National Transportation Safety Board
Aviation Accident Final Report

Location:	Meadview, AZ	**Accident Number:**	LAX05FA046
Date & Time:	12/08/2004, 1031 MST	**Registration:**	N1783U
Aircraft:	Cessna T207A	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Other Work Use		

Analysis

The airplane impacted mountainous terrain in an extreme nose-down attitude following a departure from controlled flight. The purpose of the flight was to check the weather conditions for passenger tour flights that day. The pilot reported about 20 minutes prior to the accident that the ceiling was 6,500 feet mean sea level (msl). Radar data showed that following this weather report, the airplane's radar track continued eastbound and upon its return westbound, at an altitude of about 6,000 feet msl, the airplane entered a series of altitude fluctuations approximately 1 mile west of a ridge that was the location of the accident, descending at 4,000 feet per minute while turning northbound, and then climbing at 3,900 feet per minute while traveling eastbound, prior to disappearing from the radar. The airplane impacted on the eastern side of the ridge. There were no monitored distress calls from the aircraft and no known witnesses to the accident. Prior to the accident, there were reports of vibrations during flight on this aircraft, although many went unreported to maintenance personnel. The day (and flight) prior to the accident, a pilot experienced a vibration during flight with passengers and it was not reported to maintenance personnel because it was logged improperly in the operator's maintenance tracking system. No corrective actions were taken. During the post accident examinations, no portions of the right elevator and trim tab were identified in the wreckage, or at the accident site. The bracket attachment to the right elevator was found loose within the wreckage and was torsionally twisted counterclockwise (aft). Ground and aerial searches for the missing parts based on a trajectory study were unsuccessful. This aircraft was equipped with a foam cored elevator trim tab that was installed during aircraft manufacture. A service difficulty report (SDR) query showed that 47 reports had been issued on elevator trim tab corrosion and many included reports of vibrations during flight. On January 20, 2005, the Federal Aviation Administration (FAA) issued Special Airworthiness Information Bulletin (SAIB) CE-05-27, which addressed potential problems with foam-filled elevator trim tabs in the accident make/model airplane, and Cessna 206 and 210 series airplanes. The SAIB indicated that the foam-filled elevator trim tabs, manufactured until 1985, were reported to have corrosion between the tab and the foam. The SAIB further said, in part, "When the skin of the trim tab becomes thin enough due to the corrosion, the actuator can pull the fasteners through the skin and disconnect. When this occurs, the tab can flutter." Some reports indicated prior instances of "vibrations in the tail section and portions of the elevator tearing

away with the trim tab." Prior to the issuance of the SAIB, Cessna Aircraft Company issued a Service Bulletin (SB) SEB85-7 on April 5, 1985, that addressed elevator and trim tab inspection due to corrosion from moisture trapped in the foam cored trim tabs. Based on a review of the airplane's logbooks, the SB was not complied with, nor was the operator required to do so based on the FAA approved maintenance specifications.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: a loss of control due to the in-flight separation of the right elevator and elevator trim tab control surfaces. The precipitating reason for the elevator separation could not be resolved as related to the tab foam core issue with the available evidence.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. (C) FLT CONTROL SYST,ELEVATOR TRIM/TAB CONTROL - SEPARATION
2. MAINTENANCE,SERVICE BULLETIN/LETTER - NOT PERFORMED - COMPANY MAINTENANCE PERSONNEL
3. (C) FLIGHT CONTROL,ELEVATOR - SEPARATION
4. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE - NORMAL

Findings
5. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

1.1 HISTORY OF FLIGHT

On December 8, 2004, about 1031 mountain standard time (MST), a Cessna T207A, N1783U, collided with mountainous terrain 27 nautical miles southwest of Meadview, Arizona. The commercial pilot, the sole occupant, sustained fatal injuries; the airplane was destroyed. King Airelines, Inc., was operating the airplane under the provisions of 14 CFR Part 91, as a weather scouting flight. A combination of visual and instrument meteorological conditions prevailed along the general route of flight, and no flight plan was filed. The airplane departed Henderson Executive Airport, Las Vegas, Nevada, at 0903 Pacific standard time (PST) (1003 MST).

According to the operator, the pilot was on a weather scouting mission to determine the current weather conditions in tour areas that did not have weather reporting capabilities. The normal tour routes are to fly to Wilson's Ridge (approximately 25 nm east of Henderson Airport), over Temple Bar, Arizona (approximately 15 miles east of Wilson's Ridge), and then to Grand Canyon West, Peach Springs, Arizona (an additional 25 nm east of Temple Bar). During the weather scouting flight, the pilot would normally fly east along these areas until an accurate depiction of the weather could be determined. The projected flight time was 1 hour.

According to personnel at Silver State Helicopter's fixed base operator (FBO) at Boulder City Municipal Airport, Boulder City, Nevada, a pilot identifying himself as King 2, called on the radio about 1010 MST. He asked if the radio operator could call King Airelines and let them know that their 0930 PST flight could be launched and that the ceiling was 6,500 feet mean sea level (msl). The radio operator called King Airelines and relayed the message. Approximately 2 minutes later, King 2 asked if the message had been relayed and the radio operator advised him that she had relayed the message. The radio operator told the National Transportation Safety Board investigator that radio coverage in the area is limited, so that on occasion, King Airelines pilots would radio Silver State and have them transmit messages back to Henderson via telephone.

1.1.2 Search and Rescue Activities

The accident flight was due to arrive at Henderson by 1000. Company policy states that if the flight is 30 minutes past the arrival time, the pilot must notify the Chief Pilot or the Director of Operations via radio communications. When the pilot did not report back to Henderson by 1030, the Director of Operations began contacting local airports. The Director of Operations then contacted the Park Service and asked them to dispatch ground personnel to conduct a search of the local airports.

Around 1130, the Director of Operations attempted to call the local Federal Aviation Administration (FAA) Flight Standards District Office (FSDO) unsuccessfully. The Director then called the Reno Flight Service Station, who in turn contacted the Air Force Rescue Coordination Center (AFRCC), Langley, Virginia.

AFRCC issued an Alert Notice (ALNOT) at 1333 MST. Clark County Search and Rescue personnel discovered the aircraft wreckage at 1530 MST the day of the accident.

1.1.3 Radar Information

Investigators reviewed radar data at the Nellis Air Traffic Control Center, Nellis Air Force Base, Las Vegas, using the Micro En route Automated Radar Tracking System (EARTS). According

to Nellis personnel, during the accident flight, air traffic control did not assign the airplane a discrete transponder squawk code. A review of recorded radar was undertaken to identify the accident airplane's flight track. Only one track was observed that was consistent with the accident airplane's projected route of flight, and subsequent disappearance over the accident site area.

The observed radar track and Mode C (altitude encoding) report was first observed near the Henderson Executive Airport, as the target proceeded in a southeasterly direction. The target continued in a southeast-east direction while climbing to 5,600 feet msl and maintaining groundspeeds between 130 and 160 knots. Between 1020 and 1025 MST, the target climbed to 7,500 feet msl while turning to the south. The target then made a series of turns while maintaining altitudes between 6,000 and 7,500 feet msl and groundspeeds between 110 and 140 knots. During the last 4 minutes of the recorded radar data, the target descended to approximately 6,000 feet msl and traveled west. After the target had passed over Wilson's Ridge, about 1031 MST, the target made a series of extreme altitude fluctuations while on the west side of the ridge, and then dropped off radar.

1.2 PERSONNEL INFORMATION

1.2.1 Pilot Information

King Airelines, Inc., hired the pilot on April 6, 2004. A review of the operators' personnel records for the pilot revealed that he held a commercial pilot certificate with single and multiengine airplane and instrument airplane ratings. The pilot also held a flight instructor certificate for single and multiengine airplanes and instrument airplane. He held a first-class medical certificate issued on October 18, 2004.

The pilot began his flight training at the University of North Dakota, Grand Forks, North Dakota, in 2000. He obtained a private pilot certificate on May 22, 2001. The pilot completed the remainder of his training at Westwind School of Aeronautics, located at Phoenix Deer Valley Airport, Phoenix, Arizona, over a period of about 2 years. From March 2003 until March 2004, the pilot was employed as a flight instructor at Westwind School of Aeronautics. In addition, from March 2003 until October 2003, the pilot was employed by a local FBO at the Deer Valley Airport.

King Airelines pilots described the accident pilot as someone that flew by the rules and was not a risk taker. In addition, he was said to be well-respected among the line pilots and offered guidance and support to new-hire pilots.

1.2.2 72-Hour History

The pilot's roommate reported that nothing appeared abnormal with the pilot on the days leading up to the accident. He kept a normal sleep schedule, was not taking any medications, and did not report any illnesses. The roommate further stated that the pilot generally enjoyed his job at King Airelines, but had career aspirations to fly as an air tanker pilot for the United States Forest Service.

1.2.3 Recent Experience

The pilot tracked his flight time using an electronic logbook and copies of the logbook were obtained from the pilot's family. The last entry was dated November 26, 2004. The electronic logbook combined experience in the Cessna 206 and 207, and showed a total of 101.3 hours flight time in those make and model airplanes. The pilot logged 106 hours of simulated

instrument flight time, and 49.5 hours of ground simulator time. The pilot reported 4.5 hours of actual instrument time. The pilot's total flight time was 1,209.2 hours.

On October 29 though October 31, the pilot rented a Beech 76 with another King Airelines pilot and flew 9.1 flight hours using instrument flight plans. During these flights, the pilot logged 3.1 hours of simulated instrument flight time and 2 instrument approaches.

According to the Chief Pilot at King Airelines, the pilot was a model employee and pilot, and held approximately 700 hours of total flight time when hired. He was a conservative pilot and primarily flew the multiengine airplanes. The pilot had recently submitted a scheduling proposal that would have allowed the line pilots to have more time off-call while still working the same number of hours.

1.3 AIRCRAFT INFORMATION

1.3.1 General Aircraft History

The single engine airplane was a Cessna T207A, manufactured in 1977, serial number (SN) 20700383. A review of maintenance records indicated that an FAA Approved Airworthiness Inspection Program (AAIP) inspection number 1 was completed on November 16, 2004, at a total airframe time of 12,583.2 hours, and a tachometer time of 1,951.8 hours. The inspection included both external and internal inspections of the airplane and its components, and operational performance checks of the engine. The airplane was operated by King Airelines since 1990 as an air tour airplane. Prior to that time, it was owned by another tour operator in the Las Vegas area.

The Teledyne Continental Motors (TCM) engine TSIO-520-M, SN 513532, underwent a remanufacture at Western Skyways, Inc., Montrose, Colorado, on October 9, 2000. At the time of the remanufacture, the engine had accumulated 3,200 hours.

The McCauley Propeller, SN 816513, was three-bladed. At the time of the last AAIP inspection, the propeller had accumulated 928.4 hours since its last overhaul.

The airplane was manufactured with a foam-filled trim tab and right and left elevator trailing edges. The foam was used to form rigidity within the structures.

1.3.2 Fueling

According to a company flight plan, the airplane departed Henderson with 50 gallons of fuel onboard.

1.3.3 Aircraft Installed Equipment

The minimum equipment list for the airplane showed that the airplane was equipped with a vertical speed indicator, transponder with altitude encoding capability, VHF omni-directional receiver (VOR), instrument landing system (ILS) with glide slope and localizer receiver, marker beacon, altimeter adjustable to barometric pressure, airspeed indicator, gyroscopic pitch and bank indicator, gyroscopic directional indicator system, distance measuring equipment (DME), and a magnetic compass. King Airelines did not require all of the above mentioned instruments for passenger operations; however, they were all functional prior to the pilot's departure from Henderson. The airplane was not equipped with electric trim.

1.3.4 King Airelines Maintenance Forms and Aircraft Discrepancy History

According to the FAA accepted General Operations Manual for King Airelines, all pilot

discovered mechanical irregularities were to be entered on King Airelines Form 10, "Pilot Reported Discrepancy Log." This included irregularities discovered during pre and post flight inspections, as well as during a flight. At the time of the accident, it was King Airelines policy to keep the form onboard the airplane for a period of 90 days, prior to it being filed. Mechanical irregularities discovered during maintenance activities were to be entered by maintenance personnel on King Airelines, Form 11, "Inspection Discrepancy Log." King Airelines also used a post flight inspection report, which was not intended for maintenance squawks but solely for pilots to log post flight inspection information.

On King Airelines, Inc., AAIP Pilot Reported Discrepancy Log (Form 10), an entry dated June 27, 2004, stated the following:

"RH elevator/stab damaged underside near counterweight"

On June 28, 2004, a notation in the corrective action section stated the following:

"Fabricated and installed repair patch on rt [right] horizontal stab and rt [right] elevator"

The aviation maintenance technician (AMT) that performed the repair submitted a written statement to the National Transportation Safety Board investigator-in-charge (IIC) on December 14, 2004, to the best of his recollection of the corrective action taken on June 28. A pilot had requested that the AMT look at the right horizontal stabilizer following the first flight of the day due to a scratch on its upper surface. According to the AMT, there was a dent in the top skin of the stabilizer and a scratch going outward toward the elevator balance weight. Initially, they thought that possibly a rock had impacted the structure, but based on the angle of the scratch away from the dent, it appeared to them that something else had happened. The AMT asked the pilot if he drove under something and the pilot replied no. The AMT expressed that the extent of the damage was viewed more as cosmetic rather than structural. The AMT believed that the repair consisted of a small repair patch over the dent on the right horizontal stabilizer and touchup of the scratched paint. He also thought that another AMT verified his work.

On King Airelines, Inc., AAIP Inspection Discrepancy Log (Form 11) an entry dated November 14, 2004, stated the following:

"Reported engine vibration at cruise."

On November 16, 2004, a notation in the corrective action section states the following:

"Noted 200 rpm drop. Repaired power ignition lead number 2 cylinder. Ground run check good."

Three company pilots that had flown the airplane reported feeling a noticeable vibration during flight. The pilots thought that the vibration was due to the propeller or the engine and did not write up the airplane.

Several weeks prior to the accident, a company pilot experienced a vibration during flight in the accident airplane. He reported the discrepancy to maintenance personnel, and completed the Form 10. According to the pilot, the Director of Maintenance test flew the airplane and did not experience any vibration. The airplane was returned to service.

The record of this discrepancy, and the corrective actions taken, was onboard the airplane and destroyed during the accident sequence. The Director of Maintenance and the owner of King

Airelines submitted a joint written statement describing the work that was performed following the maintenance squawk. They recalled that the Form 10 read, "Engine running rough, Aircraft [seems] to vibrate." The corrective action was as follows, "Ground run with the mixture and fuel flow check. The engine was running lean and fuel flow was on the high side. Teledyne Continental Motors Service Bulletin 97-3 was referenced for fuel pressure and fuel flow settings. The engine fuel system was adjusted to the published parameters. A test flight was conducted and logged as satisfactory. Aircraft was returned to service."

Two days prior to the accident, the company pilot that had reported the previous vibration experienced a vibration during a tour flight with a load of passengers. At an elevation of 6,500 feet msl, 27 inches manifold pressure, and 2300 rpm, he felt a vibration. He looked outside of the airplane to determine if the vibration was coming from outside. Because he had already written up the airplane for a vibration, he logged the vibration in the post flight inspection report and it was not reviewed by maintenance personnel prior to the accident flight.

1.3.5 FAA Special Airworthiness Information Bulletin & Cessna Service Bulletins

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On January 20, 2005, the FAA issued Special Airworthiness Information Bulletin (SAIB) CE-05-27. The issuance of the SAIB was not as a result of the accident investigation. The SAIB addressed potential problems with foam-filled elevator trim tabs in the accident make/model airplane, and Cessna 206 and 210 series airplanes. The SAIB indicated that the foam-filled elevator trim tabs, manufactured until 1985, were reported to have corrosion between the tab and the foam. The SAIB further said, in part, "When the skin of the trim tab becomes thin enough due to the corrosion, the actuator can pull the fasteners through the skin and disconnect. When this occurs, the tab can flutter." Reports indicated "vibrations in the tail section and portions of the elevator tearing away with the trim tab."

Prior to the issuance of the SAIB, Cessna Aircraft Company issued a Service Bulletin (SB) SEB85-7 on April 5, 1985, that addressed elevator and trim tab inspection. It noted, "evidence of internal skin to foam separation, soft spots, paint blisters, unsealed edges of exposed foam, foam deterioration or corrosion are cause for replacement of the assembly." Based on a review of the airplane's logbooks, the SB was not complied with, nor was the operator required to do so based on the FAA approved maintenance specifications.

1.3.6 Service Difficulty Reports

In a maintenance Service Difficulty Report (SDR) (97ZZZX3709) obtained from the FAA SDR database, an in-flight vibration in a Cessna U206 was reported. A search of the FAA's Service Difficulty Report (SDR) database revealed an in-flight vibration experienced in a Cessna U206 (SDR 97ZZZX3709). The SDR stated, in part, "...elevator vibration which disappeared when speed 130 miles per hour. Trim tab underside skin was deformed under bracket assembly and trim actuator was loose from fasteners. Elevator mass balance was far out of limits. Elevator trailing edge and trim tab urethane core were wet which was the reason for out of balance." Query of the SDR database revealed a total of 47 reports related to the issue.

1.3.7 Prior Accident

On April 14, 1997, a Cessna 210D experienced a severe vibration during takeoff climb out. While climbing to an assigned altitude, the pilot felt a "large amount of forward forces both

hands to level the airplane. An additional pilot in the airplane input nose-down trim and reduced the power. As the airplane leveled off and the airspeed increased, "the aircraft experienced a very violent, high frequency vibration." The pilots reported a possible engine failure to approach control. As the power was reduced, the vibration lessened significantly. The pilot scanned the instruments and did not see any unusual readings so he reapplied the power, only to experience the same vibration. The pilot then requested a return to the airport. A post accident examination revealed the right elevator was torn chordwise at the midpoint, and the trim tab actuator assembly was torn loose from the trim tab. The elevator trim tab was the foam-filled type. The examination showed that the horn, linkage, and actuator had broken loose, but were still contained in the structure. The elevator had also split in two, chordwise, about midspan (reference Safety Board accident ATL97LA059).

1.4 METEOROLOGICAL INFORMATION

The closest official aviation weather reporting station was Henderson, Nevada. An aviation routine weather observation (METAR) was issued at 0945 PST. It reported the following conditions: visibility 10 miles; altimeter 30.09 inches of Mercury; temperature 46 degrees Fahrenheit; dew point 39 degrees Fahrenheit; wind from 260 degrees magnetic at 4 knots; clouds scattered at 10,000 feet and broken at 20,000 feet.

Company pilots that flew over or near the general route of the accident flight reported the following weather observations. Clouds obscured the Wilson's Ridge area, which extended from the surface to about 6,000 feet msl. Additional cloud layers began between 6,500 and 7,500 feet msl. As the pilots flew east, the sky conditions cleared, although there were scattered clouds at 6,000 feet msl, with bases at 5,500 feet msl. The pilots indicated that normally, the route is flown at 5,500 feet msl while traveling east (to the Grand Canyon), and 6,500 feet msl when traveling west (to Henderson). They were able to maintain these altitudes with small deviations in altitude and course. It was also noted that the air was smooth that morning and no turbulence was noted.

A Safety Board senior meteorologist reviewed weather forecasts and observations pertinent to the accident area. The National Weather Service (NWS) Weather Depiction Chart for 0800 indicated an area of VFR conditions in the vicinity of the accident site, west-northwest into extreme southern Nevada and into western California.

The GOES-10 infrared and visible satellite imagery were reviewed surrounding the time of the accident from 1000 MST through 1100 MST at approximate 15-minute intervals. The images depict a band of clouds extending over the accident site. The 1030 infrared band 4 image depicted radiative cloud top temperatures of 241.70 degrees Kelvin (K) or -31.46 degrees Celsius, which corresponded to cloud tops near 30,000 feet. The visible band 1 image also depicted clouds extending over the accident site.

The aviation terminal forecast (TAF) for Las Vegas was issued at 0420 MST. It was valid from December 8 at 0400 MST, until December 8 at 1300 MST, and cloud layers were forecast as broken at 5,000 feet and 10,000 feet. Temporarily from 0500 until 0900 MST, cloud layers were forecast to be scattered at 5,000 feet. The area forecast (FA) issued at 0445 MST was for scattered to broken layers with bases 7,000 feet and tops to 18,000 feet.

1.5 WRECKAGE AND IMPACT INFORMATION

The Safety Board IIC, inspectors from the FAA, and a representative from Cessna, a party to the investigation, responded to the accident scene on December 9, 2004. The accident site was

in undeveloped, mountainous, desert terrain on the eastern side of Wilson's Ridge. The airplane impacted extremely nose-down with the longitudinal axis 90 degrees relative to the horizon, in a steep canyon that generally ran in a northeast to southwest direction. The wreckage site was on the northern wall of the canyon, with a terrain slope of about 45 degrees. The immediate surrounding ridgeline rose to elevations of about 5,000 feet. The majority of the cabin structure was consumed in a post impact fire.

The engine and propeller were buried in a 3-foot crater and the right and left wings were positioned on either side. The wings displayed similar damage patterns. The leading edges were accordioned and crushed from the leading edge aft towards the flaps and ailerons with the crush lines oriented nearly vertical to the chord line. Portions of the empennage section were in the center of the wreckage, near the engine. The rudder and vertical fin were identified. Burned portions of the left elevator control surface and horizontal stabilizer were present. A 2-foot section of the aft spar and 3-foot section of the forward spar to the right horizontal stabilizer were attached to the empennage surface. The right elevator and trim tab, or portions of them, were not identified.

Flight control cables were traced from the cockpit area to the flaps, ailerons, and aft tailcone. The right flap cable was broomstrawed inboard of the center bellcrank.

Investigators removed the three-bladed propeller from the soil beneath the engine. All three blades exhibited leading edge gouging. One blade exhibited curling at its tip and leading edge gouging at the midpoint of the blade. The second blade had gouging about 4 inches from its tip. The leading edge of the third blade was gouged midpoint on the blade with an additional gouge approximately 6 inches from its tip. The cambered surfaces of all blades displayed chordwise scratching.

The airplane's fixed landing gear struts extended out downhill from the center of the wreckage. The right and left landing gear struts were positioned so that the nose gear was directly between them. The nose gear tire remained attached to its axle. The right and left landing gear tires separated at their respective axles, and were located nearby.

1.6 MEDICAL AND PATHOLOGICAL INFORMATION

The Mojave County Coroner, Kingman, Arizona, completed an autopsy on the pilot. The FAA Bioaeronautical Sciences Research Laboratory completed toxicological testing on samples from the pilot. The results of the testing were positive for the following:

17 (mg/dL, mg/hg) ETHANOL detected in Muscle

41 (mg/dL, mg/hg) ACETALDEHYDE detected in Muscle

NO ETHANOL detected in Brain

It was noted that the ethanol found might have been the result of postmortem ethanol formation.

1.7 TESTS AND RESEARCH

Further examination of the airframe and engine commenced at Air Transport, Phoenix, Arizona, on January 6, 2005. An FAA inspector, the Cessna representative, and a representative from Teledyne Continental Motors (TCM), also a party to the investigation, were present.

1.7.1 Fuselage

The airplane was destroyed by impact and fire damage. The major discernable structure included the right and left wings, and an assortment of pieces from the empennage section. The instrument panel was destroyed with no discernible instrument readings or panel settings obtained. All of the other seat frames with the exception of one seat frame, were either destroyed or identified through pieces of the seat frameworks and seat tracks loose within the wreckage.

1.7.2 Wings

The wings displayed similar damage patterns. The wings were crushed aft to the ailerons and flaps. The wing carry-through spar was destroyed. The ailerons and flaps remained secured to the wings. The counterweights on both ailerons were secured to the forward portions of the ailerons. The wing skin separated from the wing spar along the rivet line at the aileron and flap locations, exposing the interior of the wing. Investigators measured a crush line approximately 100 degrees to the lateral axis of the airplane.

The aileron control cables were traced from the ailerons, inboard to the burned and fragmented fuselage. The left aileron crossover pulley cable was frayed.

1.7.3 Horizontal Stabilizers

Examination of the empennage section revealed portions of the right and left horizontal stabilizer. The horizontal stabilizer was identified through its forward and aft spars. The left horizontal spars consisted of a 6-inch aft spar section and a 1-foot forward spar. The right horizontal spars consisted of 3-foot forward and aft spar sections. These spars were attached to the largest recovered portion of the empennage.

1.7.4 Elevators

No portions of the elevator control surface or balance weight were identified by investigators for the right elevator.

An outboard 2-foot portion of the left horizontal control surface was attached to a 3-foot section of the left elevator control surface with a control rod. The area surrounding the control rod was not deformed on either side, and no torsional signatures were evident. The inboard sections of these pieces had burned away.

Aft from the horizontal stabilizer spars, there was an elevator bellcrank and torque tube assembly. An elevator push rod extended from the lower portion of the bellcrank and went forward approximately 1 foot where it was melted. The elevator torque tube extends to the right and left, outboard to the elevators. Brackets are secured to the interior of the torque tube and attach to the elevators. The outboard ends of the torque tube flange are riveted to the elevator.

The right bracket was recovered loose in the wreckage. The six rivets, which secured it to the interior of the torque tube, were sheared. When positioned in the torque tube, the bracket appeared twisted counterclockwise (aft) from its attach points. The entire left bracket was not recovered; however, a portion of it remained secured by rivets in the torque tube housing. This bracket portion had no torsional deformation. The left elevator horn had a bolt and a screw, which secured the counterweight. The counterweight was not in the assembly. The bolt measured 1.25 inches and the screw measured 2 inches.

1.7.5 Elevator Trim System

Investigators did not identify the elevator trim tab control surface, which by design is located on the right elevator.

The trim actuator was secured to the trim cables and was attached to the recovered empennage assembly. A clevis pin, which secures the trim actuator rod to the elevator trim control surface, was also identified loose within the wreckage.

1.7.6 Rudder

The rudder control surface was intact but separated from the remaining wreckage. Its counterweight was in place. Approximately midpoint on the lower rudder, the control surface was bent and curled up and to the left.

1.7.7 Vertical Stabilizer

The vertical stabilizer was crushed and sustained thermal damage. Portions of the aluminum skins were burned away. The vertical stabilizer remained attached to the largest recovered section of the empennage.

1.7.8 Doors

The pilot's side door, the right side door, and the passenger door were identified. The pilot's and right door were crushed aft and downward. The passenger door shape was slightly deformed around its edges. All doors sustained thermal damage. The smoke trails over the rivet heads were uniform in appearance with no shadowing noted.

1.7.9 Engine

The engine sustained fire and impact damage. The exhaust valve seat for cylinder number 6 was not identified. The cylinder fins were crushed and portions of the engine case exposed the interior components of the engine. Removal of the oil pan further exposed its internal components. All visible interior surfaces and parts were rust colored and the crankshaft would not rotate. Removal of the engine driven fuel pump and the oil pump did not reveal any operational anomalies. The fuel screen was clean although the soldering around the top portion of the screen had melted.

The turbocharger burned away from the engine but remained intact. The turbocharger fins were bent opposite the direction of rotation and thermally damaged. The top spark plug electrodes were oval in shape with similar gapping. All of the spark plugs were either bent or their casings were broken into pieces.

The magnetos were located loose in the wreckage and all of their exterior components and wiring were thermally consumed. Due to the damage, no functional test was performed. The vacuum pump veins were intact but the rotors were cracked. The rubber drive had melted.

1.7.10 Ground Search for Missing Elevator

Following the examination, a Safety Board engineer completed a trajectory analysis using the radar data, manufacturer's data, and winds aloft forecasts, for the missing trim tab and right elevator. Using the results, aerial and ground searches were performed over the projected area. The searches were unsuccessful.

1.7.11 Vehicle Performance Study

The Safety Board's Office of Research and Engineering, Vehicle Performance Division, conducted a performance study of the airplane's flight path. Data used for the study included radar data from Las Vegas Surveillance Radar (ASR-9), atmospheric data from NWS, and global positioning system measurements from the IIC. The study used the available data to show details of the airplane's ground track, altitude, vertical speed, and ground speed.

The complete performance report is included in the docket for this accident and contains graphic plots of the data. Figure 1 depicts the ground track overlaid on a topographical map to show the ground track in relation to the surrounding topography. The overlay shows the airplane's flight track departing from the area of Henderson and heading east-southeast and transitioning over the Willow Beach area. The track continues eastbound and shows a series of turns east of the Wilson's Ridge area prior to returning westbound. The track continues westbound until the track disappears near the Wilson's Ridge area. In figure 2, the altitude is plotted over time. The graph shows a continuous climb from approximately 3,400 feet to 5,500 feet, and then an additional climb to about 6,300 feet at 1014. The track then descends to approximately 5,000 feet and makes small deviations in altitude between 1015 and about 1022. At 1022, the track shows a climb to 7,000 feet. At 1027, the track shows a decrease in altitude to about 6,000 feet. About 1031, the track shows an extreme loss in altitude from 6,100 to 5,300 feet, and then an extreme climb to 5,900 feet. In figure 3, the ground track is expanded with altitude and time. In figure 4, the altitude profile was expanded and again shows the altitude plotted over time, from 1023 until the final radar target.

The vertical speed was plotted over time in figure 5. Throughout the last 7 minutes of the flight, the rates of climbs and descents were about plus or minus 1,000 feet per minute. At 1031, the rate of descent is about 4.000 feet per minute (fpm), followed by an immediate rate of climb of 3,700 feet per minute. In figure 6, the ground speed and smoothed ground speed calculations were plotted over time. The chart shows airspeeds between 110 to 130 knots, with the highest smoothed airspeed at 155 knots. Just prior to the major altitude deviations and loss of radar contact, the airspeed shows a smoothed airspeed of about 120 knots. Table IA shows all of the secondary radar returns. Table 2A shows all of the primary radar returns.

The results of the study indicate that the airplane was cruising at an altitude of about 6,000 feet msl heading approximately west, about 1 mile west of Wilson's Ridge. At 1031:03, the flight's track began a descent to 5,300 feet at a rate of about 4,000 fpm and indicated a turn to a northerly direction. By 1031:27, the airplane had reversed its descent and had climbed to 5,900 feet at a rate of 3,800 fpm and was headed in an easterly direction at the last radar return. The airplane impacted on the eastern side of the ridge.

1.8 ADDITIONAL INFORMATION

1.8.1 Company Information

King Airelines, Inc., has been operating scenic tour flights since 1986 under the provisions of 14 CFR Part 135. At the time of the accident, the operator employed on average about 20 line pilots and 9 part and full-time mechanics. They operated a fleet of 14 single and multiengine airplanes. The operator hires entry-level pilots with minimum flight time requirements of 500 hours total time; 100 hours must be cross-country, 25 hours must be at night, and 50 hours must be multiengine flight time. Pilots are required to hold a commercial certificate with an instrument rating.

The tour flights operate between Henderson and the West Grand Canyon. All of the operations are conducted under visual flight rules. The fleet of airplanes is not certified for instrument flight, although the airplanes are equipped with varying instrumentation to assist the pilot upon entry into inadvertent instrument meteorological conditions.

Documentation obtained from the FAA accident coordinator showed that the Las Vegas Flight Standards District Office performed routine inspections of King Airelines. Over the 2 years prior to the accident, 119 maintenance surveillance actions were performed and 31 operations surveillance actions were performed. The last maintenance surveillance prior to the accident was on October 28. The last operations surveillance prior to the accident was on November 12. According to the FAA accident coordinator, the principal operations inspector, the principle maintenance inspector, and the principle avionics inspector performed the required amount of inspections within the FAA mandated time periods. At the time of the accident, there were no open surveillance actions for the operator. The FAA operations specifications for the operator indicated that the airplane was to be maintained in accordance with airworthiness directives and the manufacturer's approved maintenance manual. According to the FAA, under these specifications King Airelines was not required to comply with service bulletins.

The Cessna Aircraft Company approved maintenance manual for the model 207 and T207 aircraft states the following concerning keeping Cessna publications up to date: "The information in this publication is based on data available at the time of the publication and is updated, supplemented, and automatically amended by all information issued in the Service News Letters, Service Bulletins, Supplier Service Notices, Publications Changes, Revisions, Reissues and Temporary Revisions. All such amendments become part of and are specifically incorporated within this publication. Users are urged to keep abreast of the latest amendments to this publication through information available at Cessna Authorized Service Stations or through the Cessna Product Support subscription which provide disassembly, overhaul, and parts breakdowns for some of the various suppliers' equipment items. Suppliers' publications are updated, supplemented, and specifically amended by supplier issued revisions and service information which may be reissued by Cessna: thereby automatically amending this publication and is communicated to the field through Cessna Authorized Service Stations and/or Cessna subscription service."

1.8.2 Wreckage Release

The recovered airplane wreckage was released to the owner's representative on November 30, 2005. No parts or pieces were retained.

Pilot Information

Certificate:	Flight Instructor; Commercial	**Age:**	28, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	10/01/2004
Occupational Pilot:		**Last Flight Review or Equivalent:**	05/01/2004
Flight Time:	1209 hours (Total, all aircraft), 117 hours (Total, this make and model), 1135 hours (Pilot In Command, all aircraft), 174 hours (Last 90 days, all aircraft), 35 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1783U
Model/Series:	T207A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	T207A-0383
Landing Gear Type:	Tricycle	**Seats:**	7
Date/Type of Last Inspection:	11/01/2004, AAIP	**Certified Max Gross Wt.:**	3800 lbs
Time Since Last Inspection:	32.8 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	12616 Hours at time of accident	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520-M
Registered Owner:	Skyventure, LLC	**Rated Power:**	300 hp
Operator:	KING AIRELINES INC	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	KNFA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	HND, 2492 ft msl	**Distance from Accident Site:**	26 Nautical Miles
Observation Time:	0945 PST	**Direction from Accident Site:**	255°
Lowest Cloud Condition:	Scattered / 10000 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Overcast / 20000 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	8°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Henderson, NV (HND)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Henderson, NV (HND)	**Type of Clearance:**	None
Departure Time:	0903 PST	**Type of Airspace:**	Class D

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-Ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	35.986111, -114.598611

Administrative Information

Investigator In Charge (IIC):	Kristi Dunks	**Report Date:**	03/28/2006
Additional Participating Persons:	James Daigle; Federal Aviation Administration; Las Vegas, NV Thomas Moody; Cessna Aircraft Company; Wichita, KS Michael Grimes; Teledyne Continental Motors; Mobile, AL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		