



# Aviation Investigation Final Report

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<b>Location:</b>	Newark, New Jersey	<b>Accident Number:</b>	DCA13FA094
<b>Date &amp; Time:</b>	May 18, 2013, 01:04 Local	<b>Registration:</b>	N934HA
<b>Aircraft:</b>	Bombardier DHC8	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Abnormal runway contact	<b>Injuries:</b>	34 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

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## Analysis

While on an instrument approach to the airport, when the flight crew attempted to lower the landing gear, they received an unsafe indication on the left main landing gear (MLG). They conducted a fly by of the airport control tower, and the controller verified that the left MLG was only partially extended. The flight crew performed the alternate landing gear extension procedure and worked with company maintenance to troubleshoot the failure, however, the left MLG would not extend after multiple attempts. Although the first officer indicated that he became confused after the sixth step of the alternate landing gear extension procedure, post accident testing determined that this did not have any effect on the outcome. Because the left MLG would not extend, the captain elected to conduct the landing with all gear retracted to minimize the likelihood of a loss of directional control after touchdown. All passengers and crew successfully evacuated after the airplane came to a rest on the runway.

Postaccident testing confirmed that the left MLG would not deploy using the normal or alternate gear extension systems. Examination of the landing gear components found that the left MLG uplock roller was seized and the groove on the left uplock latch was out of tolerance. The seized uplock roller and worn latch caused the forces to exceed the crews capability to release the landing gear by use of the alternate gear extension system.

Examination of the operators maintenance records indicated that the uplock rollers were to be inspected every 220 flight hours and that they were to be lubricated only on condition. The accident airplanes left MLG uplock was inspected 11 times in year prior to the accident. In all instances, the inspection paperwork indicated that the roller rotated freely and did not require lubrication for the last. Further, the uplock latches were to be visually inspected every 440 flight hours. The latches were not required to be measured and were replaced only on condition. The last measurement of the left MLG latch on the accident airplane occurred 10 years prior to the accident. After the accident, the operator modified the maintenance procedures to include regular lubrication of the rollers and to measure the wear of the uplock latch.

## Probable Cause and Findings

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

the frozen left main landing gear (MLG) uplock roller due to lack of lubrication and the uplock latch that had worn beyond acceptable tolerances, which prevented the flight crew from extending the left MLG using the alternate extension system. Contributing to the accident were the operator's improper maintenance practices, which did not detect the lubrication issue with the roller and the wear of the latch.

### Findings

<b>Aircraft</b>	Main landing gear - Malfunction
<b>Organizational issues</b>	Adequacy of policy/proc - Operator

## Factual Information

### History of Flight

<b>Approach</b>	Sys/Comp malf/fail (non-power)
<b>Landing-landing roll</b>	Abnormal runway contact (Defining event)

On May 18, 2013, about 0104 eastern daylight time, a Piedmont Airlines Bombardier DHC-8-102, N934HA, operating as US Airways Express flight 4560, landed with all gear retracted on runway 4L at Newark Liberty International Airport (EWR), Newark, New Jersey. During the initial approach, the left main landing gear (MLG) failed to lower and lock. The flight crew's attempts to lower the left MLG were unsuccessful, and they intentionally landed the airplane with all landing gear retracted. There were no injuries to the 2 pilots, 1 flight attendant, and 31 passengers onboard, and the airplane sustained substantial damage during landing. The flight was operating under the provisions of Title 14 *Code of Federal Regulations* Part 121 and originated from Philadelphia International Airport (PHL), Philadelphia, Pennsylvania.

The flight was the crew's sixth flight on the third day of a planned 4-day trip. The airplane departed PHL at 2252 with the first officer (FO) as the pilot flying (PF). About 2325, the flight was cleared for an instrument landing system (ILS) approach to runway 4R at EWR. When the crew attempted to lower the landing gear, the left MLG showed a red unsafe indication in the cockpit. The captain received approval from an EWR air traffic control tower controller to perform a "fly-by"; the tower confirmed that the left MLG appeared to be partially extended.

The flight was then issued vectors and cleared to maintain 3,000 ft mean sea level in order to troubleshoot the issue. The captain initiated the alternate landing gear extension checklist but took over as the PF and allowed the FO to run the checklist. The FO read, and the captain confirmed, the steps in the checklist as the FO performed them. The FO stated that when he pulled the main gear release handle, the gear did not extend. When asked by the captain if the checklist was complete, the FO said it was. However, he had not read the notes at the bottom of the checklist, which discussed the use of a hydraulic pump handle and the high force that might be needed on the alternate gear extension handle.

After giving PF duties back to the FO, the captain called company operations and spoke to a maintenance control supervisor, who advised using the hand pump to extend the MLG. The captain and FO again transferred control so the captain was PF, and the FO left his seat to get better leverage on the pump handle and repeatedly attempted to pump the gear down without success. The pilots again transferred control, and the captain left his seat and attempted to operate the pump, also without success. The captain stated he left the cockpit to inspect the MLG from the cabin and observed that the gear doors were open but that the left MLG was not extended.

After a second tower fly-by, the tower again confirmed that the left MLG was not down. At the suggestion of the maintenance control supervisor who was on the radio, the crew reconfigured the alternate gear system to normal, raised all the landing gear, and then re-extended them using the normal

system. The left MLG again showed a red unsafe indication. The crew again retracted the landing gear using the normal system. The captain asked the maintenance supervisor to contact the flight duty officer and was told that a company management conference call was in progress and they were discussing the best landing configuration.

At the suggestion of the company maintenance control supervisor, the crew again attempted to lower the gear while applying a positive G force to the airplane. This maneuver was not successful. The captain again asked the supervisor for advice regarding the best emergency landing configuration. The crew made a final attempt to extend the gear normally without success, then retracted the gear and left it retracted for the remainder of the flight.

When the fuel remaining was 900 lbs, the captain decided to make an emergency landing with all landing gear retracted, and the maintenance personnel agreed. The captain made a passenger address announcement, briefed the FO on the planned landing, and called for the emergency landing checklist. In accordance with the checklist, he pulled the B3 GPWS circuit breaker (CB). The captain flew the ILS approach to runway 4L. The FO stated that, during the approach, the landing gear warning horn sounded when the airplane slowed below 130 kts, and the captain maintained a speed above 130 kts to prevent the horn from sounding until the airplane was "close to the runway." After the captain called for the flaps to be selected to 35, the landing gear warning horn continued to sound until after landing. The airplane landed about 3,000 ft down the runway and slid about 2,000 ft, stopping on the runway centerline in a wings-level attitude.

The captain stated that after landing, he observed smoke on the right side of the airplane. He notified the tower they were evacuating and gave a verbal command to the FO and the flight attendant to evacuate using the left main cabin door. The passengers and crew assembled in a grassy area, and no one reported any injuries.

## **DAMAGE TO AIRPLANE**

Postaccident examination of the airplane revealed substantial damage to the underside of the airplane, including fuselage skin abraded in several areas.

## **PERSONNEL INFORMATION**

### **The Captain**

The captain held an airline transport pilot certificate for airplane multiengine land with type ratings in the BE-1900, BE-300, and DHC-8 and airplane single-engine land with a type rating in the SD-3. He also held commercial pilot certificates for rotorcraft-helicopter and airplane multiengine land with instrument ratings and a private pilot certificate for airplane single-engine land. He was issued a Federal Aviation Administration (FAA) first-class medical certificate, dated December 28, 2012, with the limitation that he must have glasses available for near vision. He was wearing his glasses during the event. FAA records indicate that he had no prior accidents, incidents, or enforcements. The captain had been continuously employed by Piedmont (or its predecessor) since June 1988.

According to company records, the captain began a 4-day trip on May 15. The incident took place on the sixth and final leg of the third duty day. On the day of the incident, he began duty at 1255. The captain stated he had received good rest and was not affected by fatigue or other personal issues.

## **First Officer**

The FO held commercial pilot certificates for airplane single-engine and multiengine land with instrument ratings, airplane single-engine sea, and airplane single-engine land and sea with ratings for airplane multiengine land and instrument airplane, and a DHC-8 type rating with second-in-command privileges only. He also held private pilot certificates for airplane single-engine land and airplane single-engine land with an instrument rating. He was issued an FAA first-class medical certificate, dated February 18, 2013, with the limitation that he must wear corrective lenses. At the time of the accident, he was wearing his corrective lenses. FAA records indicate that he had no prior accidents, incidents, or enforcements. The FO stated he had been in his current position as a DHC-8 FO since he was hired by Piedmont in April 2011.

On the day of the accident, he started his duty day at 1255. He had been on duty about 12 hours at the time of the accident. He felt rested when he reported for duty and did not feel that fatigue or other personal issues affected him during the accident flight.

## **AIRCRAFT INFORMATION**

### **Airplane Systems**

#### *Landing Gear*

The DHC-8-100 has a tricycle landing gear normally operated by the No. 2 hydraulic system. The two MLG retract rearward into the respective engine nacelles, and the nose landing gear (NLG) retracts forward into an NLG well. The NLG has two landing gear doors, and each MLG has three landing gear doors that are automatically sequenced during extension and retraction of the gear. Proximity sensors and a proximity switch electronics unit (PSEU) control the sequencing of the gear and gear doors during extension and retraction and provide signals to the gear and gear door advisory lights.

#### *Landing Gear Indication*

A landing gear actuation and indication panel is located on the forward engine indication panel. In addition to the landing gear selector lever, the panel has nine landing gear advisory lights, three for each gear. The top three lights are door open advisory lights and illuminate amber when the respective gear door remains open after extension or retraction. The center three lights illuminate green when the respective gear is down and locked. The bottom three lights are gear unsafe advisory lights and illuminate red when the respective gear is not locked up or down. An amber light in the landing gear selector lever illuminates concurrent with red unsafe lights to indicate gear in transit.

#### *Landing Gear Warning Horn*

When the airplane is in flight, a landing gear warning horn sounds and cannot be silenced when airspeed is less than 130 kts, power levers are near flight idle, and the gear is not down and locked. If only one power lever is near flight idle, the horn can be silenced by a mute button on the gear actuation panel.

#### *Alternate Gear Extension System*

An alternate gear extension system provides for mechanical extension of the landing gear and is intended for in-flight use when hydraulic power from the No. 2 hydraulic system is not available. The

alternate system is designed so that the system will always release the gear; there is no back-up system to the alternate release/emergency release system. The system relies on gravity to extend the gear; a hydraulic hand pump is provided to help the MLG fully extend, if necessary. The alternate gear extension controls consist of an alternate release door, MLG extension T-handle, and landing gear down select inhibit switch located in the cockpit ceiling above the FO; an alternate extension panel in the cockpit floor behind and to the left of the FO; and an NLG extension T-handle, an MLG extension hand pump, and three alternate gear position indicators located in the floor panel.

The alternate release system is activated in the flight deck by use of the main gear alternate release handle. Opening the ceiling alternate release door activates a bypass valve that returns hydraulic fluid in the landing gear system to the reservoir; the door also allows access to the handle. Moving the inhibit switch in the cockpit ceiling to "inhibit" disables normal hydraulic extension of the landing gear.

On the left and right gear strut, the MLG uplock roller sits on the uplock latch such that, when the alternate system is activated, the latch unhooks from the rotating roller and the gear "falls" away; pulling the MLG extension T-handle releases the MLG door uplocks and the MLG uplocks, allowing the MLG to freefall. Opening the alternate extension panel door in the cockpit floor activates a valve that permits the MLG hand pump to function. Moving the pump handle up and down provides hydraulic pressure to help the MLG become fully extended. The alternate gear position indicators provide a positive indication that each of the three landing gear are fully extended when the downlock verification switch within the floor panel is selected on.

## **Maintenance**

Examination of Piedmont's maintenance procedures indicated that a visual inspection of the MLG uplock actuator latch for wear was conducted in each of the B checks, which Piedmont conducted every 440 flight hours. The last B check was accomplished on March 21, 2013.

Piedmont also provided the certification of the uplock latch assembly. The certification provided documentation of the last time the worn groove on the uplock latch was measured. The latch groove was last measured on December 9, 2003, and was determined to be within tolerance. The inspector would have measured the groove using the manufacturer's Uplock Assembly Component Maintenance Manual instructions. Piedmont indicated that the MLG uplock latches were tracked but only removed on condition.

Further, Piedmont's maintenance procedures included a maintenance task to inspect the MLG uplock roller assembly every 220 flight hours. The task card instructions specified that, if the roller was seized or rotation was difficult, lubrication of the roller was required. For the accident airplane, the left MLG uplock roller was inspected 11 times (2,723 hours) and did not require lubrication.

## **FLIGHT RECORDERS**

### **Cockpit Voice Recorder**

The cockpit voice recorder (CVR), manufactured by L-3/Fairchild, serial, was removed from the airplane and downloaded at the National Transportation Safety Board (NTSB) Vehicle Recorder Laboratory. The CVR included about 2 hours of audio information on four channels. The audio quality of the channels containing the cockpit area microphone audio was characterized as good.

## **Flight Data Recorder**

The flight data recorder (FDR), an Allied Signal SSUFDR, was removed from the airplane and downloaded at the NTSB Vehicle Recorder Laboratory. The FDR was found to be in good condition, and the data were extracted normally. The recording contained about 27 hours of data.

## **SURVIVAL ASPECTS**

An uneventful evacuation occurred through the forward main cabin doors, and there were no injuries.

## **WRECKAGE AND IMPACT INFORMATION**

The NTSB conducted a postaccident examination of the airplane, specifically the left and right MLG. In general, neither landing gear displayed visible physical damage. However, the left MLG uplock roller was found seized and would not rotate by hand. The right MLG uplock roller could be rotated by hand.

On the latch of both the left and right MLG uplocks, a "worn" groove was noted on the lower surface of the latch. The groove in the left uplock latch appeared slightly larger than the groove in the right uplock latch. The grooves on the left and right uplock latch were measured. A comparison of the measurements of the grooves against the landing gear manufacturer's specifications showed that the groove on the left MLG uplock latch was at or beyond wear limits, and the groove on the right MLG uplock latch was at or slightly below wear limits.

The MLG uplock assembly, retract actuator, mechanical sequence valve, door actuator, and retract actuator fitting were removed, examined, and tested.

A rigging check of the alternate landing gear extension system was conducted and revealed that there was no undue force or slack required to unlatch the locks, and the system was determined to be operating normally.

In addition to the rigging check, a test of the alternate landing gear extension system was conducted. With all the landing gear retracted, the alternate landing gear extension procedure, as documented in the Piedmont Dash 8 Non-Normal & Emergency Checklist, was performed. To check the force necessary to release the MLG, a Bombardier strain/force gauge was secured to the alternate gear release T-handle, and the T-handle was pulled using the handles on the force gauge and the maximum force to release the MLG was noted. The test revealed that the right MLG released with "normal" force and in sequence, but the left MLG required force of more than 240 lbs. In another test, a 186-lb Piedmont captain sitting in the FO's seat could not release the left MLG, even by "hanging" from the T-handle (i.e., pulling himself up from the seat).

The normal MLG extension system was also tested. With all the landing gear retracted, the normal landing gear extension was tested using the normal extension procedure. Once the landing gear handle was placed into the extended position, the right MLG extended normally, the NLG extended normally, the left MLG indicated "unsafe" on flight deck, and the left MLG did not extend and remained engaged in the uplock.

In addition, a test was conducted on the alternate extension with the right MLG and NLG down, but the left MLG still retracted in the uplock. High forces were required to extend the left MLG.

Removal of the left MLG uplock roller revealed that the internal roller bearings had rust on the internal surfaces, the internal pin had marking signatures that appeared to have transferred from the roller bearings, and the bearing seal also appeared to be compromised. The roller was cleaned, lubricated, and then installed on the right MLG for a test; the right uplock roller was moved to the left MLG. The normal and alternate MLG extensions were then repeated. Using the normal extension method, both MLG extended normally. The alternate MLG extension procedure was then repeated with the swapped uplock rollers, and the left MLG released and extended. The force used to pull the T-handle (using the force gauge) was measured and determined to be about 150 lbs and was noted as "normal force."

The uplock roller assembly, MLG uplock assembly, and the uplock roller retention shoulder bolt were removed and tested at the manufacturer's facility. The MLG uplock assembly was visually inspected and appeared to be in good condition with dirt deposits but no visible damage. The worn groove on the uplock latch was noted. The uplock roller assembly was visually inspected. There was visual evidence of wear on the outer diameter of the roller, and a dimensional check of the roller assembly according to the manufacturer's specifications indicated that the outer diameter measurements were within the specified limits. In addition, the internal "needle" bearings were inspected. One set of the bearings appeared out of alignment, and several needle bearings were noted to have flat spots and corrosion. The bearing assembly appeared to be devoid of lubricant, and when placed onto the shoulder bolt and rotated, the bearing did not rotate smoothly. The uplock roller assembly shoulder bolt was also examined, and two areas of wear were noted, corresponding to the areas where the uplock roller assembly seals would contact the bolt. The shoulder bolt diameter measurements conformed to the manufacturer's specifications.

### **Piedmont Training**

A review of company training materials pertaining to emergency landing found several slides that addressed landing with all gear up or one MLG unsafe. The guidance on the slides summarized the guidance provided in the Bombardier (de Havilland) DHC-8-102 Safety of Flight Supplement No. 14, which addressed landing considerations with landing gear failure.

### **ADDITIONAL INFORMATION**

#### **Bombardier (de Havilland) Procedures**

The Bombardier (de Havilland) DHC-8-102 Quick Reference Handbook Emergency Landing Procedure, which was revised in 2009, provided procedures for landing with the landing gear extended and with the landing gear retracted. The procedure for landing gear retracted called for the landing gear warning horn CB to be pulled before landing.

The Bombardier (de Havilland) Dash 8 Operating Data Manual (ODM) Safety of Flight Supplement No. 14, dated July 24, 2009, addressed landing considerations with landing gear failure, specifically landing with the nose gear retracted or unsafe, landing with one MLG retracted or unsafe, and landing with all landing gear retracted.

#### **Flight Crew Interviews**

Regarding company training for a partial gear-up landing, the captain stated he thought the subject had been discussed at some point in the past. He stated the case with the nose wheel retracted was fairly



controllable, but the worst case was one MLG up and one MLG down due to possible loss of control. He did not recall any formal training on the subject. He stated that with the NLG and right MLG extended, they would have no nosewheel steering and would rely on rudder, and as soon as the wing dropped the fuselage and wingtip would touch. He would need to use full right brake and reverse on one propeller, and he was not sure if he could control it. A ground loop was highly probable. With all the gear retracted, he expected all the people would be able to walk away.

According to the FO, the crew ran three abnormal procedures/checklists: illumination of red landing gear unsafe light, alternate landing gear extension, and emergency landing procedures. He had been trained to do an alternate gear extension, and this event was the third time he had experienced an alternate gear extension in the airplane.

When the FO was asked if he read the entire checklist, including the warnings, cautions and notes, he stated he got distracted because the checklist said "verify three green lights illuminated." The three lights were not there, and there was nowhere to go from there. At that point he was unsure about reading the rest of the checklist. He was reminded by maintenance control to insert the handle and to pump it. He knew about the possible high force needed on the alternate gear handle, but he did not read it, and he also knew that using the pump handle was a step in the procedure.

The FO had performed two previous alternate gear extension procedures, and in both cases the landing gear had extended without the need for use of the hand pump. He stated during the accident flight, he "really pulled" the alternate gear handle all the way, multiple times.

The FO indicated that the landing gear warning horn sounded during the final approach and landing and it was extremely distracting. They kept the speed above the point where it sounded, 130 kts, because it was a "dominating" horn. The extra speed did not affect the landing. The  $V_{ref}$  was 88 kts for flaps 35; they flew 130 kts while on the glideslope and then the captain started to slow when close to the runway.

### **Operator Postaccident Actions**

Piedmont provided documentation of the changes made to maintenance and operational procedures after the accident. Maintenance changes included a fleet-wide campaign to inspect and lubricate the roller assembly and to accomplish an operational check of alternate extension; a revised work card for the uplock actuator inspection, with a reference for uplock wear limits and an addition of roller inspection; publication of a bulletin to add the use of dental mold to measure the dimensions of the uplock groove; creation of a stand-alone task to lubricate the uplock roller every 500 hours; revision of a work card to refer to the Aircraft Maintenance Manual for the procedure to lubricate the uplock roller; and revision of the flight crew and maintenance controller walkaround inspection to include physically checking the freedom of the rollers. In addition, Piedmont modified and enhanced the Alternate Landing Gear Extension Checklist making it no longer a memory item; modified the Forced Landing Checklist; added a new checklist titled Landing Gear Fails to Extend that contains the information in the Bombardier Safety of Flight Supplement No. 14; published a Flight Information Letter to all crewmembers requiring inspection of the MLG uplock roller during the originating preflight; and improved the communications procedures between the flight crew and dispatch/maintenance during inflight troubleshooting events.

## Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	60, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	December 28, 2012
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	April 30, 2013
<b>Flight Time:</b>	(Estimated) 26000 hours (Total, all aircraft), 20000 hours (Total, this make and model), 158 hours (Last 90 days, all aircraft), 39 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

## Co-pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	25, Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	February 18, 2013
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	February 18, 2013
<b>Flight Time:</b>	2000 hours (Total, all aircraft), 1684 hours (Total, this make and model), 240 hours (Pilot In Command, all aircraft), 203 hours (Last 90 days, all aircraft), 73 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Bombardier	<b>Registration:</b>	N934HA
<b>Model/Series:</b>	DHC8 102	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	139
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	41
<b>Date/Type of Last Inspection:</b>	May 11, 2013 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	34500 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo prop
<b>Airframe Total Time:</b>	61671 Hrs at time of accident	<b>Engine Manufacturer:</b>	Pratt & Whitney
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	PW120A
<b>Registered Owner:</b>	US Airways	<b>Rated Power:</b>	2000 Horsepower
<b>Operator:</b>	Piedmont Airlines	<b>Operating Certificate(s) Held:</b>	Commuter air carrier (135)
<b>Operator Does Business As:</b>	U.S Airways Express	<b>Operator Designator Code:</b>	HNAA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>	EWR,18 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	12:51 Local	<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	13 knots / None	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	320°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>		<b>Temperature/Dew Point:</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Philadelphia, PA (PHL)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Newark, NJ (EWR)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	22:52 Local	<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	Newark Liberty International EWR	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	18 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	04L	<b>IFR Approach:</b>	Visual
<b>Runway Length/Width:</b>	11000 ft / 150 ft	<b>VFR Approach/Landing:</b>	Full stop

## Wreckage and Impact Information

<b>Crew Injuries:</b>	3 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	31 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	34 None	<b>Latitude, Longitude:</b>	40.692501,-74.168609(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Lovell, John
<b>Additional Participating Persons:</b>	Steve keefer; Piedmont Airlines; Salisbury, MD Tony James; FAA AVP-100; Washington DC, DC Peter Roundtree; TSB of Canada David Monteith; Bombardier Aerospace
<b>Original Publish Date:</b>	September 22, 2020
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=86939">https://data.nts.gov/Docket?ProjectID=86939</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).