Aviation Investigation Final Report

Location:	Denver, Colorado	**Incident Number:**	CEN11IA341
Date & Time:	May 17, 2011, 06:45 Local	**Registration:**	N218YV
Aircraft:	Beech 1900D	**Aircraft Damage:**	Minor
Defining Event:	Landing gear collapse	**Injuries:**	11 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

While on approach to landing, the first officer (the pilot flying) called for the landing gear to be extended. The captain placed the gear handle in the down position and waited for the three landing gear down-and-locked annunciator lights to illuminate. Although the “NOSE” and “RH” annunciators illuminated fully, only the “L” side of the “LH” annunciator for the left main landing gear (LMLG) appeared to be illuminated (each annunciator has two light bulbs). During the landing roll, the airplane began to wobble, and the LMLG collapsed.

An examination of the airplane revealed that the nose landing gear (NLG) actuator end cap, which was found on the runway, failed due to fatigue from multiple origins that propagated from the inside diameter toward the exterior of the cap. The end cap failure, which likely occurred once the NLG reached its down and locked position, allowed most of the hydraulic fluid to be blown out of the NLG actuator, resulting in a decrease in hydraulic system pressure before the LMLG could reach the full down-and-locked position (the LMLG is the last in the system to receive a pressure pulse). No premishap mechanical deficiencies were noted with the LMLG system that would have precluded it from operating normally if sufficient hydraulic pressure had been available. However, because the loss of hydraulic pressure also disabled the manual landing gear extension system, the Quick Reference Handbook (QRH) procedure for the flight crew to manually extend the gear would have been ineffective in securing the LMLG.

The investigation identified safety issues related to the failure mode and inspection procedure for the NLG actuator end cap. Metallurgical examination of the NLG end cap revealed that the fractured NLG end cap’s grain was not in the optimum longitudinal direction. (Grain direction in

the metal's microstructure affects its tensile properties and resistance to fatigue stresses.) The NLG end cap was manufactured before the specifications were revised to indicate a longitudinal grain direction for the part. Also, evidence indicates that the fatigue crack was likely present when the end cap was overhauled in 2008 and during a routine inspection of the airplane in 2010; however, the dye penetrant inspection performed during the overhaul did not detect the crack, which would not have been detectable during the visual inspection of the airplane (because the crack had not propagated to the outside of the end cap). As a result of this investigation, the airplane's maintenance manual was changed to recommend ultrasonic inspections and overhauls for the NLG end cap at specified cycles.

Another safety issue was identified regarding the illuminated appearance of the LH annunciator in the cockpit. According to the system design, when the LMLG is not down and locked, the indication circuit is not complete, and the LH annunciator lights will not be illuminated in the cockpit. However, examination of the incident airplane revealed that an incorrect lamp module, which did not have a light dam, was installed in the center position. As a result, light from the illuminated "R" (in the adjacent annunciator) was able to bleed over and give the appearance that the "L" was also illuminated, providing the flight crew with an erroneous indication that the LMLG was down and locked.

The investigation examined other factors that influenced the flight crew's belief that the LMLG was safe and the captain's decision to continue the approach. The captain noted that, after he placed the gear handle down, the landing gear in-transit light stayed on and that the gear motor continued to run for about 16 seconds before the gear-motor relay circuit breaker popped, but he stated that he was confident that the illuminated "L" indicated that the LMLG was down and locked. The captain also noted that the gear unsafe warning horn sounded just before touchdown, but he stated that he was not concerned about the horn and elected not to go-around and run the QRH checklists because he had confirmed several times that the gear annunciator lights were illuminated, and he had visually confirmed that the landing gear appeared to be down and locked. Both crewmembers stated that their training told them that if at least one light was illuminated for each annunciator, the landing gear was safe. The captain reported that, about 3 weeks before the incident, he had experienced erroneous gear in-transit light and warning horn indications in another airplane that had resulted from a wiring problem.

The QRH procedure, LANDING GEAR MANUAL EXTENSION, states that the failure of the landing gear to fully extend may be indicated by several things, including the red in-transit light and the warning horn; however, it also states: "Because there are two redundant gear-down annunciators for each gear leg, failure of only one green gear-down annunciator to illuminate does not indicate that the gear is unsafe." The operator's director of flight standards stated that the company does not train for situations that would involve three illuminated gear down-

and-locked lights in conjunction with other gear warnings. As a result of this incident, the operator revised its Flight Standards Manual and training modules.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The fatigue failure of the nose landing gear (NLG) end cap, which resulted in insufficient hydraulic pressure to secure the left main landing gear into the down and locked position. Contributing to the fatigue failure was the NLG end cap's non-optimum grain direction and the inadequate inspection procedure performed during overhaul.

Findings

Aircraft	Landing gear actuator - Failure
Aircraft	Gear position and warning - Not specified
Aircraft	Landing gear actuator - Design
Aircraft	(general) - Inadequate inspection

Factual Information

History of Flight

Landing-landing roll	Landing gear collapse (Defining event)

HISTORY OF FLIGHT

On May 17, 2011, approximately 0645 mountain daylight time, N218YV, a Beech BE-1900D, sustained minor damage when the left main landing gear (LMLG) collapsed during landing roll out on Runway 35L at Denver International Airport (DEN), Denver, Colorado. The airline transport pilot rated captain, commercial rated first officer and the nine passengers were not injured. The airplane was registered to Raytheon Aircraft Credit Corporation, Wichita, Kansas, and operated by Great Lakes Aviation, Cheyenne, Wyoming. An instrument flight rules flight plan was filed for flight 5150 that originated at Pueblo Memorial Airport (PUB), Pueblo, Colorado, about 0607, destined for DEN. Visual meteorological conditions prevailed for the scheduled passenger flight conducted under 14 Code of Federal Regulations Part 121.

According to the captain, while on approach to DEN, the first officer (pilot flying) called for the landing gear to be extended. The captain placed the gear handle in the down position and waited for all three landing gear down-and-locked annunciator lights to illuminate green. However, only the “NOSE”, “RH”, and “L” illuminated. The "H" light for the left gear did not illuminate (there are two bulbs per annunciator, one for the "NO", "SE", "L", "R", and both "H's"). Due to the redundancy built into the annunciator lights, the Captain was confident that even though the “H” light was not illuminated; the fact that the “L” was, indicated that the gear was down and locked. He also noted that the landing gear in-transit light stayed on and the gear motor continued to run for approximately 16 seconds before the gear-motor relay circuit breaker popped. The captain said he confirmed several times that at least one light was illuminated on all three landing gear down-and-locked annunciator lights prior to landing and stated, "All training tells us that indication is 3 down and locked gear."

Just before touchdown, the gear unsafe warning horn sounded. The captain said he was not concerned about the horn and elected not to go-around and run the Quick Reference Handbook (QRH) checklists, since all three landing gear down annunciators were illuminated. Plus, he had previously looked out the window and saw what appeared to be a down and locked gear. Upon landing, and after a few seconds during the rollout, the airplane began to "wobble" and the left main gear collapsed.

The airplane came to rest on the left side of the runway and all nine passengers exited from the left main door. There was no fuel spill or fire.

PERSONNEL INFORMATION

The captain held an airline transport pilot rating for airplane multi-engine land. His last Federal Aviation Administration (FAA) first class medical was issued on August 24, 2010. At the time of the incident, the captain reported a total of approximately 3,250 total hours; of which, 2,800 hours were in a Beech 1900D.

The first officer held a commercial pilot certificate for airplane single and multi-engine land, and instrument airplane. His last FAA first class medical was issued on February 3, 2011. At the time of the incident, the first officer reported a total of approximately 950 total hours; of which, 85 hours were in a Beech 1900D.

AIRCRAFT INFORMATION

The Beech BE-1900D is equipped with a retractable tricycle landing gear system. Extension and retraction of the NLG and both main landing gear (MLG) is accomplished by the action of individual hydraulic actuators installed on each landing gear assembly. The MLG actuators retract for gear extension and extend for gear retraction while the NLG actuator extends for gear extension and retracts for gear retraction. Hydraulic pressure for the system is supplied by a hydraulic power pack located in the left wing leading edge inboard of the nacelle and associated plumbing for the normal extend, normal retract, and emergency extend modes. Control of the system is accomplished through the landing gear handle located to the left side of the center pedestal on the pilot's inboard sub panel. The landing gear handle has two detents, UP and DN. When the handle is placed in the UP position, power is supplied to the hydraulic pump motor and to a gear-up solenoid that allows fluid to flow through the normal retract side of the system. When the handle is placed in the DN position, power is supplied to the hydraulic pump motor and to a gear-down solenoid that allows the fluid to flow through the normal extend side of the system. Once the landing gears are fully extended, an internal mechanical lock in each of the actuators holds the landing gear in the down position. The lock will also activate a down-position switch in each actuator that will interrupt current to the hydraulic pump motor once all three landing gears are in the down and locked position. In the event that all three landing gears are not down and locked, the hydraulic pump motor will continue to run for about 14 seconds before the LANDING GEAR RELAY circuit breaker pops and interrupts current to the pump motor. In the event of a system malfunction or failure, the pilots can extend the landing gear manually through the use of a hand pump located in the cockpit. The manual extension system utilizes a different reservoir and plumbing than the normal system. Visual indication of the landing gear positions is provided by two red lights located in the landing gear handle and six green lights (two bulbs for each annunciator) located next to the landing gear handle. Illumination of the red lights in the handle occurs when the landing gear are in-transit and illumination of the green lights occurs when the gear are in a down and locked position. A gear-up indication occurs when none of the lights are illuminated. In addition to the down-position switches internal to the actuators, there are two position switches located in each wheel well to provide either an up-position or a down-position indication. In order to get either a gear-up or gear down and locked indication two of the three

switches have to be in the correct position. When the down-position switch in the wheel well and the down-position switch in the actuator are both closed, current is supplied to the two green down and locked lights in the landing gear position annunciator assembly corresponding to the appropriate landing gear (NOSE, RH, or LH). When the down-position switch in the wheel well is open and the up-position switch in the wheel well is closed, no current is supplied to any lights. For any other combination of switch positions, current is supplied to the two red in-transit lights in the gear handle. Based on the wiring, there are no combinations of switch positions that can supply current to both the in-transit and down and locked lights simultaneously. Each individual landing gear indication and the in-transit indication have two bulbs installed in a parallel circuit for redundancy. If one bulb should burn out, the pilot will still see the correct indication.

According to the Model 1900D Illustrated Parts Catalog, Chapter 31-10-00-03, the landing gear position annunciator assembly is composed of three different lamp modules; P/N 90-42292-001 for the NOSE indication, P/N 90-42292-002 for the L and R indications, and P/N 90-42292-003 for the H and H indications. The lamp module part number is stamped on the top of each module by the manufacturer. According to Hawker Beechcraft, the lamp modules are sold complete and there are no provisions in their manuals for replacing or changing the face plates. The individual light bulbs can be changed from the rear of the module without removing the face plate. In addition, a small wall, also called a light dam, is placed between each annunciator bulb to keep individual light bulb illumination concentrated on a specific annunciator.

The operator performed an examination of the incident airplane landing gear position annunciator assembly. A lamp module marked with P/N 90-42292-001 and with an L and R face plate was installed in the center position. However, there was no light dam installed in the lamp module assembly. This meant that the light from the illuminated "R" bulb would have bled over and given the appearance that the "L" annunciator was also illuminated. A search of the maintenance records for the incident airplane in ATA chapters 31 Indicating, 32 Landing Gear, and 33 Lights revealed only two individual light bulb replacements since the airplane had been in operation with Great Lakes Airlines. An additional search of the maintenance records was also performed using the annunciator assembly and lamp module part numbers and nothing was found. The operator then examined their remaining fleet and found 15 of 31 airplanes had discrepant annunciators. This included part numbers being inconsistent with the physical part, missing light dams between the bulbs, or incorrect face plates. All of the discrepant parts were replaced with the correct parts.

Great Lakes maintained the airplane under an FAA approved continuous inspection program, which consisted of routine inspections performed every 60 hours and detailed inspections performed every 220 hours. There are six detailed inspections performed in sequence to ensure that the entire airplane is inspected every 1,320 hours.

The incident airplane was leased by Great Lakes Airlines from Raytheon Aircraft Credit Corporation on December 30, 2008. The most recent routine inspection was performed on May

11, 2011, at a total aircraft time (TAT) of 29,562.5 hours and total aircraft cycles (TAC) of 40,314. Item 21 of the routine inspection calls for a check of the main and nose landing gear struts for leaks and was signed off. There were no non-routine work cards for the landing gear generated as a result of this inspection.

The fifth detailed inspection included provisions to inspect the main and nose landing gears on the airplane as well as performing a detailed lubrication of the landing gear components. Step 6 called out the visual inspection of the main landing gear actuators for cracks, corrosion, damage, and leaks and instructed the technician to "Pay particular attention to the end caps." Step 22 called out the visual inspection of the nose landing gear actuator but did not include a note regarding the end cap. There were no non-routine work cards for the landing gear generated as a result of this inspection.

The Airworthiness Directive (AD) Compliance list for the incident airplane was examined and all applicable AD's had been complied. FAA AD 2009-23-01 required repetitive ultrasonic inspections of the MLG actuators on Beech 1900D airplanes for cracks. Great Lakes complied with the AD on the incident MLG actuators on January 24, 2011.

The aircraft logbook was examined for any write-ups on the landing gear system. On July 31, 2010, a pilot wrote up the landing gear annunciators, "Light bulbs on down 3 green for landing gear need replace. The maintenance corrective action stated "R&R bulb P/N 327. Performed ground ops ck. Ops ck good. R&R MM 33-10-01 & 33-10-00."

On March 24, 2011, a pilot made the following write up concerning the landing gear: "Upon extending landing gear in Denver left main gear took an excessive amount of time to extend. All green lights illuminated normally except for "H" light for left main gear. In transit light stayed on & pump ran for about 15 seconds, then "H" light on left main finally illuminated & pump shut off. Left main took about 10 seconds longer to extend than the nose and right main." The maintenance corrective action stated "Performed landing gear swing IAW AIM CH10 Sec. 32-01. Performed multiple gear swings. All gears retracted & extended normally. Couldn't duplicate discrepancy. No defects noted at this time."

On April 19, 2011, a pilot wrote up the landing gear annunciators "'SE" bulb inop in NOSE gear annunciator." The maintenance corrective action stated "R&R one bulb 'NOSE' landing gear annun. P/N 327. Ops check good. Ref MM 33-10-05."

According to the maintenance records examined at Great Lakes, the NLG actuator was delivered new on the incident airplane. The actuator was removed from this airplane on January 23, 2007. The reason for removal was identified as "LG CB pops" in the airplane logbook. At the time of removal, the actuator had accumulated 21,287.5 hours and 24,948 cycles. It was sent to the manufacturer, APPH, Incorporated, for overhaul and was completed in August 2008. The overhaul paperwork indicated that the actuator components were inspected using either fluorescent penetrant or magnetic particle by A-1 NDI Services in Wellington, KS. There were no discrepancies noted and the parts, including the end cap, were

released on an FAA Form 8130-3 on August 5, 2008. The NLG actuator, S/N 583, was re-installed on incident airplane on July 10, 2009. At the time of the incident, the actuator had accumulated 29,533 cycles since new and 4,585 cycles since overhaul.

METEOROLOGICAL INFORMATION

Weather reported at DEN, at 0641, was wind from 260 degrees at 7 knots, visibility 10 miles, few clouds at 14,000 feet, broken clouds at 20,000 feet, temperature 7 degrees Celsius, dewpoint 4 degrees Celsius, and a barometric pressure setting of 29.70 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane was examined on the day of incident by an National Transportation Safety Board (NTSB) Structures Engineer along with inspectors from the FAA, and representatives of the operator. The airplane came to rest on the left side of the runway about 6,090 feet from the approach end. The airplane sustained minor damage to the removable wingtip/winglet assembly, lower wing skin, inboard and outboard flaps, and the lower left aileron skin.

Post-incident examination of the runway revealed gouging of the concrete consistent with propeller strikes. Small pieces of fiberglass and metal debris from the composite propeller blades were evident on the runway between the first and last propeller strike. The top portion of the NLG actuator end-cap was found on the runway surface about 5,815 feet from the approach end of the runway. There was a puddle of hydraulic fluid beneath the NLG where the airplane came to rest, but there was no discernible hydraulic fluid found anywhere else on the runway.

Examination of the cockpit revealed that the landing gear handle was in the down position. The LANDING GEAR RELAY circuit breaker located to the right of the landing gear handle was popped. The flap handle was in the 17° detent, the rudder trim was set to 1 unit left, and the aileron trim was set to almost 2 units right.

The airplane was lifted using a crane with slings and the LMLG fell to the down position. There was no evidence of any failures to the components on the LMLG so it was pulled into the fully down and locked position. The three landing gears were pinned and the airplane was moved to a hangar for further evaluation.

While in the hangar, power was applied to the airplane and all six landing gear annunciator lights illuminated green. The landing gear in-transit light illuminated red when tested.

The NLG retract actuator and end cap, the LMLG actuator, the LMLG Drag Leg Assembly, LMLG Upper/Middle/Lower drag leg bolts, LMLG drag leg actuator attach bolt, LMLG switch assemblies and wiring harness were removed for testing and examination.

TESTING AND RESEARCH

According to Hawker Beechcraft, they were aware of five previous NLG actuator end cap failures and provided one of these caps to the NTSB. This and the incident end cap were examined by an NTSB Metallurgist at the NTSB Materials Laboratory, Washington DC. The examination revealed that both end caps failed in fatigue from multiple origins that propagated from the inside diameter towards the exterior of the cap.

An NTSB Aerospace engineer met with Hawker Beechcraft and APPH, Incorporated, in Wichita, Kansas, on August 10, 2011, to discuss the end cap failure. According to APPH, the actuator was designed to Hawker Beechcraft specifications and is only manufactured by APPH, but is not currently in production. Hawker Beechcraft had purchased six NLG actuators as spare replacements since 2009 and at the time of the incident had four units on order. APPH has not distributed any technical information on the actuator, authorized any other company to overhaul them, nor do they sell any spare parts so they are the only approved overhaul facility for the actuator. They currently overhaul the actuators to the drawing specifications and are in the process of developing a component maintenance manual. During overhaul, the end caps are subjected to a dye penetrant inspection performed by a sub-contractor. After disassembly, the component parts remain together as a set unless there is a need to replace individual components.

The end cap is produced according to the details of drawing 25703 which is currently at Revision P. Revision N, which was approved in February 2010, added a specified grain direction along the longitudinal axis of the end-cap. Prior to this revision, there was no requirement for a grain direction. According to APPH, the change was initiated by the supplier of the raw material through the purchasing department and had nothing to do with the fatigue failures of the end caps.

Due to the fatigue failures and the possibility of more cracks, APPH initiated the manufacturing of 50 end caps in early 2011 to be used as spare replacements.

The LMLG actuator was examined at Hawker Beechcraft facilities on August 9, 2011, under the supervision of the NTSB. After a visual inspection, the actuator was functionally tested per Hawker Beechcraft Test Procedure H-3835. The actuator tested within limits and no pre-mishap anomalies were noted with the actuator that would have precluded it from operating normally at the time of the incident.

The LMLG Drag Brace, attachment hardware (upper/middle/lower bolts, and actuator attach bolt), and down-lock switch were also examined by the group at Hawker Beechcraft. Each of these items tested within tolerances and no pre-mishap anomalies were noted that would have precluded them from operating normally at the time of the incident.

It was concluded that when the end cap failed, it caused system pressure to decrease and most of the hydraulic fluid to be blown out of the NLG actuator. The slight delay in the pressure pulse reaching the LMLG possibly combined with the previous history of the LMLG being slow

to extend impeded the LMLG to reach the full down and locked position before hydraulic pressure was lost. Since the LMLG was not down and locked, the indication circuit would not be complete and the “LH” annunciator lights would not have illuminated. The failure of the end cap also impeded the emergency manual extension system from being able to pressurize, thus disabling the system.

ADDITIONAL INFORMATION

As a result of this investigation, Hawker Beechcraft has changed the recommended maintenance practices for the NLG actuator. The Model 1900D Airliner Maintenance Manual now recommends that the NLG actuator undergo an ultrasonic inspection every 1,200 cycles once it has accumulated 8,000 total cycles and that it is overhauled every 10,000 cycles.

Prior to this incident, the captain reported that he had two recent experiences in flight that involved gear unsafe issues. About three weeks prior to this incident, he had completed a maintenance check flight. When he extended the gear, the in-transit light would stay on and when power was reduced, the horn went off. The captain was able to make an uneventful landing and was later informed by maintenance personnel that it was a wiring problem. On another maintenance check flight, he said the in-transit light remained on shortly after takeoff when he tried to retract the gear and the gear would not retract. He returned to the airport and made an uneventful landing.

The first officer provided a similar account and added that he had a discussion with the captain prior to the incident landing about the "H" not being illuminated. He stated, "After discussing the lights with the captain, we decided that since the green lights have back-up systems...all gear were down and locked." In addition, the crew discussed the possibility that there may have been a hydraulic fluid block or a problem with the drag brace. Prior to landing, the captain performed a visual check and confirmed all three landing gear were down and locked.

The first officer had recently completed his initial training with the company. He recalled being trained on landing gear operations in both ground and flight training. He learned that if any three of the gear down-and-locked lights were illuminated, then the gear should be down and locked. The first officer said that it was his understanding that “three green overrides all other indications.”

Great Lakes Aviation’s Director of Flight Standards and the Chief Pilot were interviewed on June 1, 2011, by the Investigator in Charge. The interviews focused on training and how the crew responded to the landing gear light anomaly and additional gear unsafe warnings.

According to the Chief Pilot, she disagreed with the first officer’s assertion that flight crews were trained to understand that when all three landing gear down annunciator lights are illuminated it trumps all other gear unsafe warnings. If the landing gear in-transit light remained illuminated, the proper response would have been to execute a go-around and use

the Quick Reference Handbook (QRH).

The Director of Flight Standards stated that the crew should have executed a go-around and run the appropriate checklists. However, he understood how the flight crew could have been confused since the system schematic for the landing gear lights clearly indicated that if any of the three down and locked lights were illuminated, the gear should have been down and locked. Plus, the Captain had recently reported previous gear problems which may have compounded his decision making. The Director of Flight Standards also stated that they do not train for situations that would involve three illuminated gear down-and-locked lights in conjunction with other gear warnings.

A review of the QRH, LANDING GEAR MANUAL EXTENSION, page A-17, stated, “Failure of the landing gear to fully extend may be indicated by several things, including:

-for a given gear leg, failure of both green gear-down annunciators to illuminate (ie, L & H, R&H,or NO & SE)
-failure of all green gear down annunciators to illuminate
-failure of the red landing gear handle annunciator to extinguish
-tripping of the landing gear circuit breaker
-audible landing gear warning horn
-activation of the GPWS “too low, gear” warning

Because there are two redundant gear-down annunciators for each gear leg, failure of only one green gear-down annunciator to illuminate does not indicate that the gear is unsafe.”

"Step 2. If one or more green gear-down annunciators do not illuminate for any reason and a decision is made to land in this condition:

A. Alternate Extension Handle……..CONTINUE PUMPING

1.Continue to pump the handle until the maximum resistance is felt.

2.When pumping is complete, leave the handle at the top
of the stroke. DO NOT LOWER AND STOW"

The QRH then continues to provide the crew instructions on how to operate the alternate manual- extension handle prior to landing, and after landing.

Since the manual landing gear extension system was disabled from the end cap failure, and the above procedure would not have been effective in securing the gear.

As a result of this incident, Great Lakes Aviation drafted changes to the QRH for Landing Gear Unsafe conditions and revised their Flight Standards Manual and training modules.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	August 24, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 15, 2011
Flight Time:	3250 hours (Total, all aircraft), 2800 hours (Total, this make and model), 2000 hours (Pilot In Command, all aircraft), 190 hours (Last 90 days, all aircraft), 80 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	24,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	February 3, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 28, 2011
Flight Time:	950 hours (Total, all aircraft), 85 hours (Total, this make and model), 810 hours (Pilot In Command, all aircraft), 85 hours (Last 90 days, all aircraft), 70 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N218YV
Model/Series:	1900D	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	UE-218
Landing Gear Type:	Retractable - Tricycle	**Seats:**	21
Date/Type of Last Inspection:	May 11, 2011 Continuous airworthiness	**Certified Max Gross Wt.:**	17120 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	29583 Hrs at time of accident	**Engine Manufacturer:**	P&W CANADA
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	PT6A-6 SERIES
Registered Owner:	RAYTHEON AIRCRAFT CREDIT CORP	**Rated Power:**	1279 Horsepower
Operator:	Great Lakes Aviation	**Operating Certificate(s) Held:**	Flag carrier (121), Commuter air carrier (135)
Operator Does Business As:	Great lakes Aviation	**Operator Designator Code:**	GLBA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	DEN,5434 ft msl	**Distance from Accident Site:**	
Observation Time:	06:41 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Few / 14000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 20000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.7 inches Hg	**Temperature/Dew Point:**	7°C / 4°C
Precipitation and Obscuration:			
Departure Point:	Pueblo, CO (PUB)	**Type of Flight Plan Filed:**	IFR
Destination:	Denver, CO (DEN)	**Type of Clearance:**	IFR
Departure Time:	06:07 Local	**Type of Airspace:**	

Airport Information

Airport:	Denver DEN	**Runway Surface Type:**	Concrete
Airport Elevation:	5431 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	35L	**IFR Approach:**	ILS
Runway Length/Width:	12000 ft / 150 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Minor
Passenger Injuries:	9 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	11 None	**Latitude, Longitude:**	39.856945,-104.670555(est)

Administrative Information

Investigator In Charge (IIC):	Yeager, Leah
Additional Participating Persons:	Mike Hewlitt; FAA/ACO; Denver, CO Ernie Hall; Hawker Beechcraft; Wichita, KS Dan Tibbens; Great Lakes Aviation; Cheyenne, WY
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Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=79121