The private pilot downloaded official weather briefings onto his tablet computer the night before and again on the morning of the planned cross-country personal flight. The forecast conditions were not conducive to visual flight and included a series of storms passing through the intended flight route, which resulted in instrument meteorological conditions (IMC), high cloud tops, and the potential for icing and mountain obscuration. Despite these forecasts, the low-time, noninstrument-rated private pilot departed with his wife and their three children for the intended vacation, which included a surprise party later that night.

According to Federal Aviation Administration radar tracking data, shortly after departure, the flight began to encounter the forecast weather conditions, and the flightpath and altitude began to change as the pilot repeatedly deviated to avoid clouds. Air traffic control (ATC) personnel provided the pilot with regular reports of bands of precipitation and the potential for airframe icing along the intended direction of flight. However, the pilot chose to continue the flight, and the cloud tops ahead continued to rise. The pilot kept climbing the airplane to remain clear of the cloud tops and eventually reached an altitude close to Class A airspace, where an instrument flight rules (IFR) clearance would be required, and close to the airplane’s approved operating ceiling of 20,000 ft. The flight continued, but the airplane then began descending, and shortly after, the airplane likely entered the clouds.

An air traffic controller then offered the pilot the option to obtain an IFR clearance and continue the flight. Despite his lack of both an instrument rating and his limited experience flying in IMC, the pilot accepted. Radar data indicated that, during this period, the airplane turned abruptly left, directly toward a region of heavy precipitation. Then, shortly after accepting the IFR clearance, and likely while the pilot was distracted from controlling the airplane as he configured the airplane’s avionics, the flightpath became erratic. The airplane performed a rapid descending left turn, after which the pilot transmitted a distress call. The flight continued to progress erratically, and the pilot made another distress call, after which the controller provided the pilot vectors to a nearby airport; however, no response was received.
Subsequently, an alert notice was issued for the airplane, and the wreckage was located a few hours later.

Analysis of the debris field, airplane component damage patterns, and fracture surfaces indicated that both wings and stabilator halves separated from the fuselage in flight due to overstress resulting from excessive air loads. These air loads were likely induced by the pilot during his attempt to regain airplane control, which he lost shortly after the airplane entered the clouds. All persons on board were ejected from the airplane during the breakup sequence and sustained fatal injuries.

The reasons for the loss of control were likely the pilot’s inability to maintain airplane control in IMC; his spatial disorientation, as evidenced by the erratic flightpath; airframe icing; pitot-static system icing; or some combination thereof. Icing could not be ruled out because the airplane was in visible moisture and flew directly into and toward precipitation just before the diversion.

Although the airplane was equipped with an autopilot, variations in heading and altitude throughout major portions of the flight suggested that the pilot was likely hand-flying the airplane. According to one of the airplane’s owners, the autopilot was operational. However, the primary autopilot components were destroyed during the accident; thus, its operational status could not be determined.

The pilot had planned for the flight to last just over 2 hours and, based on his departure time, would have landed just before sunset. However, because of the weather deviations, the airplane had only reached the half-way point when the accident occurred, with about 30 minutes remaining before sunset.

The airplane was only equipped with a supplemental oxygen system sufficient for three persons. However, for more than half of the flight duration, the airplane was operating at altitudes that required all five occupants to be provided with and using oxygen. An oxygen mask was found entangled with the pilot’s jacket, and the relative clarity of his communications with air traffic control suggested that he was using supplemental oxygen.

Given the pilot was not rated for IFR and did not have adequate oxygen equipment for his family, he may have been reluctant to declare an emergency and request a climb above flight level 180 and into class A airspace, which would likely have taken him into visual meteorological conditions, but instead accepted the IFR clearance at a lower level that did not ensure he could remain clear of clouds. His decision-making under increasingly adverse conditions was likely driven by a desire to get his family to the destination for the scheduled event that evening.

Although the pilot’s autopsy identified significant coronary artery disease, there was no evidence of an old or new heart attack. Further, the pilot’s radio communications and subsequent distress call revealed no evidence to support pilot impairment or incapacitation due to the coronary disease.
Probable Cause and Findings

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

The noninstrument-rated pilot’s decision to conduct and continue the flight despite forecast and en route instrument meteorological conditions (IMC), which were not conducive to safe operation under visual flight rules. Also causal to the accident was the pilot's decision to accept an instrument flight rules clearance and fly into IMC during cruise flight, which led to his spatial disorientation and a resultant loss of control and an in-flight breakup. Contributing to the accident was the pilot’s self-induced pressure to arrive at the destination for a party that night.

Findings

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Performance/control parameters - Not attained/maintained (Cause)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aircraft structures - Capability exceeded (Cause)</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Qualification/certification - Pilot (Cause)</td>
</tr>
<tr>
<td></td>
<td>Decision making/judgment - Pilot (Cause)</td>
</tr>
<tr>
<td></td>
<td>Spatial disorientation - Pilot (Cause)</td>
</tr>
<tr>
<td></td>
<td>Aircraft control - Pilot (Cause)</td>
</tr>
<tr>
<td></td>
<td>Motivation/respond to pressure - Pilot (Factor)</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Clouds - Effect on personnel (Cause)</td>
</tr>
</tbody>
</table>
On December 19, 2015, at 1556 Pacific standard time, a Piper PA-32RT-300T airplane, N36402, experienced an in-flight breakup near Bakersfield, California. The pilot, his wife, and their three children sustained fatal injuries, and the airplane was destroyed. The airplane was registered to RAD Aviation LLC and operated by the private pilot as a 14 Code of Federal Regulations (CFR) Part 91 cross-country personal flight. Marginal visual meteorological conditions prevailed at the weather reporting station closest to the accident location, and an instrument flight rules (IFR) flight plan was activated by the pilot during the flight. The flight departed Reid-Hillview Airport, Santa Clara County, San Jose, California, at 1435, with a planned destination of Henderson Executive Airport, Las Vegas, Nevada.

The pilot and his family were travelling for vacation and were due to attend a surprise party in the Henderson area that night.

Radar tracking and audio communications information provided by the Federal Aviation Administration (FAA) revealed that, after departing San Jose, the airplane initiated a climb to the southeast. The pilot requested and received visual flight rules (VFR) flight-following services. During the initial climb, a controller from NorCal Approach provided the pilot with traffic advisories, and the pilot reported that he would like to climb to 15,500 ft mean sea level (msl) to stay above clouds.

As the flight progressed, the approach controller began issuing advisories and vectors to aircraft in the San Jose area for an approaching 10- to 15-mile-wide band of moderate-to-heavy precipitation. At 1502, the pilot contacted Oakland Center, and the airplane began to track south, leveling off at a radar-indicated altitude of 15,500 ft. Ten minutes later, the airplane began an unannounced and unrequested climb. At the same time, a westbound commercial flight (SkyWest 2955) was about 4 miles to the east and descending through an altitude of 17,700 ft for a landing approach to Monterey Regional Airport. The controller received a conflict alert, and the SkyWest crew reported that they were initiating a climb because their traffic collision avoidance system had issued a resolution advisory. The controller advised the accident pilot of the traffic conflict, requested that he maintain VFR, and asked if he was climbing. The pilot reported that he was "going to climb over the top of this (unreadable)" and reported that he would level off at 16,500 ft.

At 1516, the pilot requested a climb to 17,500 ft and a direct route to Paso Robles, California. The airplane then abruptly turned east, and 5 minutes later, it began an arcing right turn to the
south toward Paso Robles. About that time, the controller issued an advisory to VFR traffic for moderate-to-heavy precipitation south of the Panoche VOR, which was about 40 miles north of the accident airplane. At 1524, after having reached Paso Robles, the airplane began to turn east, and the pilot reported that he was turning toward Bakersfield, California. The airplane was then transferred to the control of Los Angeles Center. The airplane continued toward Bakersfield, and at 1537, when it was about 55 miles west-northwest of Bakersfield, the controller relayed, "moderate precipitation from one to two o'clock to your 9 o'clock position, first group of cells begins in about 5 miles, and then there is a secondary line from north to south that begins in about two zero miles and extends one five miles."

The pilot reported that he could see the clouds and would be watching them. Three minutes later, he reported that he would be descending to 15,500 ft, and shortly thereafter, the pilot of a Cessna 414 reported that he was over the Shafter VOR and that the cloud tops were at 18,000 ft. The accident pilot asked for clarification of the Cessna’s location, and the controller advised it was 30 miles to the east. The pilot responded, "Roger, just wondering when I can get over to their altitude and clear the clouds." The controller again alerted the pilot to areas of moderate-to-heavy precipitation along his flight route, and the pilot asked if the controller knew how high the bottoms of the clouds were; the controller responded that he did not have that information but that he was aware of light rime icing up to 19,000 ft to the southeast. The pilot responded, "Ok, we’re going to deviate to the south and try and go through Barstow." Another airplane pilot then reported cloud tops in the Palmdale area of about 21,000 ft, and the controller repeated this information to the accident pilot, advising that it was in the direction he was heading. The pilot responded, and the controller then provided another weather update, which indicated areas of moderate precipitation at the pilot’s 11- to 2-o’clock positions.

About 1550, the controller asked the pilot if he would like to file an IFR clearance to Henderson. The pilot responded that he would, requesting an altitude of 15,000 ft. About 90 seconds later, the airplane began a 90° left turn to the northeast toward Bakersfield as the controller advised he was ready with the IFR clearance. The controller provided the clearance, and the pilot read it back. The controller then asked the pilot if he was turning northbound, and the pilot stated, "Roger, I just took a heading off of Bakersfield and I’m going to change it to the current assigned IFR."

The controller then issued a heading change 10° to the right to a Piper PA46R-350T airplane which was approaching the accident airplane at the same altitude of 15,000 ft. About 45 seconds later, the controller asked the accident pilot to fly a heading of 095°. The pilot responded to the heading request; however, rather than turning right, the airplane continued the same northeast heading and then began a climbing left turn to about 350°, reaching an altitude of 15,600 ft 40 seconds later. The controller then asked the pilot to make an "immediate right turn to 095," followed by a directive to the Piper PA46R pilot to descend to 14,000 ft. By this time, the accident airplane had descended to 13,800 ft and was travelling eastbound. A few seconds later, the pilot transmitted, "air traffic control Lance 402 mayday mayday mayday," followed 20 seconds later by another mayday call. The controller provided the pilot vectors to Bakersfield; however, no response was received. Ten seconds later, at 1556:10, the last radar target was recorded, and it indicated that the airplane was at an altitude of 11,200 ft. The controller asked multiple aircraft in the vicinity if they could see or contact the accident airplane; however, they were unable to do so, and the Piper PA-46R pilot reported
that the area was enveloped in clouds.

Subsequently, an alert notice was issued for the airplane, and the wreckage was located by ground patrol units of the Kern County Sheriff’s Department at 1924. Low visibility and cloud ceilings prevented the department's Air Support Unit from deploying helicopters for the search operation.

The airplane had fragmented in flight and most of its components came to rest in an almond orchard, directly below the last radar target, about 9 miles southwest of Bakersfield.
The pilot held a private pilot certificate with an airplane single-engine land rating, which was issued in July 2012. He did not hold an instrument rating. The pilot held a third-class FAA medical certificate, which was issued on May 16, 2012. The certificate had no limitations or waivers and was valid until May 31, 2017.

Review of the pilot's flight logbook revealed a total flight experience of 269.5 hours as of December 9, 2015. He documented 3.1 hours of simulated instrument time as part of his training for the private pilot certificate in 2012 and 0.8 hour of flight experience in actual instrument conditions during two IFR training flights in February 2014; these two flights were his only documented actual IFR experience. He completed a flight review in July 2014 and received 2.8 hours of dual instruction on January 30, 2015, which included two instrument approaches. He had 28.3 hours of experience flying at night.

Most of his initial flight training had been conducted in a Cessna 172. He continued to fly the Cessna along with a Diamond DA-40 and a Piper PA-28R-200 throughout the 10 months following his private pilot checkride, during which time he received complex and high-performance airplane endorsements. In April 2013, he purchased a PA-28-236, which he flew exclusively for the next 2 years, accruing 85 hours of flight time. He flew five flights from the San Jose area to Henderson during that period.

He began flying the accident airplane 6 months before the accident, logging 26 flights and a total of 56.5 flight hours during that time. The accident flight was the first time he had flown the airplane to Henderson, and there were no logbook entries indicating he had received formal flight instruction in the accident airplane or model (FAA regulations did not require that he receive such flight training).
### Aircraft and Owner/Operator Information

<table>
<thead>
<tr>
<th>Aircraft Make:</th>
<th>PIPER</th>
<th>Registration:</th>
<th>N36402</th>
</tr>
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<tbody>
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<tr>
<td>Operator:</td>
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<td>Operating Certificate(s) Held:</td>
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</tr>
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</table>

The airplane was owned by RAD Aviation LLC, a corporation comprising a group of individual co-owners. The accident pilot was not part of the group, but he had been given permission to fly the airplane and had been added to the group's insurance policy.

The single-engine "T-tail" airplane was manufactured in 1978 and was equipped with conventional vacuum and electrically driven gyroscopic instruments for flight in IFR conditions. The airplane was powered by a turbocharged, Lycoming TIO-540-S1AD engine, serial number L-5380-61A. At the time of the accident, the airplane had accrued a total flight time of 3,840.38 hours.

An annual inspection along with an altimeter, transponder, and static system test and a standby vacuum system check were completed on April 18, 2015, about 111 flight hours before the accident. The engine was overhauled in 2009 and had accumulated almost 695 flight hours since installation. Since the last annual inspection, the directional gyro was replaced, a set of LED landing lights were installed, and the engine's oil was changed.

The airplane was equipped with an Aero Safe Guardian I electrically driven standby vacuum/pressure system and two portable oxygen systems. One of the airplane's co-owners reported that he filled the oxygen tanks before the pilot took the airplane for the trip. He further reported that the oxygen system was equipped with a total of three cannulas.

A Garmin MX20 multifunction display was installed in 2005, and in February 2013, the instrument panel was upgraded with the installation of a Garmin GNS430W Wide Area Augmentation System-certified GPS/NAV/COMM. The last documented VOR check occurred on May 12, 2014.

The airplane was approved for day and night IFR operations but was not approved or equipped for flight into icing conditions.
The airplane was equipped with its original AltiMatic IIIC autopilot (which could control the airplane in roll, pitch, heading, and altitude hold modes). An entry in the flight logbook, made by the accident pilot on August 21, 2015, stated, "Gyrocompass Inop, Autopilot Inop." A subsequent entry in the airframe maintenance logbook, dated August 28, 2015 stated, "Installed overhauled directional gyro." No further entries related to the autopilot's operational status were documented. Except for the directional gyro repair, the most recent autopilot-related entry was for the repair of the IC493 Glide Slope Coupler in 2005.

One of the airplane's co-owners stated that, to the best of his knowledge, the autopilot was operational and that he had used it regularly, including multiple times since the accident pilot's "inop" entry. He stated that it was reliable and could hold heading and altitude. The radar data indicated subtle variations in heading and altitude at various stages throughout the flight.

### Meteorological Information and Flight Plan

<table>
<thead>
<tr>
<th>Conditions at Accident Site:</th>
<th>Visual Conditions</th>
<th>Condition of Light:</th>
<th>Day</th>
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</thead>
<tbody>
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<tr>
<td>Destination:</td>
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<tr>
<td>Departure Time:</td>
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</tbody>
</table>

The pilot filed a VFR flight plan and obtained an electronic weather briefing via the CSC direct user access terminal service (DUATS) using Garmin Pilot software installed on a tablet computer. Transaction data provided by CSC DUATS revealed that the pilot initiated the briefing at 2202 the night before the accident flight and initiated another briefing at 0653 on the morning of the flight. The pilot did not call Lockheed Martin Flight Service for a telephone weather briefing nor did he activate the VFR flight plan once airborne.

The tablet computer was recovered at the accident site, and although its screen was damaged, the 0653 weather briefing was still loaded, along with the flight plan and flight route summary. The flight summary documented a total distance of 386.8 nautical miles with an average
The filed flight route indicated a departure from San Jose at 1400 with waypoints of Paso Robles Municipal Airport, Paso Robles, California, and Meadows Field Airport, Bakersfield, California, at an altitude of 13,500 ft. The filed en route flight time was 2 hours 4 minutes, and the flight plan indicated 4 hours 28 minutes of fuel onboard, and a true airspeed of 165 knots.

The airplane was not equipped with a weather radar system nor a data uplink system that would have allowed weather to be updated in flight to either the Garmin MX20 or the Garmin Pilot software. Additionally, although the version of Garmin Pilot software used by the pilot was GPS enabled, it did not have the capability to log flight track data.

Synoptic Conditions

The National Weather Service (NWS) Surface Analysis Chart for 1600 depicted a low pressure center immediately south of the accident site. From this low-pressure center, a cold front extended south, then southwest over the Pacific Ocean. Extending east from the low pressure center was a short stationary front with a cold front extending northeast and east. NEXRAD area imagery for the same period depicted light-to-moderate values of reflectivity over much of the accident region.

Area Forecast

An area forecast that included the central portion of the state of California was issued at 1245 by the Aviation Weather Center in Kansas City, Missouri. The area forecast for the San Joaquin Valley for the accident time included ceiling broken at 1,000 ft with cloud tops to flight level (FL) 200, visibility of 3 to 5 statute miles, mist, and scattered light rain showers.

AIRMETs and SIGMETs

AIRMET advisories for IFR conditions, mountain obscuration, and moderate icing (between the freezing level and FL180) were active for the accident site at the accident time. These AIRMETS were included in the pilot's most recent weather briefing.

There were no convective or nonconvective SIGMET advisories active for the accident location at the accident time.

Surface Observations

An Automated Surface Observation System was located at BFL at an elevation of 509 ft. A METAR report at 1554 indicated wind from 170° at 3 knots, 4 miles visibility with light rain and mist, ceiling 5,000 ft broken with an overcast cloud layer at 6,500 ft, temperature 09°C, dew point 08°C, and an altimeter setting of 29.97 inches of mercury. Precipitation in the last 3 hours was 0.08 inch, with 0.02 inch in the last hour.

Conditions continued to deteriorate after the accident, which resulted in three special METARS being issued over the next hour until visibility had dropped to 1 1/2 miles with mist and an
overcast 200-ft ceiling.

Clear skies and visibilities of 10 miles and greater prevailed at Henderson throughout most of the day. However, at 2256, light rain was reported with scattered clouds and an overcast ceiling of 9,000 ft.

Weather Radar

NEXRAD Level-II base reflectivity imagery from the San Joaquin Valley, California, indicated a 17,000-ft high band of reflectivity stretching directly in front of, and perpendicular to, the airplane’s position/track at 1552. Over the next 3 minutes, the airplane entered the band and rather than continuing its track through the band, it turned northeast toward Bakersfield, toward the heavier areas of reflectivity.

Satellite Imagery

Geostationary Operational Environmental Satellite-15 data imagery from 1600 identified cloudy conditions over the accident region with the last portion of the accident flight, as the airplane turned northeast, occurring among an area of higher cloud tops, with heights reaching about 18,000 ft. To the west, minimum cloud top heights were about 8,500 ft. The imagery appeared to show an overcast cloud layer stretching about 100 miles back along the already-
traveled flight route.

Area Forecast Discussion

The NWS Weather Forecast Office issued an area forecast discussion at 1413. The forecast described a storm system that was impacting the Central California interior with rain in the San Joaquin Valley area. The forecast discussed a second system that was due to come through later the following day with unsettled weather predicted through most of the remaining week.

Pilot Reports

After the accident, a pilot who had been flying in the Tehachapi area (40 miles east-southeast of the accident site) on an IFR clearance at 12,000 ft reported that he encountered moderate rime/mixed ice with no turbulence beyond a few "bumps." The pilot who was flying the Piper PA-46R airplane that was receiving vectors to avoid the accident airplane over Bakersfield reported that he departed the San Francisco area en route to Riverside and flew at 15,000 ft and below. The initial portion of flight was clear, and he eventually traversed a cold front and needed to deviate around severe weather and cloud tops, which were reported to be reaching FL210. He estimated that the tops were about 16,000 ft in the Bakersfield area and added that, when flying through clouds, the airplane picked up traces of ice "if any," and he encountered, at most, light turbulence.

Sunset

Sunset at Henderson occurred at 1628, and civil twilight ended at 1657.

Photographic Images

A damaged camera was recovered from the accident site. The camera's memory card contained a series of photographs, which appeared to be taken by a passenger in the front right seat about 1520 on the day of the accident. Some of the photographs included a reflection of the sun on the upper forward surface of the right wing, indicating that the airplane was most likely traveling south at that time. The airplane was above a broken layer of stratocumulus clouds, and a vertical development of clouds similar in appearance to cumulus mediocris could be seen to the west, with peaks about level with the airplane.

For more information about the weather, see the Weather Study contained in the public docket for this accident.
### Wreckage and Impact Information

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<th>Crew Injuries:</th>
<th>1 Fatal</th>
<th>Aircraft Damage:</th>
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<tbody>
<tr>
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<td>Ground Injuries:</td>
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</tr>
</tbody>
</table>

All of the wreckage was located within the confines of the orchard, which was at an elevation of 340 ft. The debris field was 1/2-mile-long and 700 ft wide on a south-to-north orientation. Heavier components, including the engine and forward cabin, were in an irrigation ditch at the southernmost point of the field. Cabin seats, baggage, and the vertical stabilizer were located about 800 ft north of the engine with both wings and multiple cabin roof fragments located 400 ft farther north. Lighter debris consisting of shredded sections of cabin sheet metal and both the left and right sides of the stabilator were located 700 ft farther north, and the left aileron was the last component found in the debris path. The occupants were all located at the southern end of the debris field.

Neither the airframe nor engine exhibited any indications of thermal damage.

### Right Wing

The right wing had separated from the airplane at its root, and it came to rest largely intact at the accident site. The wingtip had twisted about 90° leading-edge-down, and the inboard 12 inches of the wing leading edge exhibited green paint transfer marks, which matched the color of the fuselage. The main spar was fractured at the main spar splice joint and was buckled and deformed, and the upper and lower wing skins exhibited diagonal wrinkling. The flap, aileron, and its balance weight were still attached. There was a single impact impression on the forward aileron stop with no evidence of repeated impact on the forward and aft stops that would be consistent with aerodynamic flutter.

The forward wing attachment point was intact, and the fuselage fitting had pulled from the fuselage. The main spar upper and lower caps were fractured, and the upper spar cap exhibited upward deformation at the fracture locations. The lower spar cap exhibited a less pronounced upward deformation. All fracture surfaces exhibited a dull, grainy appearance.

### Left Wing

The left wing remained attached to the center fuselage section and was mostly intact. The flap remained in place, and most of the left aileron skin had detached with the inboard and outboard aileron hinges remaining attached to the wing. There was no obvious deformation of the main or aft wing spars along their lengths, and the forward and main wing attachment points were intact.

### Center Section and Fuselage
The fuselage structure was highly fragmented. The wing center section and lower fuselage were intact between the wing roots. The right wing upper spar cap was deformed upward. There was no obvious deformation direction to the right wing lower spar cap. The center section main spar fractures on the right side matched those observed on the right wing. All fracture surfaces exhibited a dull, grainy appearance.

Empennage

The empennage had fragmented into multiple pieces with the vertical stabilizer remaining attached to a portion of the upper fuselage. The upper half of the vertical stabilizer displayed damage and buckling consistent with torsion load to the left. The left and right sides of the stabilator had detached from the vertical stabilizer fitting. The stabilator hinges remained intact and attached to the fitting, the stabilator stops exhibited no evidence of repeated contact that would be consistent with aerodynamic flutter, and the stabilator balance weight remained attached.

The right stabilator main spar was fractured near the root rib, and the upper skin on the right stabilator and inboard face of the leading-edge root rib exhibited green paint transfer marks. The left stabilator main spar was fractured about 10 inches outboard of the root. There were green paint transfer marks on the left stabilator upper leading edge skin. All stabilator spar fracture surfaces exhibited a dull, grainy appearance.

Flight Controls

The primary flight control cables were traced from the cockpit to their respective flight control surfaces. All cables were broken at varying locations consistent with the breaks in the structure. All the cable ends had a splayed, broom-strawed appearance.

Engine

The engine remained partially attached to its mount, which was attached to the forward cabin.

The upper side of the engine sustained crush damage, flattening the pushrods and intake manifolds around the cylinder heads and severing all spark plug leads at the spark plugs. The flywheel, along with the propeller and hub, remained attached to the crankshaft, and the six engine cylinders remained attached to the crankcase. The oil dipstick was in place at the filler neck, which was crushed.

The oil sump had fragmented, revealing the inside of the crankcase lower chamber and the bent oil dipstick. The servo throttle body had been crushed and fragmented. The turbocharger and all exhaust pipes remained attached; the inlet to the turbocharger compressor cover was clogged with mud, crushed, and impinged against the compressor wheel. The compressor wheel was intact, and two blades were bent at the point of contact with the cover. The turbine wheel was intact and coated, along with the inner surface of the exhaust pipe, with light-colored tan deposits.
The accessory case was cracked, which liberated the dual magneto, turbo scavenging pump, and engine-driven fuel pump. Both pumps rotated smoothly when turned by hand via their input shafts. All fuel and oil lines throughout the engine compartment were intact and secured at their respective fittings.

The dual magneto case had shattered, separating the spark plug leads and resulting in the crushing and expulsion of the magneto's internal components. Removal of the top spark plugs revealed that the plugs for the Nos. 2, 4, and 6 cylinders were wet with oil; the plugs for the Nos. 1, 3, and 5 cylinders exhibited grey and tan deposits. When compared to the Champion Aviation Check-A-Plug chart, all the plugs exhibited worn out to normal signatures. Borescope examination of the cylinder chambers via the upper plug holes revealed no indications of catastrophic failure.

The fuel selector valve was disassembled and contained 3 ounces of clear, blue-colored fuel.

Vacuum System

The primary vacuum pump had separated from its engine pad, exposing the plastic coupling, which was intact. The electrically driven backup vacuum pump assembly was intact at the firewall. Both pumps were disassembled and examined. The primary pump exhibited fracture damage to its graphite rotor, and all its vanes were intact. The graphite components of the secondary pump were undamaged. Neither pump exhibited indications of prior failure or binding, and the vacuum filter was clear.

Oxygen System

The two portable oxygen tanks were located at separate locations within the debris field. Both had completely detached from the airframe and sustained impact damage with the connection ports separated from the manifold of one tank. The flow valves for both tanks were in the partially open position, and the pressure gauges both indicated empty. A total of three cannulas and various lengths of oxygen supply tubing were found distributed throughout the debris field. One cannula was located with the youngest passenger, the second was found in the middle of the debris field, and the third was located in a tree entangled with the pilot’s jacket.

Autopilot and Flight Instruments

The autopilot and flight instrument components sustained extensive damage during the breakup and ground impact sequence, which prevented any assessment of their functionality or operational status at the time of the accident.

All flight instruments were crushed and fragmented within the instrument panel, with the exception of the engine tachometer. Likewise, most of the cabin switches were damaged, such as pitot heat, which prevented an accurate determination of their positions at the time of the accident.

The autopilot control head assembly was crushed and twisted within the main instrument
panel, and most of its control switches had separated from the face. The selection switch on the VOR/LOC coupler assembly was set to the "HDG" position.

Medical And Pathological Information

The Kern County Sheriff-Coroner's Office performed an autopsy of the pilot. The cause of death was reported as "multiple blunt force trauma."

The report noted that the pilot weighed 190 lbs. Evidence of coronary artery disease was identified; no other significant natural disease was found.

The FAA's Bioaeronautical Sciences Research Laboratory conducted toxicological tests on the pilot specimens. The testing was negative for carbon monoxide, ingested alcohol, and any screened drug substance.

Additional Information

Weight and Balance

Fueling records provided by a fixed-base operator at San Martin Airport, San Martin, California, revealed that the airplane had been serviced with 59.26 gallons of 100 low-lead aviation fuel from the self-service pump 10 days before the accident. According to the airplane flight logbook, the accident pilot then flew the airplane that day, returning it to San Jose, for a flight time of 0.6 hour. The logbook did not contain any other flight entries until the accident flight. According to one of the airplane's co-owners, the partnership agreement stated that the fuel tanks should be topped off after each flight.

The distribution of the airplane contents throughout the debris field prevented an accurate weight and balance assessment, and the airplane's most recent weight and balance records could not be located. However, an estimated weight and balance calculation was conducted.

According to the airplane's original Pilot's Operating Handbook (POH) and FAA-approved Airplane Flight Manual, the airplane had a factory basic empty weight of 2,082 lbs and a useful load of 1,518 lbs. The medical examiner reported that the total weight of all occupants was 604 lbs. The baggage and cabin contents recovered from the debris field totaled about 170 lbs. Therefore, assuming a total fuel load of 60 gallons, the airplane would have been about 384 lbs below its maximum gross weight of 3,600 lbs at the time of the accident.

Airspeed and Altitude Information

The POH, Section 2.3, "Airspeed Limitations," stated that the airplane's never-exceed speed was 189 knots calibrated airspeed (KCAS) and that the maximum structural cruising speed
(VNO) was 150 KCAS. The POH noted, "Do not exceed this speed [VNO] except in smooth air and then only with caution." The POH also listed design maneuvering speeds (VA) for gross weights of 3,600 lbs (132 KCAS) and 2,170 lbs (109 KCAS) and noted that full or abrupt control movements should not be made above VA.

The POH, Section 2.23, "Operating Limitations Altitude," stated that flight above 20,000 ft was not approved and that flight up to and including 20,000 ft was approved if the aircraft was equipped with oxygen in accordance with Federal Aviation Regulation (FAR) 23.1441 and avionics in accordance with FAR 91 or 135.

Airplane Performance Study

An airplane performance study was conducted to determine the events leading up to the inflight breakup. The study used radar data, winds aloft information, debris locations and covered the last 22 minutes of flight. An airplane gross weight of 3,600 lbs was used for the study.

About 1552, when the airplane began the 90° left turn toward Bakersfield, it was about 14,900 ft. Within 34 seconds, as the air traffic controller was providing the pilot his IFR clearance, the airplane had reached 168 KCAS (above the maximum structural cruising speed). The airspeed then began to decrease, and, about 2 minutes later, the airplane reached 15,500 ft at 145 KCAS and was turning left to the northwest. Interpolation of radar data indicated that the airplane then performed an abrupt left turn from about 300° to 89° during the 4.5 seconds between radar returns and lost about 1,000 ft of altitude. Presuming that the maneuver was conducted in coordinated flight, the turn corresponded to a rate about fifteen times faster than standard and imposed a load factor of about 2.8 g’s.

The pilot then transmitted the first mayday call, and the airplane continued to descend while tracking generally east and "zig-zagging" to the north and south. The airplane continued to descend during this final period as the airspeed varied from 150 to 90 KCAS and then back to 145 KCAS. The airplane's final radar return at 1556:10 placed it on a 20° track, at 11,200 ft, and almost directly above the north end of the debris field. For most of the last 22 minutes of flight, the airplane's airspeed was at or above the 132 KCAS maneuvering speed.

Airspace

Class A airspace is generally classified as the airspace from 18,000 ft msl up to and including flight level 600. Additionally, CFR 91.135 states that unless otherwise authorized, all operation in Class A airspace is conducted under instrument flight rules.

Supplemental Oxygen Requirements

Title 14 CFR 91.211 states the following:

No person may operate a civil aircraft of U.S. registry
(1) At cabin pressure altitudes above 12,500 feet (MSL) up to and including 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen for that part of the flight at those altitudes that is of more than 30 minutes duration;

(2) At cabin pressure altitudes above 14,000 feet (MSL) unless the required minimum flight crew is provided with and uses supplemental oxygen during the entire flight time at those altitudes; and

(3) At cabin pressure altitudes above 15,000 feet (MSL) unless each occupant of the aircraft is provided with supplemental oxygen.

Radar data indicated that for the last 51 minutes of flight before the mayday call diversion, the airplane flew at mode C reported altitudes varying between 15,075 and 17,750 ft.

Administrative Information

<table>
<thead>
<tr>
<th>Investigator In Charge (IIC):</th>
<th>Eliott Simpson</th>
<th>Adopted Date:</th>
<th>05/16/2017</th>
</tr>
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<tr>
<td>Additional Participating Persons:</td>
<td>Michael Coberly; Federal Aviation Administration; Fresno, CA</td>
<td></td>
<td></td>
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<td>Charles Little; Piper Aircraft; Vero Beach, FL</td>
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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.