# Aviation Investigation Final Report

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| **Location:** | Four Corners, California | **Accident Number:** | WPR18FA013 |
| **Date & Time:** | October 21, 2017, 16:12 Local | **Registration:** | N414MT |
| **Aircraft:** | Flugzeugproduktions-und Vertri EA 300/L | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | Unknown or undetermined | **Injuries:** | 2 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Instructional | | |

## Analysis

The commercial pilot and passenger departed in the aerobatic airplane to an area established by the operator for accomplishing aerobatic maneuvers. Although operating as a flight training company, the operator described itself as an "extreme aviation attraction," providing a series of aviation-related experiences that included aerobatics, simulated air combat, and flight training, during which passengers had the opportunity to fly the airplane. The accident flight was a 25-minute-long "Top Gun" experience, which incorporated aerobatics, high-g maneuvers, and a low-level bombing run simulation.

Radar data revealed that the airplane flew to the standard practice area while performing the maneuvers. About that time, witnesses observed the airplane performing aerobatic maneuvers, then watched the airplane descend to the ground. One witness stated that he could see the airplane spiraling down behind a ridge. Another, who was closer to the accident site, stated that the airplane appeared to be descending at a rapid rate. He then heard popping sounds as the airplane passed behind a ridge and impacted the ground. Another witness, who was familiar with the aerobatic operations in the area, stated that the airplane appeared to be flying more aggressively than usual.

An accurate analysis of the final stages of the flight could not be derived due to the sample rate of the radar data relative to the airplane's rapid aerobatic movements.

An aft-facing onboard camera, mounted in front of the passenger was recording throughout the entire flight. The video revealed that the airplane was performing aerobatic maneuvers for about 7 minutes with both the pilot and passenger manipulating the controls. After the pilot completed a tumble maneuver, the airplane began to regain altitude. The passenger then moved his hands away from the flight controls and appeared to be bracing his arms against the sides of the airframe in anticipation for an aerobatic maneuver. The airplane then pitched up and rolled right, and then rolled left while the pilot made a "whooping" sound, as the airplane transitioned into an inverted spin. The passenger experienced negative g forces and reached up with his right arm up to secure the headphones that were pulling away from his head. The maneuver progressed, and its direction of rotation then reversed, until the airplane

transitioned into an attitude such that only the sky was visible in the canopy.

The wind noise began to increase, and a gap began to appear at the interface between the canopy frame and fuselage, indicating that the airplane was approaching its never exceed speed. The passenger then began to aggressively be rocked from side to side; however, the sun could be seen gradually transitioning across the canopy, indicating the airplane was no longer tumbling and its attitude had stabilized. Up until this point, the passenger appeared to be enjoying the flight, but his facial expression changed, and he looked down and reached forward with his right hand. At that moment, the pilot activated the canopy release handle and the canopy opened. The camera was ejected, and continued to record as it descended to the ground, capturing the airplane collide with terrain 6 seconds later.

The violent rocking movement experienced by the passenger in the final seconds did not correspond to the gradual movement of the sun in the canopy, and was likely a result of the pilot applying rapid control inputs, possibly to the rudder, in an attempt to regain airplane control. The pilot released the canopy very shortly after the rocking movements began, so it is likely that he quickly deduced that recovery was not possible and that a bailout was necessary. The collision with terrain happened so fast after canopy release that a successful bailout was unlikely. Both occupants' seat belts were found in the latched and locked positions, further indicating that they did not have enough time to egress the airplane. Likewise, both occupants were wearing parachutes, neither of which had been deployed.

The video did not reveal any evidence of bird strike, fire, canopy failure, or flight control separation, and the passenger appeared to be conscious throughout the entire recording. Sound spectrum analysis revealed that the engine was operating within its normal operating speed range prior to the canopy opening.

The passenger's seatbelt harness was loose throughout the flight, and he could be seen moving up, down, and forward throughout the maneuvers, with particularly accentuated movement during the maneuver leading up to the accident. The position of his feet during the final maneuver could not be determined, however, inadvertent flight control interference could not be ruled out as he braced himself against the effects of the negative g-forces while secured with a loose seatbelt.

The debris field and wreckage distribution indicated that the airplane impacted the ground in a near-vertical attitude at high speed. The airplane was heavily fragmented during the impact, but remnants of all flight control surfaces were found within the immediate vicinity of the accident site.

The airplane had recently been purchased by the operator, and although it was about 8 years old, it had very low total flight time. Post impact examination did not reveal any anomalies with the airframe or engine that would have precluded normal operation; however, due to the extensive damage sustained during impact, such anomalies could not be ruled out.

The airplane was subject to two service bulletins (SB) pertaining to the flight controls, neither of which had been performed. The first required replacement of the rudder cable to prevent premature failure, however the airplane's rudder cable did not display evidence of failure in the area documented by the SB. The other SB required the addition of a safety clamp to the transponder after a report that a transponder had slid out of its rack and jammed against the pilot control stick during aerobatic maneuvers. It could not be determined if the transponder had moved during the accident flight and

inhibited the control stick.

Federal Aviation Regulations do not require compliance with SB's for aircraft operating under 14 *Code of Federal Regulations(CFR)* Part 91.

Due to the physical trauma to the occupants, it was not possible to confirm or eliminate preexisting natural diseases that may have occurred before the accident. No samples definitively attributed to the pilot were available for toxicological testing, and only limited samples were available from the passenger.

Federal Aviation Regulations require commuter and on-demand operators to be appropriately certificated under 14 CFR Part 135; as such, their operations, pilots, and aircraft are subject to Federal Aviation Administration (FAA) regulations and oversight that exceed that of Part 91 operations. Part 135 also prohibits passengers from manipulating the flight controls, and FAA guidance generally does not allow anyone operating under Part 91 to advertise their services, however, exceptions exist for flight training.

The operator presented itself as a 14 CFR Part 61 flight school, and although they did provide upset recovery and tailwheel endorsement flight training and all the company pilots held flight instructor certificates, the vast majority of customers (including the accident passenger) did not hold any type of pilot certificate, and purchased flights for the aerobatic and air combat experience. Further, the operator's facilities were outfitted with equipment to host parties, including a bar, dart boards, pool tables, and basketball hoops. The company's website and sales literature was clearly directed toward the adventure and experience side of the business and contained numerous references to sightseeing. The operator employed a marketing director and actively advertised its services, often to groups, for corporate events and birthday, retirement, and wedding celebrations. Very little of the advertising was related to traditional flight training.

The operator's president stated that he had conferred with the FAA and made attempts to identify the appropriate operations category, and it was on that basis that he had chosen to establish the company as a Part 61 flight school operation. Limited FAA oversight exists for Part 61 operations, and there are essentially no regulations specifically tailored for the certification and comprehensive oversight of the "adventure flight" category that the company was essentially operating under.

Therefore, by operating as a Part 61 flight training provider, the company was able to advertise its services, expose fee-paying passengers to high-risk flight profiles, while circumventing the regulations and oversight for operators who provide transportation for compensation or hire.

The operator was involved in four other accidents in the previous 3 years, one of which resulted in two fatalities, and one of which was never reported to the NTSB, although it was required to be based upon the damage sustained to the airplane. Additionally, the operator was involved in two FAA enforcement actions during the same period, all involving incidents with passengers on board. In one case, a pilot's certificate was suspended for careless and reckless flying. In another, the FAA concluded that the pilot was likely acting carelessly and sanctioned him with safety awareness counselling.

Review of onboard video footage from the accident pilot's previous flights revealed that, although

considered to be a mentor and conservative in nature by his colleagues, the pilot routinely flew airplanes beyond their operating limitations (specifically their vertical acceleration, or g limitations) and at speeds very close to the never-exceed speed, all with passengers on board. Review of footage taken with other pilots revealed a company-wide pattern of disregard for the airplane's published operating limitations and the company's own policies regarding airspeed and g limitations. Because both the accident airplane and other airplanes in the company fleet had been flown beyond their rated g limits, they would have been required to undergo additional maintenance checks. There was no evidence that such checks had ever been performed on the accident airplane; as such, the airplane was likely unairworthy at the time of the accident.

Both the company's ineffective internal controls and their ability to operate in an environment where limited FAA oversight existed allowed these behaviors and violations to continue.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Collision with terrain after the pilot was unable to regain airplane control during an aerobatic maneuver. Contributing to the accident was the operator's failure to provide effective internal oversight to identify and prohibit exceedance of the airplanes' performance parameters, and the lack of regulatory framework available to oversee and regulate such flight operations.

### Findings

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| **Personnel issues** | Aircraft control - Pilot |
| **Aircraft** | (general) - Not attained/maintained |
| **Organizational issues** | Oversight of personnel - Operator |
| **Organizational issues** | Adequacy of policy/proc - FAA/Regulator |

# Factual Information

## History of Flight

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| **Maneuvering-aerobatics** | Unknown or undetermined (Defining event) |
| **Maneuvering-aerobatics** | Collision with terr/obj (non-CFIT) |

On October 21, 2017, at 1612 Pacific daylight time, an EXTRA Flugzeugproduktions-und Vertriebs-GmbH, EA 300/L, N414MT, collided with terrain within the watershed of the El Capitan Reservoir, near Four Corners, California. The flight instructor and passenger sustained fatal injuries and the airplane was destroyed. The airplane was registered to KD Leasing, LLC, and was being operated by California Extreme Adventures, LLC, doing business as Sky Combat Ace (SCA), as a Title 14 *Code of Federal Regulations (CFR)* Part 91 instructional flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight, which departed Gillespie Field Airport (SEE), San Diego/El Cajon, California, at 1557.

SCA's website described itself as an "extreme aviation attraction," providing a series of aviation-related experiences, which it described as including aerobatics, air combat, and flight training. The accident flight was a 25-minute "Top Gun" experience which, according to sales literature, included "Advanced Aerobatics," "Basic Aerobatics," a "Low Level Bombing Run," "You Fly Maneuvers," and "You Fly Departure."

Ground-based radar tracking data provided by the Federal Aviation Administration (FAA) indicated that the airplane departed from runway 17 at SEE and initiated a climbing left turn, reaching a transponder-reported altitude about 4,700 ft mean sea level (msl) about 5 nautical miles (nm) northeast of the airport. For the next 10 minutes, the airplane followed a track northeast along the general path of the San Diego River, then east of the El Capitan Reservoir and north toward the town of Four Corners. The track depicted a meandering path at varying airspeeds and altitudes between 4,300 and 6,300 ft msl in a manner consistent with aerobatic maneuvers. Multiple witnesses along the route reported seeing an airplane performing aerobatic maneuvers about the time indicated by the radar data.

At 1610, the airplane was about 15 nm from SEE and just north of the reservoir. It then began to track back to the southwest, climbing from 5,000 ft msl to 6,900 ft msl over the next 90 seconds. About 15 seconds later, the last radar return was recorded at the northern edge of the reservoir at an altitude of 3,800 ft msl (about 3,000 ft above ground level).

One witness, who was piloting a motorglider, was flying southwest and was inbound for SEE at 4,500 ft msl when she observed an airplane trailing white smoke and performing aerobatic maneuvers. The airplane was ahead of her and appeared to be at an altitude of about 3,500 ft msl at the northern end of the reservoir. As the witness's glider got closer to the airplane, the airplane was leveling out at the bottom of a loop when the smoke stopped. The witness was concerned that the other pilot would not see her, so she banked the glider to the left in order to present the glider's long wing profile to the other airplane for increased conspicuity. She then passed the airplane and did not see it again. The witness stated that the aerobatic maneuvers appeared standard and that the airplane did not appear to be in

distress.

A witness who was in her residence about 3 miles north of the accident site stated that she was very familiar with the aerobatic operations in the area and had seen airplanes perform maneuvers in the same general location many times before. She stated that she was often drawn to look at the airplanes because she found the sound annoying. On this occasion, she noticed that the airplane was being flown either faster, more "recklessly," or more "intense" than usual, with sharper turns than she was used to seeing. She saw white smoke, but it was thicker than usual and lasted much longer. A short time later, the noise had stopped, and she saw a plume of smoke rising from the ground below.

Another witness was also about 3 miles north of the accident site. He saw the airplane perform two "giant" loops, after which it began to climb and then started to "corkscrew" toward the ground. It then disappeared behind a ridge. Initially, he did not think anything was unusual because he had previously seen airplanes perform similar maneuvers over the same area; however, a few minutes later, he saw smoke rising from behind the ridge.

Another witness, located at a camping area about 1 mile northeast of the accident site, stated that he could hear an airplane performing maneuvers. He said that he heard a "dive" sound like the sound airplanes typically make in movies. The engine noise then stopped, and he heard a "pop pop" sound, followed a few seconds later by the sound of an impact. He looked toward the direction of the impact sound and saw a rising plume of black smoke.

## Flight instructor Information

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| **Certificate:** | Commercial; Flight instructor | **Age:** | 54,Male |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Rear |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | 5-point |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane multi-engine; Airplane single-engine; Instrument airplane | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 With waivers/limitations | **Last FAA Medical Exam:** | December 12, 2016 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | March 8, 2016 |
| **Flight Time:** | (Estimated) 4289.2 hours (Total, all aircraft), 113 hours (Total, this make and model), 120 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft) | | |

Flight Instructor

The pilot was hired by SCA in May 2017, and according to the president of SCA, quickly came to be considered one of the company's most dependable and reliable pilots. The president stated that he was a good mentor, was conservative in nature, and provided supervision for some of the younger pilots. He further stated that the pilot was well-suited to work unsupervised at SCA's smaller SEE location.

The pilot's resume included experience in manufacturing and engineering until 2002, when he began to work as both a flight instructor and a commercial air tour pilot in the Southern California area. His experience included aerobatic, tailwheel, and emergency maneuver training in both the Pitts and Extra 200 series of aerobatic airplanes.

The pilot held a commercial pilot certificate with ratings for airplane single- and multiengine land and instrument airplane. He also held a flight instructor certificate with ratings for airplane single- and multiengine, instrument airplane, and ground instructor (advanced).

His most recent FAA medical examination was conducted on December 12, 2016, following which he was issued a second-class medical certificate with the limitation that he must wear corrective lenses.

The last entry in the pilot's flight logbook was dated October 15, 2017. At that time, he had documented 4,289.3 total hours of flight experience, with 2,246.2 as a flight instructor. The logbooks revealed that he had accrued about 113 hours of total flight experience in the Extra 300 series, all since he first flew the type as part of his SCA initial hire training in May 2017. There were no entries indicating that he had flown the accident airplane; review of SCA records indicated that the accident flight was likely the third time he had flown it. The Extra 300 airplane that he usually flew was being used in Florida as part of an event. It was used because it was more suited for the cross-country trip, because it had a heater and autopilot, unlike the accident airplane.

SCA's base of operations was located near Las Vegas at Henderson Executive Airport (HND), Henderson, Nevada. The pilot was based in San Diego, and the day before the accident, he flew from there to Las Vegas by commercial airline and had dinner with SCA employees that night. SCA had sleeping quarters in Henderson. According to a company employee, all rooms were taken the night before the accident, so the pilot slept on a couch (which he had done before). He was observed to retire about 2200. No witnesses observed what time the pilot woke up, but one stated that it was not unusual for him to rise at 0600 and go for a run. All individuals who were with him stated that he was in good spirits, and none observed anything out of the ordinary.

About 1000 on the morning of the accident, the pilot flew a customer on a group combat mission from HND in an Extra 300 airplane. He then flew back to the SEE facility in the accident airplane with the company's director of marketing. The accident flight was his third flight of the day.

Passenger

The passenger did not hold any FAA pilot or medical certificates. He had had flown with SCA on a similar flight in December 2015 out of SCA's HND location.

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Flugzeugproduktions-und Vertri | **Registration:** | N414MT |
| **Model/Series:** | EA 300/L | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 2009 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Aerobatic; Normal | **Serial Number:** | 1300 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | October 1, 2017 100 hour | **Certified Max Gross Wt.:** | 2095 lbs |
| **Time Since Last Inspection:** | 12 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 186.57 Hrs as of last inspection | **Engine Manufacturer:** | LYCOMING |
| **ELT:** | C126 installed, not activated | **Engine Model/Series:** | AEIO-580-B1A |
| **Registered Owner:** | KD LEASING LLC | **Rated Power:** | 310 Horsepower |
| **Operator:** | California Extreme Adventures LLC. | **Operating Certificate(s) Held:** | None |
| **Operator Does Business As:** | Sky Combat Ace | **Operator Designator Code:** | |

The tandem-seat normal and aerobatic category airplane was manufactured in 2009, imported into the US in 2013, and purchased by KD leasing on May 10, 2017. The airplane was equipped with dual flight controls, a Lycoming six-cylinder AEIO-580-B1A engine, and a three-blade hydraulic constant-speed propeller manufactured by MT Propellers. FAA and maintenance records did not reveal any modifications to the airplane beyond the installation of a remote oil filter kit. According to the maintenance records, at the time of the last 100-hour inspection on October 1, 2017, the airframe and engine had accrued a total of 186.57 flight hours.

The airplane had a basic empty weight of 1,513 lbs and a maximum takeoff weight (MTOW) of 2,095 lbs. The maneuvering speed limitation (Va) in the aerobatic category was 158 knots indicated (KIAS). The never-exceed (Vne) speed was 220 KIAS. The airplane was placarded with the following:

CAUTION: Particular caution must be exercised when performing maneuvers at speeds above Va (158 KIAS). Large or abrupt control inputs above this speed may impose unacceptably high loads which exceed the structural capability of the aircraft.

The airplane had g limitations in the aerobatic category of +/-10 g. This limit was only allowed with one person onboard, at a MTOW of 1,808 lbs. In a two-person configuration, the limits were +/-8 g at 1,918 lbs MTOW and +/-6 g at 2,095 lbs MTOW.

The pilot was seated in the rear seat for the accident flight. With a pilot weight of 173 lbs, passenger weight of 195 lbs, 30 lbs of parachute equipment and 25 gallons of fuel, the airplane's weight on the accident flight would have been about 2,061 lbs.

The airplane was equipped with a mechanical accelerometer (g-meter) which had a sweep range of -6 g

to +10 g. The unit had maximum and minimum g needles that recorded the highest and lowest sensed g values, respectively. Both needles could be reset to zero using a button on the front of the instrument bezel.

The airplane was equipped with a one-piece plexiglass and composite canopy, which was fixed by three hinges on the right side and was opened by the pilot lifting it to the right. It had forward and aft interior locking handles, which were painted bright red and located on the left side of the canopy frame and within reach and view of both seats. The canopy was unlocked by squeezing the handles together, whereby three locking pins on the left side of the canopy would slide forward and out of locking sleeves mounted to the airframe. According to the airplane's information manual, if unlatched during normal flight, the canopy will open automatically due to low pressure over its surface. The canopy can be jettisoned by pushing it forward while opening.

The airplane manufacturer issued two service bulletins (SBs) applicable to the accident airplane's model. SB 300-1-15 was issued on May 5, 2015, following reports of throttle cable failures; it recommended the inspection and replacement of the throttle cable. SB 300-1-11 was issued July 18, 2011, after a report that a transponder had slid out of its rack and jammed against the control stick during aerobatic maneuvers; it recommended the installation of a safety clamp.

The FAA issued Special Information Airworthiness Bulletin (SAIB) CE-12-01, applicable to the accident airplane's model, on October 24, 2011, after receiving a report of a severely frayed stainless steel rudder cable. The SAIB recommended careful inspection of the rudder cable and its eventual replacement with a galvanized version, when available.

The maintenance records for the airplane contained no record of compliance with SB 300-1-15, SB 300-1-11, or SAIB CE-12-01. Federal Aviation Regulations do not require compliance with SBs or SAIBs for aircraft operating under 14 CFR Part 91.

During the investigation, multiple parties contacted the NTSB regarding a rudder pedal inspection airworthiness directive (AD 98-24-07) that had been issued for the airplane type. Subsequent research indicated that this AD was not applicable to the accident airplane based on airplane serial number. According to the airplane's service manual, in the event of exceedances of limitations such as load factor and never exceed speed, the manufacturer should be contacted for appropriate unscheduled maintenance check procedures. There were no entries in the airplane's logbooks documenting that such exceedances had occurred or that unscheduled maintenance inspections were performed.

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KSEE,387 ft msl | **Distance from Accident Site:** | 13 Nautical Miles |
| **Observation Time:** | 22:47 Local | **Direction from Accident Site:** | 236° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 9 knots / None | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 300° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.97 inches Hg | **Temperature/Dew Point:** | 26°C / 12°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | El Cajon, CA (SEE ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | El Cajon, CA (SEE ) | **Type of Clearance:** | None |
| **Departure Time:** | 15:57 Local | **Type of Airspace:** | Class E |

A weather sounding released at 1600 from Miramar MCAS Airport, San Diego, California, 2 miles west of the accident site, indicated 7 to 12 knot wind speeds generally out of the northwest at altitudes from 2,000 ft to 8,500 ft.

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | 1 Fatal | **Aircraft Fire:** | On-ground |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Fatal | **Latitude, Longitude:** | 32.943332,-116.764442 |

The accident site was located within a valley on a hillside slope at an elevation about 775 ft msl, about 1,000 ft east of the last radar target. The primary wreckage consisted of a 4-ft-deep by 6-ft-wide crater, which contained fragmented engine and airframe components. (See figure 1.) The outboard left wingtip rib, along with shards of the red position light, were located about 14 ft west, with the corresponding right wingtip rib and green position light shards about the same distance to the east. The debris field continued about 75 ft downhill to the north, and contained the engine crankcase, instrument panel components, fragmented tubular airframe material, the crumpled steel remains of the tail section, and burnt composite structure.

Most of the airplane's composite structure was consumed by fire, except for about a dozen composite

skin fragments, which were scattered in the surrounding trees and in the immediate vicinity of the impact site. The impact ignited a brush fire, which burned about 45 acres of land northeast of the accident site along the flank of the adjacent hillside.

A secondary debris field was located in a dry riverbed about 400 ft north of the crater. The debris was oriented east-west, about 800 ft long, and contained the left (lock side) and rear arch sections of the canopy frame, multiple pieces of canopy plexiglass material, and parts from the passenger's headset. No items in the secondary debris field, including the canopy components, displayed any indications of fire or bird strike.

Figure 1. Accident Site Viewed to the South

Airframe and Engine Examination

The wreckage was recovered from the accident site and examined by the NTSB and technical representatives from Extra Flugzeugproduktions-Und and Lycoming Engines. A complete report is included in the public docket; the following is a summary of findings.

The identifiable components were separated and organized into their respective subsystems for

examination. Except for the tail, all steel airframe tubing members were fragmented and deformed into sizes varying from 3 to 24 inches. Additionally, all composite components that had not been ejected from the impact site (skin sections, cockpit instruments, tailwheel assembly) were consumed by fire.

Remnants of all flight control surfaces and their corresponding primary aerodynamic load structures were located, and no bird remnants or feathers were found.

The left and right rudder cables were continuous from the aft rudder pedal assembly to the base of the rudder. Forward of the aft rudder pedals, the cables had separated into multiple pieces with the fragmented airframe structure. The left cable remained attached to the control arm at the base of the rudder; the right cable had detached from the right arm, which had melted at the cable attach point. There were no indications of cable degradation or separation in the locations referenced in SAIB CE-12-01.

The primary components of the elevator and aileron control system sustained extensive fragmentation throughout. All located bellcranks, control tube fittings, hinges, and wing spades sustained varying degrees of bending damage consistent with impact overload.

Most of the wing primary structure and fuel tanks were consumed by fire. The left and right main spar attachment flanges remained partially attached to the fragmented airframe members, and both main wing bolts and flange bushings were in place. Burnt remnants of the wing spar were still sandwiched between their respective spar attachment flange assemblies.

Both the front and rear main seatbelt latches were accounted for in the wreckage, along with both supplementary lap belt ratchets. Both systems were in the belt-locked position. Eight of the seatbelt mount points were located; all remained firmly bolted to their respective airframe members. Remnants of both parachutes were found, including their associated D-rings, "pilot" springs, and the locking buckles, all of which remained in the latched configuration.

All avionics and instruments sustained extensive crush and/or fire damage, preventing an accurate assessment of their settings and indications at impact.

The four rear seat assembly adjustment pins were all located in their respective seat fixtures. The front seat was fixed.

Examination of the left side of the canopy frame, including the lock and lock pin assembly, rear arch, and shattered plexiglass canopy fragments located in the secondary debris field revealed that the forward and aft canopy lock handles were intact and their interconnecting rods were bent, resulting in indeterminate lock positions.

All canopy hinge and lock sleeve assemblies were accounted for in the main impact crater and immediate surrounding area. The canopy hinge pins and their corresponding barrels and lock sleeves sustained varying degrees of bending damage.

The engine was separated from the airframe and sustained significant impact damage, liberating most of its ancillary components, including the starter motor, governor, alternator, fuel injection servo, both

magnetos, and all but one push rod. The cylinder heads from cylinder Nos. 1 and 2 had detached from their respective barrels, which were both bent aft. The oil sump had fragmented, exposing the lower engine crankcase and bottom half of the oil dipstick, which was bent aft. The accessory case had broken away, revealing the crankshaft, camshaft, and idler gears, and the forward crankcase had been breached, exposing the governor drive gears. There was no indication of pre-impact catastrophic internal engine failure.

The top spark plugs from cylinder Nos. 4, 5, and 6, and the bottom plugs for cylinder Nos. 3, 5, and 6 were removed and examined. All spark plug electrodes exhibited normal to worn out-normal wear signatures when compared to the Champion AV-27 Check-A-Plug chart.

Visual inspection of the combustion chambers for cylinder Nos. 3, 4, 5, and 6 was accomplished through the spark plug bores utilizing a borescope; there was no evidence of catastrophic internal damage and all combustion surfaces exhibited dark grey deposits.

The propeller hub remained attached to the crankshaft. All blades had separated, with only partial remnants of splintered wood and twisted leading edge caps recovered.

## Medical and Pathological Information

An autopsy was performed on both occupants by the San Diego County Medical Examiners Department. The cause of death for both was reported as multiple blunt force injuries. The reports indicated extensive fragmentation and charring.

Due to the condition of the remains, all of which were located in and around the crater in the primary debris field, it was not possible to confirm or eliminate preexisting natural diseases or injuries that occurred prior to the accident. Additionally, no samples definitively attributed to the pilot were available for toxicological testing, and only limited samples were available from the passenger.

Toxicology testing performed at the FAA Forensic Sciences Laboratory on specimens from the passenger. The results were negative for all screened drug substances with the following results for volatiles:

-66 (mg/dL, mg/hg) Ethanol detected in Muscle
-N-Butanol detected in Muscle
-Propanol (N-) detected in Muscle

Ethanol is the intoxicant in beer, wine, and liquor, but it can also be produced in postmortem tissues by bacterial action. How much, if any, of the identified ethanol had been ingested could not be determined.

## Tests and Research

Radar Data

Due to the sample rate of the radar data relative to the airplane's rapid aerobatic movements, accurate interpolation of the final stages of the flight could not be achieved. The radar data revealed the flight path of the passing motor glider, along with an aircraft that circled the location of the wreckage and fire shortly after the accident.

Onboard Video Cameras

The airplane was equipped with three video cameras mounted throughout the cabin. SCA used the cameras to record the flights, and sold the compiled footage to the passengers.

A Garmin VIRB Elite, which was capable of recording GPS track data and audio from the airplane's intercom system, was mounted on the right side of the center instrument panel divider, facing forward over the right shoulder of the passenger. It was discovered in the main wreckage and had sustained thermal damage. The camera was sent to the NTSB Recorders Division for data extraction; however, the internal microSD memory card, which stored the recorded data, had sustained crush damage and was unreadable. Subsequent evaluation with an acoustic microscope revealed cracks that had penetrated into the card's silicon die.

A GoPro camera had been mounted on the left side of the center instrument panel divider, facing outboard toward the left wing. This camera was not located, and presumed to have been destroyed on impact.

An aft-facing GoPro Hero camera had been mounted to the lower front section of the canopy. The camera mount was found attached to fragments of the canopy plexiglass in the secondary debris field, and the camera was ultimately located 2 years after the accident in the area between the main impact crater and the debris field.

The recovered camera was sent to the NTSB Vehicle Recorders Division for data extraction, and a video group convened which included the NTSB investigator-in-charge, NTSB engineering and technical specialists, and the Chief Pilot from Extra USA.

The unit had recorded video and audio data of the entire flight, from the time shortly after the passenger boarded to the camera's separation from the airplane and its impact with the ground. The camera recorded ambient cabin audio, and was not connected to the radio or intercom.

The camera was mounted on the centerline of the airplane, facing the front seat, and had a view of the passenger's upper body and head. The upper 2/3 quadrant of the camera frame had a clear view outside of the canopy, and intermittent and distorted reflections of the pilot's head could be seen in the canopy throughout the flight. The forward canopy lock and outboard tips of the horizontal stabilizer were visible.

With the canopy open, the camera had a view of the inboard section of the right wing and aileron, the vertical and horizontal stabilizer, and the pilot in the aft seat. When the recording began, the airplane was on the ground with the canopy open, and although the passenger was out of frame, comments from

the pilot indicated that he was already seated. The pilot could be seen securing himself with both the main belt harness and the supplemental lap ratchet.

As the canopy came down, the passenger came in to view. His seatbelt shoulder adjusting strap was fully extended, such that the seatbelt harness was loose around his shoulders and chest. The passenger's headphones were equipped with a Velcro chin strap, which was not secured, and remained unsecured for the entire flight.

The engine start, run-up, taxi, and departure proceeded without any indication of anomalies, and the aerobatic maneuvers began about 6 1/2 minutes after takeoff. The maneuvers continued for about 7 minutes, during which the airplane performed what appeared to be a series of roll, hammerhead, and tailslide maneuvers. The passenger appeared to be manipulating the control stick during some of the maneuvers, while the pilot either lifted both of his hands free of the control stick, or rested them on the top of the center instrument console. The maneuvers were all initiated at similar altitudes, and on multiple occasions the passenger looked outside of the airplane in a manner consistent with scanning for traffic.

After the pilot completed what appeared to be a tumble maneuver, he could be heard saying, "how's that?" to which the passenger replied, "that was awesome." Over the next 50 seconds, the airplane regained altitude in a series of climbing turns ending in level flight.

At this time, the passenger was not holding the flight controls and appeared to be bracing his arms against the sides of the airframe. The nose of the airplane then pitched up to 45°, and the airplane rolled 90° to the right. The nose began to drop as the roll continued to about 130°, then the direction of roll suddenly reversed, the pilot made a "whooping" sound, and the airplane transitioned into what appeared to be an inverted spin. The passenger appeared to rise up in his seat, and reached up with his right arm up to secure the headphones which were pulling away from his head.

The nose of the airplane then dropped as the spin progressed. After about one revolution, the right wing dropped, and the direction of rotation reversed. After entry into the reversal, the rate of rotation began to increase, and only the sky was visible through the canopy. The wind noise began to increase markedly, and a gap appeared at the right-side canopy frame junction with the fuselage, which is consistent with the airplane approaching Vne. The passenger began to rock from side to side while forced up against his shoulder straps as the sun came into view on the left side. The sun transitioned to the right side while the rocking movement continued. During the final maneuver the passenger was smiling and made "yelping" sounds. However, the expression on the passenger's face then changed, and he looked down and reached forward with his right hand. The forward canopy release handle on the left side of the cabin (which was connected to the rear canopy release handle) then moved to the open position, and the canopy opened.

The camera was ejected, and continued to record as it descended toward the ground while rapidly spinning.

Because the camera was attached to the canopy, it began to move upwards as the canopy opened, pivoting around the canopy hinge on the right side of the cockpit. Frame-by-frame review revealed that as the canopy opened, the pilot came into view, and could be seen holding onto the aft canopy release handle with his left hand, while his right hand remained in the area of the control stick. The inboard

sections of the ailerons were visible, along with the leading edge of the horizontal stabilizer, the entire vertical stabilizer, and rudder. About 6 seconds after the canopy opened, the camera recorded what appeared to be an orange glow consistent with fire on the terrain below. The camera struck the ground 26 seconds after the canopy opened.

The video did not reveal any evidence of bird strike, fire, canopy failure, or flight control separation, and the passenger appeared to be conscious throughout the entire recording.

Sound spectrum analysis of the video's audio channel revealed that the engine was operating at a speed of 2,580 rpm before the canopy opened. The airplanes Pilot's Operating Handbook indicated an upper operating range of 2,700 rpm.

## Organizational and Management Information

Company Operations

SCA provided flights to its passengers by operating as a flight school under the auspices of 14 CFR Part 61 and using flight instructors to provide training.

The company had three bases of operation: HND, SEE, and Minden-Tahoe Airport (MEV), Minden, Nevada. The primary operations facility was located at HND and included a hangar and co-located office. SCA's hangars at HND and SEE were equipped with a bar, dart boards, pool tables, and basketball hoops to support customers' group parties.

According to the SCA operations manual, "Standards and Syllabus," the "Top Gun" experience included g warm-up exercises, aileron rolls, barrel rolls, loops, hammerhead stalls, tail slides, spins, tumbles, and a low level bombing run, with optional maneuvers including the avalanche and inverted spins. The El Capitan Reservoir was the established area for performing maneuvers after departing from SEE.

Interviews with two pilots from SCA revealed that their flying varied based on seasonal loads, but they typically flew four to five customer missions per day, about 5 days per week. One pilot, who was initially the director of training and then director of flight operations, stated that, of about 2,000 customers he had flown for SCA, about 12 to 15 were pilots looking to receive targeted flight training for either upset recovery or a tailwheel endorsements. The other pilot stated that of the 500 customers he had flown, about 6 were pilots seeking tailwheel endorsement training and the others were customers seeking "experience" missions.

SCA Customer Training and Interaction

Upon arrival at an SCA facility, customers who had scheduled a flight experience were required to sign a "Participant Agreement Release and Assumption of Risk" waiver and take part in a briefing session. The waiver included, in part, the following statements:

I understand that I will be receiving general aerobatic and/or combat aviation flight instruction from a

qualified flight instructor. I understand that I will be given the opportunity to fly at various portions of the mission profile....

I expressly agree and promise to accept and assume all of the risks existing in this activity....I confirm that I am in good health and am not aware of any preexisting conditions that could medically preclude me from safely participating in this activity.

The briefing session included a presentation of SCA operations, an overview of basic aircraft handling and flight controls, a safety briefing, and a review of the chosen flight profile. The presentation also discussed the use and operation of the parachute, along with how to egress and bailout from the airplane in the event of an emergency.

SCA Advertising

The company employed a director of marketing, who was hired about 6 months before the accident. She stated that the company used the services of a third-party public relations firm to coordinate advertising along with the services of multiple online travel and adventure, destination management, and event coordinating companies. She was not involved with any of the flight training activities but instead focused on the flight experience aspects of the operation and customer interaction. She stated that one of her recent focuses within the company was to try to bring in more customers through group bookings.

The majority of SCA's website was devoted to the flight experiences aspect of the operation, such as air combat and aerobatics, with a subsection for tailwheel and upset recovery training.

Review of the SCA presence on multiple social media platforms revealed that it both presented itself and was categorized in the "tour" category. The website's blog section included the comment, "Not for you? Ditch the tricks and enjoy one of our sightseeing tours, like our breathtaking Las Vegas Night Lights Tour, where we fly you and someone special over the neon lights of the Strip. We provide complimentary transportation to and from the Strip for all aerobatic and sightseeing experiences, and we'll even throw in champagne for the night-flight option."

The Group section of the website stated, "Bring your Group to Sky Combat Ace - Corporate Events, Teambuilding, Birthdays, Retirements, Bachelor Parties & More....We can cater to groups from 6 to 125 passengers per day, with a combination of aerobatic flights, air-to-air dogfighting, low level bombing runs, as well as extreme sightseeing. We even offer Spectator flights for those that like their thrills right side up."

FAA Oversight

The president of SCA stated that, during the company's infancy, he had approached FAA Flight Standards District Offices (FSDOs) within the geographic areas in which he planned to operate to discuss certification options for the flights he intended to conduct. He said that he ruled out operating the company under a Part 135 certificate because passengers would not have been allowed to manipulate the aircraft controls. He had also considered operating under 14 CFR Part 91.147 (the regulation that applies to certain revenue passenger-carrying flights operated within 25 miles of an airport) but stated that, during his discussions with FAA personnel, an inspector had advised him that the passenger flight

control prohibition also applied to Part 91.147.

The SCA president stated that he finally concluded that operating SCA flights as instructional flights under Part 61 would allow him to legally operate the business as he intended. He stated that he was aware of three other competitors that use a similar model, but, to his knowledge, two had gone out of business and the other had changed its focus exclusively to flight training.

The SCA president stated that, in 2015, after deciding to open the SEE location, he consulted with FAA personnel from the San Diego FSDO, who requested that the SCA website be more explicit regarding flight training. In response, SCA added the following disclaimer to the bottom of each website page: "All SCA flights are instructional in nature conducted by certified flight instructors under 14 CFR Part 61 of the United States Code. Instruction will be provided during ground and flight portions for all flights." He stated that the same disclaimer was included in the customer waiver release form, which was required to be signed by all customers prior to flight.

FAA guidelines for its inspectors to perform oversight on Part 61 flight schools is outlined in FAA Order 1800.56, "National Flight Standards Work Program Guidelines." According to the order, FAA inspectors are required to conduct one inspection for each flight training device (FTD) located at each flight school and satellite school within the region that uses a Level 4 or 5 FTD in its flight training. At the time of the accident, SCA did not use any Level 4 or 5 FTDs.

Review of FAA records up to the accident date revealed three events related to SCA that resulted in FAA investigation:

In June 2015, the FAA Las Vegas FSDO was contacted by a Park Ranger from the Lake Mead National Recreation area. The Ranger had received complaints that an airplane operated by SCA (N330MT) had been flying low, "buzzing" kayakers on Lake Mead, and performing low-level aerobatic maneuvers in the vicinity of the Hoover Dam. A subsequent FAA investigation resulted in suspension of the pilot's certificate for careless/reckless operation, the aerobatic operation of an airplane within the lateral boundaries of the surface areas of Las Vegas Class B airspace, and the aerobatic operation of an airplane below an altitude of 1,500 ft above the surface.

The president of SCA stated that the pilot involved in these incidents resigned shortly after having his certificate suspended and before the president had a chance to terminate his job at SCA. However, at the time of completion of this report, an undated post from the pilot extolling the virtues of aerobatic flight was still present in the blog section of SCA's website.

On January 28, 2016, after landing, the pilot of N466MD failed to notice a pedestrian on an uncontrolled section of the ramp at HND. The airplane struck the pedestrian, who sustained minor injuries after he attempted to get clear of the propeller. The FAA inspector who investigated the incident concluded that the pilot was likely acting carelessly and in violation of 14 CFR 91.13. The pilot was referred for ongoing safety awareness counselling.

On June 19, 2017, N414MT underwent a ramp inspection by an FAA inspector from the Reno FSDO. The inspector noted that SCA was not registered as an air tour operator, yet he had observed SCA flyers in the airport lobby that were advertising rides without any reference to flight instruction. He advised an

SCA pilot of this finding and recommended that the pilot address this issue with SCA.

During the inspection, the inspector found permanent camera mount points had been installed on the upper surfaces of both wings and the horizontal stabilizer just forward of the control surfaces. There were no corresponding maintenance logbook entries related to the camera installations, or evidence that a record of a major repair or alteration (FAA Form 337) had been completed. Out of concern that such camera installations could potentially interfere with the flying characteristics or flight control surfaces, the inspector issued SCA a notification that the FAA would be exercising the authority of 49 CFR 44709(a) to perform a reinspection of all SCA aircraft to determine their airworthiness and certificate eligibility. An inspection of five airplanes operated by SCA was subsequently performed, and although some of the fleet lacked the required cabin placards, no significant anomalies were noted.

Previous SCA Accidents

Review of NTSB and SCA records indicated that SCA had experienced three reported and one unreported accident since October 2014. One of those accidents resulted in two fatalities. All involved Extra Flugzeugproduktions 300-series airplanes while flying paying passengers. These accidents are summarized below.

NTSB accident WPR15LA024: On October 26, 2014, an EA 300/L, N763DT, experienced an in-flight rudder cable separation after recovering from an aerobatic maneuver. During the emergency landing at McCarran International Airport (LAS), Las Vegas, Nevada, the airplane veered off the runway and sustained substantial damage.

The investigation revealed that FAA SAIB CE-12-01 had been issued about 3 years before the accident to address such a rudder cable failure. There was no evidence of compliance with the SAIB. The NTSB accident report noted that compliance with the SAIB was not mandatory, even though SCA operated flights for paying passengers, including aerobatics and air combat demonstrations. The NTSB determined the probable cause of the accident was "the failure of the rudder cable due to tension overstress as a result of the cable's strength being compromised by wear damage, which resulted in the flight instructor's inability to maintain directional control during the landing roll."

NTSB accident WPR15LA034: On November 5, 2014, an EA 300/L, N369XT, experienced a loss of engine power while on final approach to HND. The airplane collided with terrain short of the runway and sustained substantial damage.

The investigation revealed that fuel was present in the center and left wing fuel tanks but that the right wing fuel tank was empty. No mechanical anomalies were observed, and the reason(s) for power loss were not determined.

NTSB accident WPR16FA097: On April 30, 2016, an EA 300/L, N330MT, was destroyed when it impacted terrain about 10 miles south of HND. The airline transport pilot and passenger were fatally injured, and the airplane was destroyed.

The investigation revealed that the passenger became airsick after the pilot conducted simulated air-to-air combat maneuvers. The pilot then performed a planned low-level simulated bombing run during the

return to the airport, during which time the airplane struck a hill. Toxicology testing of the pilot detected tetrahydrocannabinol (THC), the primary psychoactive component of marijuana.

The NTSB determined the probable cause of the accident was "the pilot's failure to monitor and maintain clearance with terrain while maneuvering at low level. Contributing to the accident was the pilot's failure to conduct an adequate amount of clearing turns while maneuvering at low level."

Additionally, SCA was involved in one accident that was not reported to the NTSB or FAA. In September 2016, an EA 300/L, N466MD, experienced a failure and near-total separation of the windshield during aerobatic maneuvers. A video of the event provided by SCA revealed that, while pulling out of the bottom of a loop, the pilot allowed the airplane to exceed its Vne speed (220 knots) and the canopy plexiglass fractured and separated from its frame. The pilot was able to fly the airplane back to the airport with most of the canopy missing.

The separation of the canopy adversely affected the performance and flight characteristics of the airplane, and, as such, met the definition of substantial damage; therefore, this event met the definition of an accident. Title 49 CFR Part 830.5 requires the operator of an aircraft involved in an accident to immediately notify the NTSB.

Company Policies and Operations Manual

According to the president of SCA, g-forces are limited to 6 g with passengers onboard, and airspeed is limited to 180 knots. The "Standards and Syllabus" stated that, in order to minimize wear and tear on the aircraft, all aerobatic flights would "strive" to remain at or under 6 g and that aerial dogfighting would be allowed up to 8 g.

The manual stated, "For SCA pilots, there is a special emphasis required to ensure that they are prepared for the rigors of aerobatic flight. SCA Management expects each pilot to get at least 10 hours of uninterrupted rest prior to flying."

SCA had no policy for routine drug screening and testing of its pilots, nor was it required to have such a policy.

Video Review

The president of SCA was also an active instructor for the company. He stated that, due to the quantity of video footage produced, he did not review every flight video but instead instructed the video editing team (who were composed of pilots and non-pilots) to bring to his attention any flight maneuvers or operations that could be considered a violation of company policy.

SCA provided to the NTSB video footage from the accident pilot's previous eight flights, along with the previous eight flights of the accident airplane.

The footage from the accident pilot's flights was recorded from October 8 through 21. Two of the flights were for "dogfight" missions involving multiple aircraft, and the remaining six were solo missions in the area of the El Capitan Reservoir. The forward instrument panel, including the g-meter and airspeed

indicator, was visible in the recordings.

The single-airplane flights typically followed a similar pattern, with the aerobatic maneuvers mostly performed over the north end of the reservoir (within the immediate vicinity of the accident site). Typically, at the completion of these maneuvers and just before returning to SEE, the pilot would ask the passenger if they were ready to experience some high-g maneuvers. The airplane would then begin a dive or series of spin maneuvers. The pilot would initiate the recovery, build up airspeed, and level the airplane as the ground approached. It was during these final phases that the highest airspeeds and vertical accelerations were reached.

During the final phase of three of those flights, the airplane reached 10 g and maximum speeds of 200 and 205 knots. On one flight, the airplane reached 9 g and 200 knots, and during another, the airplane reached 8.5 g and 190 knots. The pilot appeared conscious during the high-g maneuvers. Three of the passengers appeared to pass out during the high-g phases of those flights, with one passenger also passing out twice as the airplane taxied into the hangar at the completion of the mission. As the highest speeds were reached, gaps could be seen along the edge of the canopy frame at the join with the fuselage, with larger gaps on the right side.

The GPS data from the flights performed by the accident pilot over the El Capitan area during the period from October 8 through October 13, 2017, was compared to the radar data for the accident flight. The accident flight followed the same general path as the other flights. (See figure 2.)

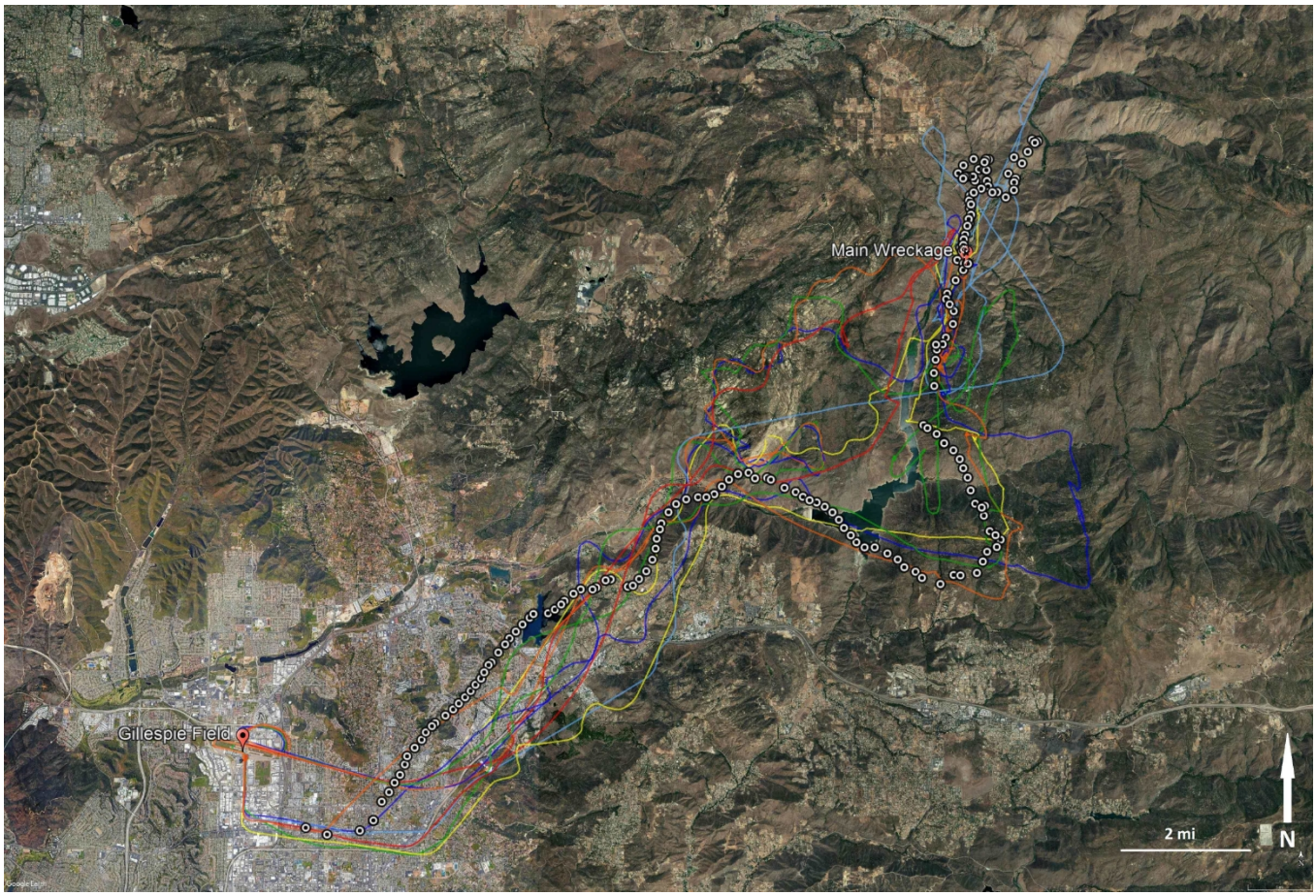


Figure 2. Radar Track from the Accident Flight (white dots) Compared to the GPS Tracks of the Previous Flights with the Accident Pilot

On October 17, another SCA pilot flew the accident airplane in series of "dogfight" missions with two other SCA Extra 300 series airplanes as part of a corporate group event in Florida. Video revealed that at the beginning of the flights, the g-meter limit needles had not been reset and indicated that the airplane had at some point reached 10.5 g. The vertical acceleration during those missions varied between 3 g and 6 g; however, on the final flight of the day, the pilot asked the passenger if she wanted to perform a high-g turn and experience acceleration of 7 to 8 g's. She responded that she did not want to pass out, and the pilot gave her advice on how to prepare her body for the turn. He then performed a descending turning maneuver, during which the g meter registered 9 g, and the passenger passed out. The recovery was completed about 950 ft agl. The dogfight maneuvers between the airplanes were performed in scattered cloud conditions at altitudes of between 1,500 and 3,500 ft agl, and on multiple occasions the accident airplane passed through clouds. As the other airplanes performed their final maneuvers, another pilot transmitted, "Oh yeah, 8 G's" over the common traffic advisory frequency.

The degree of passenger interaction with the flight controls varied, with some holding the controls through most of the flight, some touching the controls intermittently, and some showing hesitancy to interact in any form. None of the passengers in the reviewed videos held FAA pilot or medical certificates.

## Additional Information

The president of SCA stated that he had considered operating under Part 91.147, but it was his understanding that under that provision, the passengers would not be able to operate the controls. He specifically stated that after discussing it with the FAA, he felt it would be like operating with a "mini" Part 135 certificate.

The provisions of 14 CFR 91.147, "Passenger Carrying Flights for Compensation or Hire" allow for an operator to carry passengers for hire without a Part 135 or 121 certificate provided that the flights begin and end at the same airport and are conducted within a 25-statute-mile radius of that airport. In order to be granted the authority to operate under this provision, the operator must apply for, be granted, and abide by a letter of authorization (LOA) from the closest FAA FSDO. The operator must also register and implement a drug and alcohol testing program and follow a basic set of safety rules defined in 14 CFR 136 Subpart A "National Air Tour Safety Standards."

FAA Order 1800.56 also provides FAA inspectors with surveillance guidelines for Part 91.147 operations. It requires inspection of 10% of those air tour operators that have an LOA within the region. One inspection must be for maintenance and another for avionics; there are no provisions for operations inspections.

Common Carriage

FAA Advisory Circular (AC) 120-12A, "Private Carriage Versus Common Carriage of Persons or Property" was issued by the FAA in 1986. The AC stated that its purpose was to provide guidelines for determining whether transportation operations by air constitute private or common carriage. The AC further stated that operations that constitute common carriage are required to be conducted under 14 CFR Parts 121 or 135.

According to the AC, "common carriage" and "private carriage" are common law terms, and the FAA Act of 1958 uses the term "common carriage" without defining it, therefore, the AC provided the following guidelines:

A carrier becomes a common carrier when it "holds itself out" to the public, or to a segment of the public, as willing to furnish transportation within the limits of its facilities to any person who wants it....There are four elements in defining a common carrier; (1) a holding out of a willingness to (2) transport persons or property (3) from place to place (4) for compensation. This "holding out" which makes a person or company a common carrier can be done in any one of several different ways, including:

Signs and advertising are the most direct means of "holding out" but are not the only ones.

A "holding out" may be accomplished through the actions of agents, agencies, or salesmen who may, themselves, procure passenger traffic from the general public and collect them into groups to be carried by the operator. It is particularly important to determine if such agents or salesman are in the business of

selling transportation to the travelling public not only through the "group" approach but also by individual ticketing on known common carriers....

Although AC 120-12A defines a common carrier, the applicability section of 14 CFR Part 119.1e excludes both student instruction and nonstop commercial air tours conducted under Part 91.147 from the need to conform with the requirements for air carriers (Part 121) or operators for compensation or hire (Part 135).

## Administrative Information

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|---|---|
| **Investigator In Charge (IIC):** | Simpson, Eliott |
| **Additional Participating Persons:** | Jocelyn MacGregor; Federal Aviation Administration FSDO; San Diego, CA<br>Thomas Kostrzewa; Federal Bureau of Aircraft Accidents Investigation; Braunschweig<br>Mark Platt; Lycoming Engines; Williamsport, PA |
| **Original Publish Date:** | July 13, 2020 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=96223 |