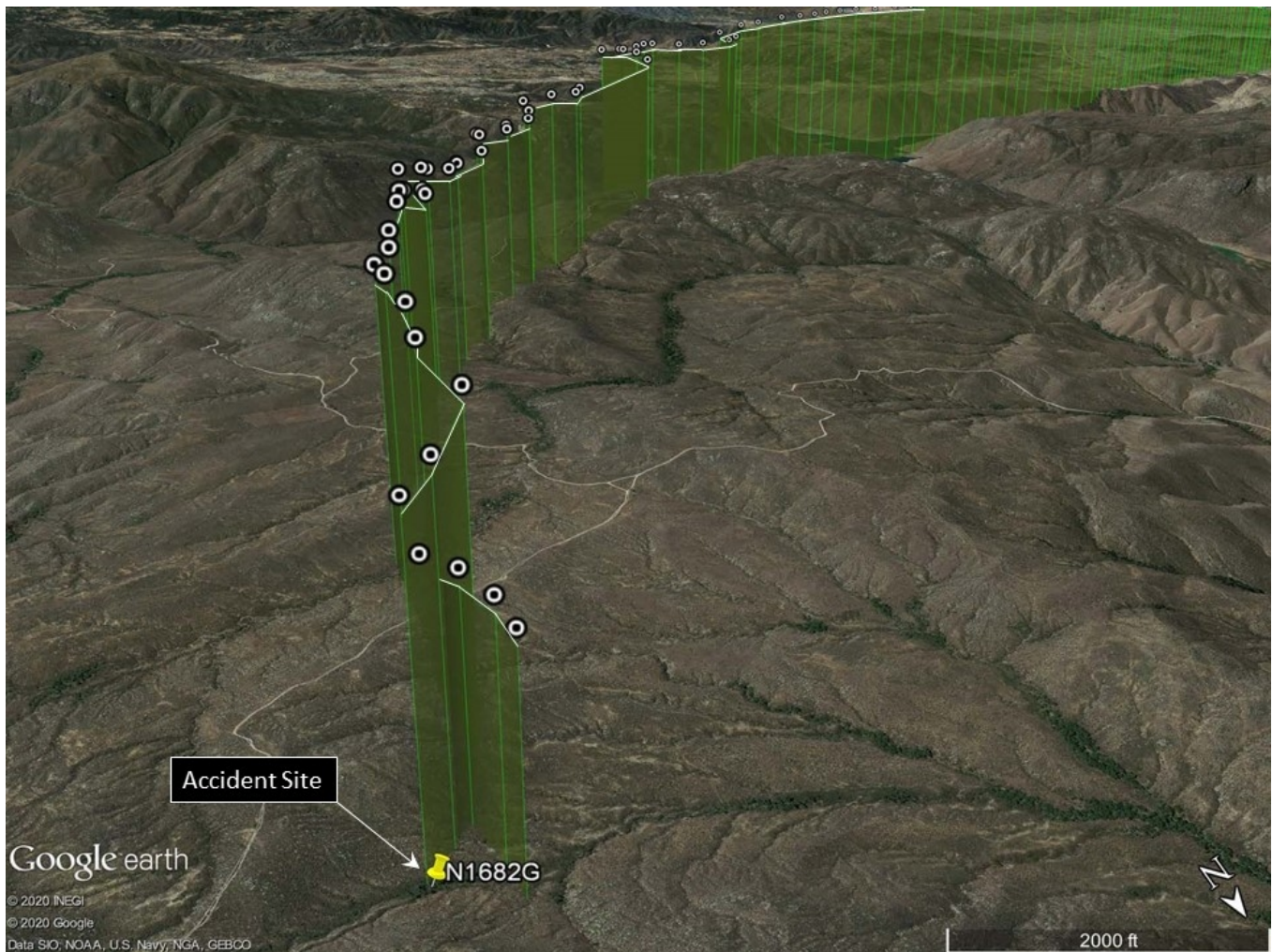


Figure 1-Radar flight track and accident site.

A pilot who flew with the instructor earlier on the day of the accident, said that the instructor told him that he had a flight in the afternoon and was not looking forward to the spin training that was planned.

## PERSONNEL INFORMATION

### Flight Instructor

The instructor's logbook was not recovered. On the application for his most recent medical certificate dated August 28, 2017, he did not report any flight experience. In his previous application for a medical certificate, dated June 19, 2013, he reported 7,120 total hours of flight experience.

### Pilot Receiving Instruction

On the application for his most recent medical certificate dated August 26, 2014, he reported 0 hours of flight experience. During the investigation, a review of the pilot's logbook showed 269 total hours of flight experience.



## AIRCRAFT INFORMATION

Following the accident, the weight and balance figures provided in the airplane's documentation were used to calculate weight and balance information. The maximum gross weight of the airplane was 1,650 lbs. According to the weight and balance calculations, the airplane weighed 1,723 lbs at takeoff, which was over the maximum gross weight by 73 lbs, and outside both the normal and acrobatic category flight envelope.

## WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in a wooded ravine, which had an elevation of 2,585 ft msl and was situated within a mountainous area. The main wreckage was contained within a debris field about 120 ft in length and about 20 ft wide on a directional heading of 112° magnetic. The debris field was level compared to the surrounding terrain that was increasing in elevation to the north. (See figure 2)

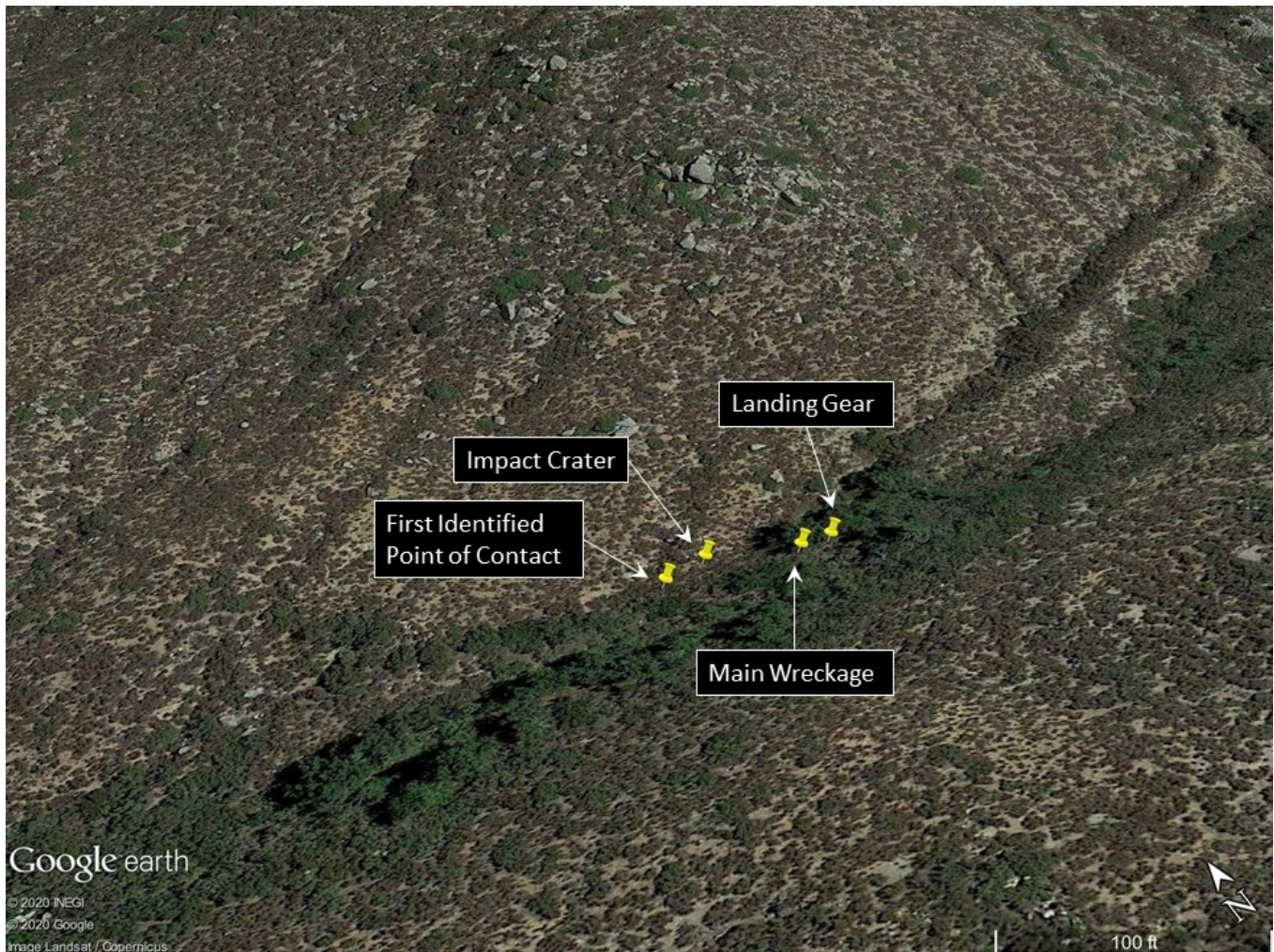


Figure 2-Accident site.

The first identified point of contact (FIPC) was an area of disturbed ground containing a small crater. A flat rubber seal was found near the FIPC and contained small fragments of green glass, consistent with the right-wing tip navigational light, which would be consistent with the right wing impacting the

ground first. Small red wing access panels were also found near the FIPC. Further up through the debris field was an area of disturbed ground and brush about 70 ft in length and about 6 ft wide. The area contained a larger crater, about 4 ft in diameter and 6 in deep, about 30 ft from the FIPC. More red and blue wing panels were found in this area. The aircraft cabin door had impact damage and was found near the ravine in the bushes adjacent to the large crater. Broken Plexiglas was found surrounding this area. A broken red lens fragment was found near bushes on the left of the debris field about 70 ft from the FIPC. The main wreckage was found about 90 ft from the FIPC. The left wing had impact damage and was intact.

Hydraulic deformation was evident on both wing fuel tanks, which were breached. Residual fuel was noted within several engine fuel supply lines.

The right-wing had excessive impact damage and remained attached to the main wreckage. A landing gear strut and wheel assembly separated from the main wreckage and found near the main wreckage. The other main gear strut was the furthest piece of wreckage in the debris field and the wheel assembly had separated and was not found. The main wreckage was on a directional heading of about 180° magnetic.

The empennage remained intact and flight control continuity was established to the cockpit controls. The left rudder control cable exhibited overload signatures near the connection of the rudder pedal. Aileron and flap continuity could not be attained onsite. Both ailerons and flaps remained attached to the wings.

The cabin area showed crush damage and the engine, and its mounting assembly was broken from the airframe structure. The propeller and the crankshaft propeller flange separated from the engine. The propeller blades showed light chordwise scuffing on the cambered sides, the leading edges of the blades had nicks and striations, both were bent slightly aft with torsional twisting of the blades and trailing edge S-bending.

A follow-up examination of the engine and propeller revealed no evidence of preimpact anomalies.

## MEDICAL AND PATHOLOGICAL INFORMATION

### Flight Instructor

According to the autopsy performed by the San Diego County Medical Examiner's Department, the cause of death for the FI was blunt trauma and the manner of death was accident. In addition to the blunt trauma to the head, neck, torso, and extremities, moderate to severe atherosclerotic cardiovascular disease was noted. The heart was of normal size and shape. While the left main, left circumflex, and right coronary arteries had minimal atherosclerosis, there was 75% narrowing of the left anterior descending coronary artery. There was no evidence of an acute coronary event. Microscopic exam of the myocardium showed no inflammation or fibrosis. Moderate to severe atherosclerosis was noted in the aorta; there was no evidence of any aortic aneurisms. The arteries at the base of the brain had no atherosclerosis or aneurisms.

Toxicological testing performed by the FAA's Forensic Sciences Laboratory identified 0.014 grams per deciliter (gm/dL, 0.014%) ethanol in cavity blood, no ethanol in brain tissue, or 0.011 gm/dL (0.011%)

in muscle. While ethanol is primarily a social drug that acts as a central nervous system depressant, ethanol may also be produced in the body after death by microbial activity. No tested drugs or carboxyhemoglobin were detected in cavity blood. Toxicological testing by the San Diego coroner was negative for drugs of abuse and showed a chest blood alcohol concentration of 0.02% (weight per volume).

#### Pilot Receiving Instruction

According to the autopsy performed by the San Diego County Medical Examiner's Department, the cause of death in the PRI was blunt trauma and the manner of death was accident. No significant natural disease was identified.

Toxicological testing performed by the FAA's Forensic Sciences Laboratory identified 0.028 gm/dL (0.028%) ethanol in cavity blood, no ethanol in brain tissue, and 0.019 gm/dL (0.019%) in muscle. No tested drugs or carboxyhemoglobin were detected in cavity blood. Toxicological testing by the San Diego coroner was negative for drugs of abuse and showed a central blood alcohol concentration of 0.04% (weight per volume).

#### ADDITIONAL INFORMATION

The FAA Airplane Flying Handbook (FAA-H-8083-3A), chapter 4, states the following concerning spin procedures:

##### *Developed Phase*

*The developed phase occurs when the airplane's angular rotation rate, airspeed, and vertical speed are stabilized in a flightpath that is nearly vertical. In the developed phase, aerodynamic forces and inertial forces are in balance, and the airplane's attitude, angles, and self-sustaining motions about the vertical axis are constant or repetitive, or nearly so. The spin is in equilibrium. It is important to note that some training airplanes will not enter into the developed phase but could transition unexpectedly from the incipient phase into a spiral dive. In a spiral dive the airplane will not be in equilibrium but instead will be accelerating and G load can rapidly increase as a result.*

##### *Recovery Phase*

*The recovery phase occurs when rotation ceases and the AOA of the wings is decreased below the critical AOA. This phase may last for as little as a quarter turn or up to several turns depending upon the airplane and the type of spin.*

*To recover, the pilot applies control inputs to disrupt the spin equilibrium by stopping the rotation and unstalling the wing. To accomplish spin recovery, always follow the manufacturer's recommended procedures. In the absence of the manufacturer's recommended spin recovery procedures and techniques, use the spin recovery procedures below. If the flaps and/or retractable landing gear are extended prior to the spin, they should be retracted as soon as practicable after spin entry.*

*1. Reduce the Power (Throttle) to Idle*

*2. Position the Ailerons to Neutral*



3. *Apply Full Opposite Rudder against the Rotation*
4. *Apply Positive, Brisk, and Straight Forward Elevator (Forward of Neutral)*
5. *Neutralize the Rudder After Spin Rotation Stops*
6. *Apply Back Elevator Pressure to Return to Level Flight*

The FAA Airplane Flying Handbook (FAA-H-8083-3A), chapter 4, also states the following concerning weight and balance requirements related to spins:

*In airplanes that are approved for spins, compliance with weight and balance requirements is important for safe performance and recovery from the spin maneuver. Pilots must be aware that even minor weight or balance changes can affect the airplane's spin recovery characteristics. Such changes can either degrade or enhance the spin maneuver and/or recovery characteristics.*

*An airplane that may be difficult to spin intentionally in the utility category (restricted aft CG and reduced weight) could have less resistance to spin entry in the normal category (less restricted aft CG and increased weight). This situation arises from the airplane's ability to generate a higher AOA (angle of attack). An airplane that is approved for spins in the utility category but loaded in accordance with the normal category may not recover from a spin that is allowed to progress beyond one turn.*

*The FAA Advisory Circular AC 61-67C, Stall and Spin Awareness Training, provides the following information.*

*The training should begin by practicing both power-on and power-off stalls to familiarize the applicant with the aircraft's stall characteristics. Spin avoidance, incipient spins, actual spin entry, spin, and spin recovery techniques should be practiced from an altitude above 3,500 feet AGL.*

*Minor weight or balance changes can affect an aircraft's spin characteristics. For example, the addition of a suitcase in the aft baggage compartment will affect the weight and balance of the aircraft. An aircraft that may be difficult to spin intentionally in the utility category (restricted aft CG and reduced weight) could have less resistance to spin entry in the normal category (less restricted aft CG and increased weight) due to its ability to generate a higher AOA and increased load factor. Furthermore, an aircraft that is approved for spins in the utility category, but loaded in the normal category, may not be recoverable from a spin that is allowed to progress beyond one turn or 3-second spin, whichever is longer.*



## Flight instructor Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	77,Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Rear
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	5-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	August 28, 2017
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	7120 hours (Total, all aircraft)		

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	36,Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Front
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 None	<b>Last FAA Medical Exam:</b>	August 31, 2014
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	269 hours (Total, all aircraft), 204 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Champion	<b>Registration:</b>	N1682G
<b>Model/Series:</b>	7KCAB No Series	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1968	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	137
<b>Landing Gear Type:</b>	Tailwheel	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	February 7, 2018 Unknown	<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>	36 Hrs	<b>Engines:</b>	
<b>Airframe Total Time:</b>	1538 Hrs at time of accident	<b>Engine Manufacturer:</b>	
<b>ELT:</b>	C91 installed, not activated	<b>Engine Model/Series:</b>	
<b>Registered Owner:</b>		<b>Rated Power:</b>	
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KSEE, 387 ft msl	<b>Distance from Accident Site:</b>	16 Nautical Miles
<b>Observation Time:</b>	23:47 Local	<b>Direction from Accident Site:</b>	240°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	9 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	250°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.96 inches Hg	<b>Temperature/Dew Point:</b>	29°C / 18°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	El Cajon, CA (SEE )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	El Cajon, CA (SEE )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	16:01 Local	<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	Gillespie Field SEE	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	387 ft msl	<b>Runway Surface Condition:</b>	Unknown
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	32.957778,-116.697776(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Swick, Andrew		
<b>Additional Participating Persons:</b>	Scott Worthington; FAA-FSDO; San Diego, CA Mark Platt; Lycoming Engines; Phoenix, AZ Jerry Mehlhaff; American Champion Aircraft Corp.; Rochester, WI		
<b>Original Publish Date:</b>	December 3, 2020	<b>Investigation Class:</b>	3
<b>Note:</b>	The NTSB traveled to the scene of this accident.		
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=98134">https://data.nts.gov/Docket?ProjectID=98134</a>		

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](#).