# Aviation Investigation Final Report

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| **Location:** | Paso Robles, California | **Accident Number:** | LAX08FA043 |
| **Date & Time:** | December 30, 2007, 11:40 Local | **Registration:** | N254SR |
| **Aircraft:** | Cirrus Design Corp. SR22 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

As the airplane was approaching a friend's residence, the pilot called the friend on a cellular telephone informing him that he was about to pass by. The pilot had done this on many occasions as a way of notifying the friend that he should leave to pick him up from the airport. The friend was speaking with the pilot on the telephone when he observed the airplane drop rapidly about 1,000 feet as it was flying toward his house. The airplane was maneuvering very low in a nose-high configuration with full power, flying fast through the slight valley about 75 feet above ground level (agl). He noted that the winds were from the east (providing a tailwind) and estimated they were about 40 miles per hour (mph). The friend heard the telephone drop, with the pilot making a few inaudible comments. The airplane than made a rapid ascent as it neared power lines, climbing in a near vertical nose-high maneuver to about 1,000 feet agl. It subsequently made a 90-degree pivot about the longitudinal axis and then continued to turn into a barrel roll, disappearing behind the tree line. Ground scar analysis, impact signatures, and wreckage fragmentation patterns disclosed that the airplane impacted terrain in a near level attitude, with high forward velocity. The impact geometry combined with the witness statements of observing the airplane roll immediately after a near-vertical climb, is consistent with the pilot recovering from an accelerated stall and subsequent roll just prior to impact. There was no evidence of a pre-mishap mechanical malfunction or failure observed during the examination of the engine or airframe. A pilot report in the immediate vicinity and prior to the accident reported continuous light to occasional moderate turbulence between 2,000 and 5,000 feet mean sea level (msl). The GOES-11 satellite imagery surrounding the period depicted orographic clouds over and downwind of the higher terrain and 5 minutes after the accident, showed a band of tubular or "arcus" clouds moving over the accident site, which were similar in appearance to roll clouds. The clouds were of short duration and had moved southeastward and became less distinct about 15 minutes thereafter. Additionally, the Vandenburg AFB soundings surrounding the accident time indicated a strong low-level temperature inversion with northerly winds favorable for mountain wave activity formation downstream from high terrain.  Based on an analysis of the terrain, wind flow pattern, and

potential arcus clouds over the area, it is likely the accident aircraft encountered moderate or greater turbulence and downdrafts during the flyby of the residence.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's encounter with isolated moderate (or greater) turbulence, updrafts, and downdrafts associated with localized mountain wave conditions at low altitude, and, his failure to maintain adequate airspeed during the encounter that resulted in an inadvertent accelerated stall. Contributing to the accident were the pilot's decision to conduct low altitude flight maneuver and the pilot's diverted attention while using a cell phone.

### Findings

# Factual Information

## History of Flight

HISTORY OF FLIGHT

On December 30, 2007, about 1140 Pacific standard time, a Cirrus SR22, N254SR, departed controlled flight and collided into the slope of a hill near Paso Robles, California. Cirrus Design Corporation (Cirrus), Duluth, Minnesota, was operating the airplane under the provisions of 14 Code of Federal Regulations Part 91. The certificated flight instructor, the sole occupant, was killed. The airplane was substantially damaged. The personal flight departed San Carlos Airport, San Carlos, California, about 1030, with a planned destination of Paso Robles Municipal Airport. Visual meteorological conditions prevailed, and no flight plan had been filed.

The National Transportation Safety Board investigator-in-charge (IIC) interviewed a close friend of the pilot immediately following the accident and during the course of the investigation. He stated that the pilot was planning to visit him for the weekend, flying the airplane from his base airport to Paso Robles, as he had done many times prior. As the airplane approached the proximity of the friend's residence, the pilot called him on a cellular telephone informing him that he was about to pass by. The pilot had done this on many other occasions to let the friend know that he was about to land, as a way of notifying him that he should leave to pick him up from the airport, which was an approximate 15-minute drive.

The pilot's friend further stated that he proceeded outside his residence to watch the airplane while speaking with the pilot on the telephone. He noted that the winds were from the east and estimated they were continuously strong, about 40 miles per hour (mph). He observed the airplane drop rapidly about 1,000 feet as it was flying toward his house. As the airplane was approaching his house in a nose-high configuration with full power, he heard the telephone drop, and the pilot make a few inaudible comments. He noted that with the orientation of the airplane to the terrain, he was nervous of an impending crash. The airplane then made a rapid ascent as it neared power lines, climbing in a near vertical nose-high maneuver to about 1,000 feet above ground level (agl). It subsequently made a 90-degree pivot about the longitudinal axis and then continued to turn into a barrel roll, disappearing behind the tree line. The friend noted that he heard the engine producing full power during the maneuver.

Numerous witnesses were interviewed by the IIC following the accident. One witness, who lived adjacent to the pilot's friend, stated that she was trimming olive trees that surround her property when she noticed an airplane fly over her house. The airplane continued slightly left [west] and was maneuvering at a "very, very, very low" altitude. Another witness recalled observing the airplane flying from the east and over his house at an altitude of about 200 feet.

He noted that the airplane was flying very fast and descended to about the treetop level. The airplane then began a rapid ascent, almost vertical. After gaining altitude, it rolled to the right and then began a loop below the tree line, where he lost visual contact.

An additional witness, whose property is oriented on a small hill about 100 feet above the valley floor, stated that from his vantage point he was looking downward at the airplane as it passed by, which he approximated was maneuvering at 75 feet agl. The airplane was flying rapidly through the valley and began a rapid ascent as it reached the end of the west property lines of the neighbors.

PERSONNEL INFORMATION

The pilot, age 41, was employed in the capacity of a Regional Sales Manager for the accident airplane manufacturer, Cirrus Design Corporation; he was hired in 2001. According to the Federal Aviation Administration (FAA) Airman and Medical record files, the pilot held a commercial pilot certificate with airplane ratings for single-engine land and sea, multi-engine land, and instrument flight. The most recent issuance of the certificate was the addition of the certificated flight instructor certificate, which occurred on August 21, 2001. A second-class medical certificate was issued on June 20, 2007, with no limitations.

Company records indicated that the pilot last received a recurrent check (formulated by Cirrus) in the SR22 on December 28, 2007. During that 1.6-hour flight, the check pilot signed the performance record as all areas performed to a satisfactory level. The pilot's personal logbooks were not recovered. On the application for his medical certificate dated in March 2006, the pilot indicated that his total flight experience was 6,300 hours.

AIRCRAFT INFORMATION

The airplane was a Cirrus SR22, serial number 2537, which was manufactured in 2007. The current operator, Cirrus, purchased the airplane from a private individual in August 2007. The Teledyne Continental Motors (TCM) IO-550-N27B engine, serial number 917843, was not the engine originally installed on the airplane. The original engine experienced a malfunction on July 15, 2007 [NTSB accident report SEA07IA201], and was exchanged in October 2007. At the time of installation, the replacement engine had a total time of 174.8 hours since last major overhaul (performed by TCM), while the airframe had amassed 49 hours total time in service.

Records established that the airplane was fueled with the addition of 44.2 gallons of aviation fuel on the day of the accident.

According to the SR22 Pilot's Operating Handbook (POH):

"SR22 stall characteristics are conventional" and that "power-on stall [accelerated stalls] are marked by a high sink rate at full aft stick." The POH further states that "the stall is marked by a gentle nose drop and the wings can easily be held level or in the bank with coordinated use

of ailerons and rudder." A warning is given stating that "extreme care must be taken to avoid uncoordinated, accelerated or abused control inputs when close to the stall, especially when close to the ground."

The airplane is equipped with an electro-pneumatic stall warning system to provide and audible warning of an approach to aerodynamic stall.

According to a representative from Cirrus, the SR22 stall speeds with full power are within several knots calibrated airspeed (KCAS) as the power-off stall speeds [with a possible lower indicated air speed in the power-on maneuver]. The following speeds were provided for an airplane with the flaps retracted and in a zero-bank configuration:
- 1g maneuver: 59.1 KCAS
- 1.5g maneuver: 73.1 KCAS
- 2g maneuver: 84.4 KCAS

METEOROLOGICAL INFORMATION

The closest official weather observation station was in Paso Robles Municipal Airport, located about 10.5 nautical miles (nm) northwest of the accident site at an elevation of 836 feet mean sea level (msl). An aviation routine weather report (METAR) for the airport was issued at 1153. It stated: winds from 310 degrees at 5 knots; visibility 10 statue miles; scattered clouds at 1,700 feet; temperature 13 degrees Celsius; dew point 7 degrees Celsius; altimeter 30.26 inches of mercury.

Shortly following the accident, photographs of the accident site were taken from a helicopter by the California Highway Patrol. The photographs were taken when the airplane was engulfed in fire. The smoke emitted from the wreckage appears to not immediately disperse; rather the massive plume appears to be thick and have little horizontal movement.

The following pilot report was one of several issued that were recorded between 0000 and 1300 on the day of the accident concerning the central California region: San Luis Obispo routine pilot report; Over - 10 miles southeast of San Luis Obispo; Time - 1100; Flight level - 5,000 feet; Type aircraft - Cessna 172 single engine airplane; Turbulence - continuous light to occasional moderate turbulence between 2,000 and 5,000 feet; no other low altitude turbulence reports were received.

Safety Board investigators reviewed the Geostationary Operations Environmental Satellite number 11 (GOES-11) imagery for the following times: 1045, 1115, 1145, and 1200. The images depict orographical clouds extending to the west and northwest of the accident site over the southern portion of the mountain range west of Paso Robles and to the southeast. The clouds were best classified as stratocumulus standing lenticular and banner type clouds. The GOES-11 satellite imagery surrounding the period depicted orographic clouds over and downwind of the higher terrain and 5 minutes after the accident, showed a band of tubular or "arcus" clouds moving over the accident site, which were similar in appearance to roll clouds.

The clouds were of short duration and had moved southeastward and became less distinct about 15 minutes thereafter.

Vandenburg Air Force Base (AFB) soundings surrounding the accident time indicated a strong low-level temperature inversion. The wind profile indicated surface winds from 330 degrees at 21 knots with winds veering to the north-northeast through 4,000 feet, and then backing to the north and northwest. Several low-level wind maximums were identified, one at 1,367 feet with winds from 335 degrees at 27 knots with winds decreasing above to another maximum at 4,367 feet at 015 degrees at 28 knots. The mean wind was from 320 degrees at 31 knots. The sounding continued to supported light to moderate turbulence.

According to a Safety Board Meteorologist, rotor clouds are the lowest form of mountain wave clouds and are often referred to as stratocumulus or fractocumulus. The clouds typically form as tubular lines of cumulus, stratocumulus, or fractocumulus parallel to the ridge underneath lenticular clouds, and always imply severe or greater turbulence. Depending on the strength of the wind flow and atmospheric conditions, less developed lines may form downstream beneath the crest of subsequent waves. The base of rotor clouds is about the same height as the ridge and may extend vertically 3,000 to 5,000 feet. Violent updrafts are common in the vicinity of rotor clouds.

## WRECKAGE AND IMPACT

The Safety Board investigator-in-charge performed an on-scene wreckage documentation and initial examination on December 31, 2008, the day following the accident.

The accident site was located on the hills of an estate, with the debris stretching over 1,200 feet from the first impact marking to the farthest debris found (right main landing wheel); the main wreckage was situated close to the middle of the debris path. In character, the rolling hills were comprised of dirt and dry grass, populated by scattered oak trees typical of the central California region.

The pilot's friend was standing in his backyard when he witnessed the airplane maneuver in a southwesterly direction through a small adjacent valley. His location was about 2,050 feet from the initial impact point, which was located on the same southwestern course; a cluster of mature trees was situated between the two locations. Approximately 320 feet from the friend's house power lines ran north-south and were about 75-100 feet agl. A complete pictorial of the wreckage location with respect to the witness locations and surrounding terrain is contained in the public docket for this accident.

The main wreckage came to rest on a northeast facing slope at an elevation of about 1,063 feet mean sea level (msl), and had been subjected to severe thermal damage. The main wreckage consisted of the left wing and tail section as well as the ashen remains of the fuselage. The cabin was completely consumed by fire. The left wing was inverted, though remained on the left side of the fuselage with the leading edge facing downslope and nearly

perpendicular to the debris path. The empennage was aft of the wing spar and attached by sections of partially consumed fiberglass and steel cables; the rudder was askew from the empennage, positioned on the right side of the wreckage. All flight control surfaces were accounted for at the accident site with the exception of the left aileron. The left aileron's aluminum control surface had sections attached at the respective hinges, but the middle section was absent consistent with it being consumed by fire. The firewall was located under the main wreckage and the engine mounts were broken.

The initial impact ground scars consisted of disrupted dirt on a small berm making up the far northern end of the debris field, about 450 feet from the main wreckage. The ground scars started as two nearly parallel indentations in the vegetation and dirt spaced about 8 feet 4 inches apart. The right crater began about 1 foot before the left and stretched 8 feet while narrowing in width. The left crater was around 11 inches in width and stretched 12 feet along the debris path continuing slightly upslope. The nose landing gear strut was found 35 feet from the left crater along the debris path. The craters were consistent in size and orientation to that of the main landing gear.

A detailed wreckage and impact report with accompanying pictures is contained in the public docket for this accident.

MEDICAL AND PATHOLOGICAL INFORMATION

The San Luis Obispo County Coroner completed an autopsy on the pilot. Specimens were retained for toxicological testing both by the county laboratory and the FAA Toxicology and Accident Research Laboratory in Oklahoma City. The results of analysis of the specimens were negative for carbon monoxide, cyanide, and volatiles. Omeprazole (unquantified amount) was detected in the blood and urine specimens.

TESTS AND RESEARCH

Investigators achieved manual rotation of the crankshaft by rotation of the crankshaft propeller flange. Thumb compression was established in all cylinders. Valve train continuity was observed, with equal lift action at each rocker assembly; oil was found in the rocker box areas on all cylinders. Investigators removed the upper spark plugs of all cylinders; they were light gray in color. According to the Champion Aviation Check-A-Plug AV-27 Chart, these spark plug signatures correspond to normal engine operation. A borescope examination of the cylinders revealed no foreign object damage, no evidence of detonation, and no indication of excessive oil consumption.

There was no evidence of pre-mishap mechanical malfunction or failure observed during the examination of the engine or airframe. A detailed examination report is contained in the public docket for this accident.

Non-Volatile Memory

The Compact Flash card from the Multi Function Display (MFD) was retained and sent to the Safety Board's Vehicle Recorders Division. It was determined that the card and respective memory chips were too damaged to recover any data.

The pilot's BlackBerry device was intact and found within the debris field. The call log indicated that at 1034 on the day of the accident, a 49-second call was placed to the pilot's friend [whom reported talking to the pilot just prior to the accident].

## Pilot Information

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| **Certificate:** | Commercial; Flight instructor | **Age:** | 41,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):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane multi-engine; Airplane single-engine; Instrument airplane | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 2 Without waivers/limitations | **Last FAA Medical Exam:** | June 1, 2007 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | December 1, 2006 |
| **Flight Time:** | 6300 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Cirrus Design Corp. | **Registration:** | N254SR |
| **Model/Series:** | SR22 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 2537 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | October 1, 2007 Continuous airworthiness | **Certified Max Gross Wt.:** | 3400 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 174.8 Hrs as of last inspection | **Engine Manufacturer:** | Teledyne Continental |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | IO-550-N27B |
| **Registered Owner:** | Cirrus Design Corporation | **Rated Power:** | 310 Horsepower |
| **Operator:** | | **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:** | PRB,836 ft msl | **Distance from Accident Site:** | 10 Nautical Miles |
| **Observation Time:** | 11:53 Local | **Direction from Accident Site:** | 165° |
| **Lowest Cloud Condition:** | Scattered / 1700 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 5 knots / None | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 310° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.26 inches Hg | **Temperature/Dew Point:** | 13°C / 7°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | San Carlos, CA (SQL ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Paso Robles, CA (PRB ) | **Type of Clearance:** | None |
| **Departure Time:** | 10:30 Local | **Type of Airspace:** | |

## Airport Information

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| **Airport:** | Paso Robles Airport PRB | **Runway Surface Type:** | |
| **Airport Elevation:** | 836 ft msl | **Runway Surface Condition:** | |
| **Runway Used:** | | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | None |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | On-ground |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 35.542221,-120.522781 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Keliher, Zoe |
| **Additional Participating Persons:** | David Witt; Federal Aviation Administration; San Jose, CA<br>Bradley T Miller; Cirrus Design Corporation; Duluth, MN<br>Chris Lang; Teledyne Continental Motors; Mobile, AL |
| **Original Publish Date:** | September 26, 2008 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=67326 |

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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.