



National Transportation Safety Board Aviation Accident Final Report

Location:	Kodiak, AK	Accident Number:	ANC08MA038
Date & Time:	01/05/2008, 1343 AST	Registration:	N509FN
Aircraft:	PIPER PA-31-350	Aircraft Damage:	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	Injuries:	6 Fatal, 3 Serious, 1 Minor
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The airline transport pilot and nine passengers were departing in a twin-engine airplane on a 14 Code of Federal Regulations Part 135 air taxi flight from a runway adjacent to an ocean bay. According to the air traffic control tower specialist on duty, the airplane became airborne about midway down the runway. As it approached the end of the runway, the pilot said he needed to return to the airport, but gave no reason. The specialist cleared the airplane to land on any runway. As the airplane began a right turn, it rolled sharply to the right and began a rapid, nose- and right-wing-low descent. The airplane crashed about 200 yards offshore and the fragmented wreckage sank in the 10-foot-deep water. Survivors were rescued by a private float plane. A passenger reported that the airplane's nose baggage door partially opened just after takeoff, and fully opened into a locked position when the pilot initiated a right turn towards the airport. The nose baggage door is mounted on the left side of the nose, just forward of the pilot's windscreen. When the door is opened, it swings upward, and is held open by a latching device. To lock the baggage door, the handle is placed in the closed position and the handle is then locked by rotating a key lock, engaging a locking cam. With the locking cam in the locked position, removal of the key prevents the locking cam from moving. The original equipment key lock is designed so the key can only be removed when the locking cam is engaged. Investigation revealed that the original key lock on the airplane's forward baggage door had been replaced with an unapproved thumb-latch device. A Safety Board materials engineer's examination revealed evidence that a plastic guard inside the baggage compartment, which is designed to protect the door's locking mechanism from baggage/cargo, appeared not to be installed at the time of the accident. The airplane manufacturer's only required inspection of the latching system was a visual inspection every 100 hours of service. Additionally, the mechanical components of the forward baggage door latch mechanism were considered "on condition" items, with no predetermined life-limit. On May 29, 2008, the Federal Aviation Administration issued a safety alert for operators (SAFO 08013), recommending a visual inspection of the baggage door latches and locks, additional training of flight and ground crews, and the removal of unapproved lock devices. In July 2008, Piper Aircraft issued a mandatory service bulletin (SB 1194, later 1194A), requiring the installation of a key lock device, mandatory recurring inspection intervals, life-limits on safety-critical parts of forward

baggage door components, and the installation of a placard on the forward baggage door with instructions for closing and locking the door to preclude an in-flight opening. Postaccident inspection discovered no mechanical discrepancies with the airplane other than the baggage door latch. The airplane manufacturer's pilot operating handbook did not contain emergency procedures for an in-flight opening of the nose baggage door, nor did the operator's pilot training program include instruction on the proper operation of the nose baggage door or procedures to follow in case of an in-flight opening of the door. Absent findings of any other mechanical issues, it is likely the door locking mechanism was not fully engaged and/or the baggage shifted during takeoff, and contacted the exposed internal latching mechanism, allowing the cargo door to open. With the airplane operating at a low airspeed and altitude, the open baggage door would have incurred additional aerodynamic drag and further reduced the airspeed. The pilot's immediate turn towards the airport, with the now fully open baggage door, likely resulted in a sudden increase in drag, with a substantive decrease in airspeed, and an aerodynamic stall.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of company maintenance personnel to ensure that the airplane's nose baggage door latching mechanism was properly configured and maintained, resulting in an inadvertent opening of the nose baggage door in flight. Contributing to the accident were the lack of information and guidance available to the operator and pilot regarding procedures to follow should a baggage door open in flight and an inadvertent aerodynamic stall.

Findings

Aircraft	Cargo/baggage doors - Incorrect service/maintenance (Cause) Airspeed - Not attained/maintained (Factor)
Personnel issues	Repair - Maintenance personnel (Cause)
Organizational issues	Emergency proc training - Manufacturer (Factor) Availability of policy/proc - Manufacturer (Factor)

Factual Information

HISTORY OF FLIGHT

On January 5, 2008, about 1343 Alaska standard time, a twin-engine Piper PA-31-350 airplane, N509FN, received substantial damage when it collided with ocean water following a loss of control shortly after takeoff from Runway 36 at the Kodiak Airport, Kodiak, Alaska. The airplane was being operated by Servant Air, Inc., Kodiak, as a visual flight rules (VFR) on-demand charter flight under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135, when the accident occurred. Of the 10 people aboard, the airline transport pilot and 5 passengers died at the scene, 3 passengers sustained serious injuries, and 1 passenger sustained minor injuries. Visual meteorological conditions prevailed, and company flight following procedures were in effect. The flight was en route to Homer, Alaska.

During an initial hospital room interview with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), on January 5, about 2200, a passenger related that the purpose of the flight was to transport a group of commercial fishermen from Kodiak to Homer for Russian Christmas. He added that many of the passengers were family members that lived in the same community near Homer.

The passenger stated that he was seated in the third row on the right side of the airplane. He said that shortly after becoming airborne, he saw the airplane's nose baggage door open slightly, which he said initially startled the pilot. He said that while the airplane was still over the departure end of Runway 36, the pilot initiated a shallow right turn, presumably to return to the airport. He said that as soon as the pilot started the right turn, the baggage door swung open to the full open position, and it remained in that position. The passenger said that as the airplane continued the right turn, it rolled sharply to the right, and began a rapid, nose and right wing low descent. It collided with the water adjacent to the departure end of Runway 36. The passenger said that during the collision the fuselage fragmented, and the airplane sank shortly after impact. He said that he was able to free himself from the sinking wreckage by swimming through a large void in the airplane's fuselage.

According to the contract Air Traffic Control Tower (ATCT) specialist that was on duty at the time of the accident, the accident airplane departed from runway 36, and became airborne about midway along the 5,013-foot long runway. The ATCT specialist said that as the airplane continued to climb approaching the departure end of the runway, the pilot calmly stated that he needed to return to the airport, but gave no reason for his need to return. The ATCT specialist reported that as the airplane began a right turn, it began a steep roll to the right, and descended nose-low into the water. He said that immediately after witnessing the accident, he alerted airport fire rescue crew of the accident, and contacted the U.S. Coast Guard's Air Station Kodiak, which is located adjacent to the Kodiak airport.

The ATCT specialist noted that just after the accident, another Kodiak-based operator in a float-equipped de Havilland DHC-2 Beaver airplane contacted him on the tower radio frequency and said, in part: "[Kodiak] tower, Beaver five forty five's by the Crash Harbor, um can I help there?" The ATCT specialist responded by saying: "Beaver five forty five, yeah, you may be able to uh, you may be the first one that can get to those people that are in the water, they are right off the approach end of runway one eight, just off Buskin Beach, and uh you can transition into the airspace at your discretion." The ATCT specialist said that the pilot of the float-equipped de Havilland DHC-2 went directly to the accident site, then landed near the

partially submerged wreckage.

During an interview with the NTSB IIC, on January 8, the pilot of the de Havilland DHC-2 Beaver airplane reported that at the time of the accident he was doing a postmaintenance engine run following a 100-hour inspection of his airplane. He said that while parked in a bay locally known as "Crash Harbor" adjacent to the Kodiak Airport, he initially overheard the radio conversation between the accident pilot and ATCT specialist, followed by the conversations between the ATCT specialist and the fire rescue crews, so he offered his assistance.

The pilot said that once he found the partially submerged wreckage, he landed, and then taxied close as he could to the sinking wreckage. He said he discovered two passengers swimming in the water next to the submerged wreckage, and two other passengers clinging to the airplane's exposed vertical stabilizer. He said that wind conditions at the time of the rescue made it very difficult to maneuver his airplane next to the wreckage. Once he had the four severely hypothermic passengers aboard, he departed to the north, and flew directly to the Kodiak boat harbor where an ambulance was waiting. The pilot noted that when he departed the accident site, no other passengers were visible on the surface of the water.

Pilot Preflight

During an interview with the NTSB IIC on January 8, an employee of Servant Air reported that the accident pilot loaded the airplane himself, while his passengers waited in the operator's lounge. The employee noted that he watched the pilot load various items into the forward baggage area, closed and latched the baggage door, then continued loading the remaining items in the aft baggage area, and wing lockers. He said that when the pilot was done loading the airplane, he saw him do a "walk around" the entire airplane. He said that when the pilot approached the forward baggage area, the pilot slide his open left hand across the closed door, then while making a loose fist, he lightly tapped the door, just above the door's handle and lock assembly, then continued around the airplane's right wing.

PERSONNEL INFORMATION

Pilot Information

The pilot held an airline transport pilot certificate with airplane multiengine land and sea, and helicopter ratings. He also held a flight instructor certificate with airplane single-engine land, multiengine land, instrument airplane, and helicopter ratings. His most recent first-class medical certificate was issued August 7, 2007, and contained no limitations.

According to the NTSB Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1) submitted by Servant Air, dated January 18, 2008, the pilot's total flight time was 9,437 hours, of which 400 were in the accident airplane make and model, and 1,108 in multiengine airplanes.

His most recent airman competency/proficiency check (CFR Part 135.293) check ride was on September 1, 2007, the company president, who was a company check airman, administered the check ride in the accident airplane.

A review of the flight and duty records for the pilot revealed in the 30 days before the accident, he flew about 47.5 hours. His flight time in the previous 90 days was about 179.6 hours.

According to the operator, the company hired the pilot on June 1, 2004, and at that time, his

total combined (helicopter and airplane) flight experience was about 6,555 flight hours, with 36 hours in multiengine airplanes.

Before being hired by Servant Air, the pilot was a full-time helicopter pilot for the United States Coast Guard. During his time in service with the Coast Guard, he was stationed in various theaters around the world, including Alaska. While in the Coast Guard, he accumulated about 6,000 flight hours in helicopters, and about 465 hours in airplanes.

Company Information

The operator is a Federal Aviation Regulations (FAR) Part 135 Air Carrier, and holds scheduled commuter and on-demand operations specifications. Company facilities are in Kodiak and Anchorage, Alaska. The president/director of maintenance and chief pilot reside in Kodiak. The vice president/director of operations resides in Anchorage. A review of the company's operations specification, issued by the FAA, indicate that flights shall only be initiated, diverted, or terminated under the authority of the director of operations, who may delegate his authority, but retains responsibility. At the time of the accident, the company president was out of town, and the vice president/director of operations was in Kodiak in his absence.

A review of Servant Air's FAA approved training program revealed no specific training requirements concerning the proper operation of the nose baggage door. In addition, there were no emergency procedures training concerning an inadvertent opening of the nose baggage door.

AIRPLANE INFORMATION

The airplane was equipped with two Lycoming TIO-540-J2B engines that were each rated at 350 horsepower.

The airplane's original maximum gross weight was 7,000 pounds, but it had been modified to 7,368 pounds in accordance with an FAA-approved supplemental type certificate (STC).

According to the load manifest computed by the pilot just before departure, the airplane's gross weight was 7,221 pounds, or 147 pounds below its maximum gross weight.

The airplane was not equipped with a cockpit voice recorder, or a flight data recorder.

Maintenance records revealed that the last recorded inspection event of the engine and airframe was a 100-hour inspection, completed on December 18, 2007, 18 days and 27 service hours before the accident. At that time, the airplane had a total of 13,102 service hours. The left engine had about 615 service hours since the last major overhaul, and the right engine had about 1,151 service hours since the last major overhaul.

The most recent annual inspection of the engines and airframe was on August 15, 2007, at which the airplane had 12,914 service hours. The left engine had about 427 service hours since a major overhaul, and the right engine had about 1,363 service hours since major overhaul.

The left engine overhaul was done by Aero Recip Alaska, on June 14, 2006. The engine was installed on the accident airplane on June 29, 2006, and remained there until the accident.

The right engine overhaul was done by Aero Recip Alaska, on December 8, 2003. The engine was installed on the accident airplane on January 5 2004, and remained there until the accident.

METEOROLOGICAL INFORMATION

The closest official weather observation station is located at the Kodiak Airport. At 1353, an Aviation Routine Weather Report (METAR) was reporting, in part: Wind, 300 degrees (true) at 17 knots with gusts to 26 knots; visibility, 10 statute miles; clouds and sky condition, 1,600 feet few, 25,000 feet scattered; temperature, 25 degrees F; dew point, 14 degrees F; altimeter, 29.96 inHg.

COMMUNICATIONS

Review of the air-ground radio communications tapes maintained by the FAA at the Kodiak Airport, revealed the pilot contacted the Kodiak Air Traffic Control Tower (ATCT), about 1337, and requested a clearance to taxi from the commercial ramp for a northbound departure. The ATCT specialist on duty responded by saying: "Navajo niner Foxtrot November Kodiak tower, runway three six position and hold, taxi via the runways." According to the ATCT specialist, the airplane taxied to runway 36 as instructed, then held short at the end of the runway.

At 1340, the ATCT specialist said: "Navajo niner Foxtrot November, wind two eight zero at one six, runway three six, cleared for takeoff." The pilot said: "Cleared for takeoff, [runway] three six, nine foxtrot November."

At 1342, the pilot said: "and tower, nine foxtrot November, I need to return for landing." The ATCT specialist on duty responded by saying: "Navajo niner Foxtrot November, wind three zero zero at one seven, and you can land on any runway you please." The pilot responded and said: "nine fox November." No further radio contact from the accident airplane was received.

A transcript of all communications between the accident pilot and the ATCT specialist is included in the public docket of this accident.

AERODROME AND GROUND FACILITIES

The Kodiak airport, elevation 73 feet msl, is equipped with three, intersecting hard-surfaced runways. Runway 36 is 5,013 feet long by 150 feet wide. The departure end of runway 36 is positioned at the edge of Chiniak Bay.

The airport is near the base of Barometer Mountain, which rises to 2,506 feet west of the airport.

The Kodiak Airport is the home of the U.S. Coast Guard's Air Station Kodiak. The Air Station is the major tenant of Integrated Support Command (ISC) Kodiak, and the largest Coast Guard command in the Pacific area. Air Station Kodiak operates a fleet of HC-130H's airplanes, as well as a fleet of HH-60J, and HH-65A rescue helicopters.

WRECKAGE AND IMPACT INFORMATION

The NTSB IIC, and a Federal Aviation Administration (FAA) airworthiness inspector, Anchorage Flight Standards District Office, traveled to Kodiak on January 5. The NTSB IIC and the FAA inspector were aboard the recovery vessel when the airplane wreckage was recovered January 6.

All of the airplane's major components were found at the main wreckage site. The airplane's fragmented wreckage sank in the shallow, tidal waters of Chiniak Bay, about 200 yards offshore, and about 30 degrees to the right of the centerline of Runway 36.

The airplane received substantial damage during impact and recovery. Divers who arrived on scene shortly after the accident described the condition of the airplane as severely damaged. The divers described the nose and forward section of the airplane as "fragmented." The airplane was found resting upright on the ocean floor in 10 feet of water at high tide. The divers noted that the upper portion of the airplane was visible during low tide.

The airplane's landing gear was in the extended position.

The airplane's right wing remained partially attached to the fuselage by cables, and the fragmented left wing was found torn from its fuselage to wing attachment points.

The airplane's right engine assembly was torn from the airplane's firewall, and was found among the submerged wreckage. The right engine sustained impact damage to the front and underside portions. The exhaust tubes were crushed upward, and the folded edges of the exhaust tubes did not exhibit any cracking or bending. The right propeller hub remained attached to the crankshaft flange. All three propeller blades were loose in the propeller hub, but remained attached to the propeller hub assembly. The three propeller blades were bent aft, and all had torsional "S" twisting.

The airplane's left engine assembly remained attached to the airplane's firewall. The engine sustained impact damage to the front and underside portions. The exhaust tubes were crushed upward, and the folded edges of the exhaust tubes did not exhibit any cracking or bending. The left propeller hub remained attached to the crankshaft flange. All three propeller blades were loose in the propeller hub, but remained attached to the propeller hub assembly. The three propeller blades were bent aft, and all had torsional "S" twisting.

During recovery efforts, ropes and cables were attached to the engine nacelles, fuselage, and landing gear to hoist the wreckage onto a recovery barge. While being hoisted, the airplane broke apart in numerous areas, and the left wing separated. The right wing remained attached by cables.

The accident airplane's nose baggage door was recovered along with the main wreckage, and it sustained relatively minor damage. The twisted, broken, and distorted nose baggage doorframe was found in the fragmented wreckage of the nose section. The nose baggage door handle was found in the closed position, and both the forward and aft latching arms were extended [closed position]. The nose baggage door lock cam assembly was found partially engaged into the baggage door handle slot. The plastic guard, which is designed to cover the door's locking mechanism components and the latch tube assembly on the inside portion of the door, was missing. The painted surface of the latch tube assembly had areas of chipped paint, with areas of corrosion and rust on the exposed areas.

During recovery, it was noted that the nose baggage door's original equipment key lock had been replaced with a thumb-latching device, which does not utilize a removable key. Additionally, there was a 6-inch aluminum fabricated fastening device mounted on the lower portion of the nose baggage door, which was severely distorted.

After the airplane was recovered, it was transported to a nearby State of Alaska airport

maintenance building for the postaccident examination.

On January 7 and 8, 2008, a wreckage examination and layout was done under the direction of the NTSB IIC. An FAA airworthiness inspector, Anchorage Flight Standards District Office, and an air safety investigator from Piper Aircraft also assisted the NTSB IIC.

Both the right and left throttle and propeller controls were full forward. The left engine mixture control was full forward, and the right mixture was extended about 1/2 inch from full forward. The fuel selectors were on the inboard tanks. The fuel cross-feed was in the off position.

The airplane's flight control system cable continuity was established to the point of impact related damage. The flap mechanism in each wing was in the flaps-up position.

SURVIVAL ASPECTS

The air temperature at the time of the accident was about 25 degrees F, and the water temperature was about 34 degrees F. A review of U.S. Coast Guard survivability data revealed that in 32-degree water, the time to a loss of useful consciousness is about 30 minutes. The operator reported that the airplane was equipped with personal flotation equipment, but passengers were not required to wear the equipment during the flight.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot was conducted under the authority of the Alaska State Medical Examiner, 4500 South Boniface Parkway, Anchorage, Alaska, on January 7, 2008. The cause of death for the pilot was attributed to blunt force, traumatic injuries.

The FAA's Civil Aeromedical Institute (CAMI) did a toxicological examination on February 5, 2007, and was negative for alcohol or illicit drugs. An unspecified amount of Ibuprofen, an over-the-counter pain reliever, was detected in the pilot's blood.

SEARCH AND RESCUE

According to the FAA's ATCT records, emergency notification of the accident was reported to the Kodiak Airport fire department, via the direct-dial "crash" phone, at 1343. Rescue personnel from the Alaska State Trooper's dive rescue team, Kodiak Airport fire department, Kodiak fire department, and Kodiak police department responded to the departure end of Runway 36, but they were unable to reach the accident site.

The U.S. Coast Guard's Air Station Kodiak was notified at 1343, that an airplane had crashed in the waters of Chiniak Bay, just north of the departure end of runway 36. The Coast Guard initiated an emergency response and immediately dispatched an HH-60J rescue helicopter from Air Station Kodiak, and a small Coast Guard boat to aid in the rescue.

According to U.S. Coast Guard mission logs the helicopter arrived on scene about 1404, and the Coast Guard small boat arrived on scene about 1412. Once the Coast Guard rescue swimmers entered the water they were able to free one victim that was restrained within the submerged wreckage. The unconscious and unresponsive passenger was transported to a local hospital,

but attempts to revive him were unsuccessful. The rescue swimmers confirmed that the pilot and four passengers were still in the submerged wreckage, and that they had sustained fatal injuries. The report noted that the four surviving passengers had been picked up by another float-equipped airplane and transported them to the Kodiak boat harbor, before the Coast Guard's helicopter arrived.

Kodiak Airport Emergency Plan

The Kodiak Airport's Emergency Plan (AEP) does not contain a water rescue plan. It does contain a Water Rescue Notification document, which is pages 21 through 23, within the AEP. The document outlines the airport's responsibility, and lists other agencies and their rescue assets. The document states, in part: "Water rescue equipment is not stationed at the Kodiak Airport. In the event an aircraft accident occurs in the surrounding waters, the U.S. Coast Guard will respond to the scene of the accident. In addition, local emergency agencies will also respond to the scene depending on the distance from the airport."

TESTS AND RESEARCH

Engines

On February 8, 2008, at the direction and under the supervision of the NTSB IIC, both engines were disassembled and inspected at Alaskan Aircraft Engines, Inc., Anchorage. The engine inspections revealed no preaccident mechanical anomalies.

Nose Baggage Area and Door

The nose baggage compartment door is mounted on the left side of the nose, just forward of the pilot's windscreen, and measures about 28 inches long by 24 inches tall. The baggage door is hinged at the top on two hinges, allowing it to swing upward when opened. When the door is in the fully open position, it is held open by a latching device. To close the baggage door, a latch release lever must be pushed, which releases the latching device. The nose baggage compartment has a loading capacity of 200 pounds, and a volume of 14 cubic feet.

When the baggage door is closed and the handle is placed in the closed position [flush with the surface of the door], a mechanical linkage rotates two latch arms mounted on the lower portion of the door [one forward and one aft] and extends them both outward. The latching arms then contact two nylon striker plates mounted on the forward and aft portions of the baggage door doorframe. With the door handle in the closed position, the baggage door key lock mechanism can be rotated counterclockwise, engaging the locking cam into a slot on the baggage door handle. With the locking cam in the locked position, removal of the key prevents the locking cam from moving out of the slot door in the door handle, which in turn prevents the door handle from opening. Piper's original equipment key lock is designed so the key can only be removed when the lock is in the locked position.

Thumb Latch vs. Key Lock

During the postaccident inspection of the accident airplane's forward baggage door, it was discovered that Piper's original equipment key lock mechanism had been replaced with a

thumb-latch device. In postaccident interviews with other Piper PA-31 operators it was revealed that many of them have also modified the baggage doors by replacing the key lock mechanism with a latching mechanism that does not require a key.

According to FAA inspectors, this modification is considered to be a minor alteration that requires maintenance personnel to make only a logbook entry. The FAA inspectors explained that a supplementary latch typically accompanies the installation of a keyless lock. The supplementary latch is commonly known to Piper PA-31 operators in Alaska as the "Peebles Latch." The safety latch, fabricated from 0.040" Alclad Aluminum, is installed above the forward baggage door handle, and provides a secondary, external latching system once the latch is placed over the door handle. The accident airplane's forward baggage door was not equipped with a secondary latch.

During an interview with the NTSB IIC on January 8, the company's president reported that the accident airplane was purchased from an Anchorage based aircraft broker in November 2004. He said that the thumb-latch device was already installed on the airplane when the company purchased the airplane.

Baggage Door Guard

During the postaccident inspection of the accident airplane's forward baggage door it was discovered that the plastic guard was missing. The guard is designed to protect the door's locking mechanism components, which are positioned on the interior portion of the baggage door. According to the on scene air safety investigator from Piper Aircraft, the guard is designed to prevent items that are placed in the forward baggage area from interfering with door's locking mechanism during flight. He noted that operating the airplane without the guard might result in an inadvertent opening of the baggage door.

During an interview with the NTSB IIC on January 8, the company president, who also serves as the director of maintenance and is a company pilot, reported that the last time he flew the accident airplane the plastic guard was in place. He added that even more recently the guard was in place on December 10, 2007, 18 days and 27 service hours before the accident, at which time he completed a 100-hour inspection.

The airplane's forward baggage door was sent to the NTSB's materials laboratory for examination.

The accident airplane's forward baggage door was inspected on July 1, 2008, at the NTSB's Washington D.C. materials laboratory. The examination was done at the direction of a Safety Board senior materials research engineer. The Safety Board engineer reported that the plastic guard is held in place by six #6-32 screws that screw into corresponding rivnuts mounted on the interior portion of the baggage door. He said that five of the six rivnuts were empty, and one rivnut contained a screw and a fractured piece of the plastic cover. He added that the empty rivnuts holes were cleaned and examined with an optical microscope, and none of the threads within the rivnuts were stripped.

The Safety Board engineer also noted in his report that both the latch mechanism and the [thumb] lock mechanism were operational. If the lock was not engaged, the latch could be opened by an aft force applied along the latch tube assembly.

A complete copy of the NTSB's materials laboratory factual report is included in the public docket for this accident.

Previous Accident History

A review of NTSB's database shows seven previous accidents which resulted from inadvertent in-flight openings of nose baggage doors on Piper PA-31 Navajo, Piper PA-23 Aztec, and Piper PA-31T Cheyenne series airplanes, all of which share a similar baggage door design. Common findings among most of the previous accidents related to airplanes operating at or near the airplane's maximum gross weight, and/or during takeoff.

During a telephone conversation with the NTSB IIC on January 10, the manager of Piper Aircraft's air safety division said that his research revealed that during the original certification process of the Piper PA-31 series airplane, no flight testing was conducted, nor was it required, concerning the adverse aerodynamic effects of a nose baggage door opening in-flight.

During a telephone conversation with the NTSB IIC on January 15, the director of operations for a Part 135 cargo operator, which operates 41 Piper PA-31-350 airplanes, reported that in the past, his company has had the nose baggage doors open in-flight, but none resulted in an accident since the airplanes were operating at relatively low gross weights, and none occurred during takeoff. He said that after installing a secondary latch device on all of its airplanes about 10 years ago, no inadvertent baggage door openings have occurred since. The director of operations said that the secondary latch device his company uses mounts to the lower portion of the nose baggage door, and with the door closed, a quick release Camlock wing-stud is inserted into a receptacle that's mounted into the lower doorframe, and locked into place.

Forward Baggage Door Latch Mechanism Inspection Requirements

The NTSB IIC reviewed Piper Aircraft's recommended inspection and maintenance intervals contained within the FAA approved Piper PA-31-350 maintenance service manual. The review revealed that a visual inspection of the forward baggage door latch mechanism is required every 100-hours of service. The Piper PA-31-350 100-hour checklist, item E, labeled Fuselage and Empennage Group, item number 15, states, in part: "Inspect forward baggage door latch and hinge operation and security."

An air safety investigator from Piper Aircraft reported that the mechanical components of the forward baggage door latch mechanism are considered "on condition" items, with no predetermined life-limit.

In conjunction with the NTSB's investigation, Piper Aircraft did a random fleet survey, which identified several common aging-fleet related conditions that can hamper the door's latching capability. The conditions were, in part: Worn/non-conforming key locks, worn/corroded clevis pins, bent/deformed/non-conforming baggage door brackets, and damaged/corroded door locking springs.

FAA Safety Alert for Operators

On May 29, 2008, the FAA's Flight Standards Service, Washington D.C., issued a safety alert for operators (SAFO number 08013), which alerts operators of Piper PA-31 Navajo, Piper PA-23 Aztec, and Piper PA-31T Cheyenne series airplanes, concerning the risks associated with an inadvertent opening for the forward baggage doors.

The SAFO recommends, in part:

"Operators should develop procedures to routinely inspect the baggage door and associated latches and locks during the normal aircraft inspection process."

"The operator's training programs should ensure that flight crews, ground handlers, and maintenance personnel understand the proper operation of the forward baggage door."

"The baggage door key should only be allowed to be removed when the lock is fully engaged or fully disengaged. The operator's pilot training program should include emergency procedures training on how to react should a baggage door open during take-off or in flight. The training should include a description of what to expect such as noise, vibration, handling, and potential secondary damage from baggage hitting props."

"Operators need to remove any "permanent key" installations. This defeats the safety feature of having a removable key. The key can only be removed when the lock is either totally open or completely engaged. With a "permanent key" installed, the lock is free to rotate."

"Make sure latch and lock mechanisms conform to original type design and are in a condition for safe operation."

The FAA SAFO also states: "FAA Aircraft Certification is currently working with Piper Aircraft to develop additional certification requirements pertaining to this issue. Until such time as the additional requirements are published, operators should consider the recommendations contained herein."

On July 15, 2008, Piper Aircraft issued a mandatory service bulletin (SB 1194), which was later revised (SB 1194A) on November 10, 2008, requiring, in part, the following:

The installation of a key lock device on all Piper PA-31 Navajo, Piper PA-23 Aztec, and Piper PA-31T Cheyenne series airplanes. (The key can only be removed from the lock after the key is placed in the locked position)

Establishes mandatory recurring inspection intervals of the forward baggage door latching mechanism and lock assembly.

Establishes life-limits on safety-critical parts of forward baggage door components.

Requires the installation of a placard on the forward baggage door that provides instructions for closing and locking the door.

A complete copy of Piper's mandatory service bulletin is included in the public docket for this accident.

WRECKAGE RELEASE

The Safety Board released the wreckage to the owner's insurance representative on January 9, 2008. The Safety Board retained the forward baggage door until December 17, 2008 when it was also released to the owner's insurance representative.

History of Flight

Initial climb	Sys/Comp malf/fail (non-power) (Defining event) Aerodynamic stall/spin Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Airline Transport	Age:	50, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):		Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without Waivers/Limitations	Last Medical Exam:	08/07/2007
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	09/01/2007
Flight Time:	9437 hours (Total, all aircraft), 400 hours (Total, this make and model), 179 hours (Last 90 days, all aircraft), 74 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	PIPER	Registration:	N509FN
Model/Series:	PA-31-350	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	31-7952162
Landing Gear Type:	Retractable - Tricycle	Seats:	10
Date/Type of Last Inspection:	12/18/2007, 100 Hour	Certified Max Gross Wt.:	7368 lbs
Time Since Last Inspection:	27 Hours	Engines:	2 Reciprocating
Airframe Total Time:	13130 Hours	Engine Manufacturer:	Lycoming
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	TIO-540 Serie
Registered Owner:	OSOWSKI WES A	Rated Power:	350 hp
Operator:	Servant Air, Inc.	Air Carrier Operating Certificate:	Commuter Air Carrier (135); On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	S4EA

Meteorological Information and Flight Plan

Observation Facility, Elevation:	ADQ, 78 ft msl	Observation Time:	1353 AST
Distance from Accident Site:		Condition of Light:	Day
Direction from Accident Site:		Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Few / 1600 ft agl	Temperature/Dew Point:	-4° C / -10° C
Lowest Ceiling:		Visibility	10 Miles
Wind Speed/Gusts, Direction:	17 knots/ 26 knots, 300°	Visibility (RVR):	
Altimeter Setting:	28.97 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	KODIAK, AK (ADQ)	Type of Flight Plan Filed:	Company VFR
Destination:	HOMER, AK (HOM)	Type of Clearance:	None
Departure Time:	1343 AST	Type of Airspace:	

Airport Information

Airport:	Kodiak (ADQ)	Runway Surface Type:	Asphalt
Airport Elevation:	78 ft	Runway Surface Condition:	Dry
Runway Used:	36	IFR Approach:	None
Runway Length/Width:	5013 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	5 Fatal, 3 Serious, 1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	6 Fatal, 3 Serious, 1 Minor		

Administrative Information

Investigator In Charge (IIC):	Clinton O Johnson	Adopted Date:	04/15/2009
Additional Participating Persons:	John P Jones; Federal Aviation Administration (Airworthiness); Anchorage, AK George Hollingsworth; Piper Aircraft, Inc.; Vero Beach, FL Troy R Helgeson; Textron Lycoming; Williamsport, PA Wes Osowski; Servant Air; Kodiak, AK		
Publish Date:	08/04/2011		
Investigation Docket:	NTSB accident and incident docket 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.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.