
Runway excursion, A320-232, January 21, 2001

Micro-summary: Loss of directional control when landing on a snow-contaminated runway resulted in a runway excursion for this Airbus A320.


Event Date: 2001-01-21 at 808 EST


Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).
 2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***
 3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.
 4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.
-

		NTSB ID: NYC011A068		Aircraft Registration Number: N509JB	
		Occurrence Date: 01/21/2001		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Jamaica		State NY	Zip Code 11430	Local Time 0808	Time Zone EST
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Airbus Industrie		Model/Series A320-232		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
History Of Flight					
<p>On January 21, 2001, at 0808 eastern standard time, an Airbus A320-232, N509JB, operated by JetBlue Airways, Inc., as flight 88, departed the left side of Runway 4R during landing roll, at John F. Kennedy Airport (JFK), Jamaica, New York. There was no damage to the airplane, and there were no injuries to the 2 certificated pilots, 4 flight attendants, or 139 passengers. Instrument meteorological conditions prevailed for the scheduled passenger flight, which originated from Ontario, California. The flight was operated on an instrument flight rules flight plan conducted under 14 CFR Part 121.</p> <p>There were no problems reported with the en route or approach phases of the flight. At the time of the incident, runways 13L/31R, and 13R/31L were being plowed to remove snow and were not available for use.</p> <p>At 0625, the winds at JFK were reported to be from 340 degrees at 17 knots with gusts to 23 knots. The winds did not change until the 0751 observation.</p> <p>A transcript of the cockpit voice recorder was prepared by the Vehicle Recorder Division of the Safety Board in Washington, DC.</p> <p>According to a summary of events prior to the transcript:</p> <p>At 0647:29, the flight crew discussed using autoland.</p> <p>At 0658:24 the flight crew conducted an approach briefing for runway 31R, missed approach with autopilot, minimum sector altitudes, fuel state, divert/holding options, autobrake setting medium, autoland winds and wind limitations for autopilot.</p> <p>At 0724:17 the flight crew re-briefed for an approach for runway 4R.</p> <p>At 0733:50, the flight crew received JFK airport Automatic Terminal Information Service (ATIS) information Yankee.</p> <p>According to ATIS Yankee, issued at 0651:</p> <p>"...wind three four zero at one seven, gust two three, visibility two, light snow, blowing snow, mist, ceiling one thousand five hundred broken...approach in use ILS runway four right, departing runway four left, notice to airmen runway four left, two two right, three inches loose snow, runway four right, two two left, plowed one hundred twenty feet wide, thin wet snow, the remainder six inches loose snow, runway four right mu, two eight, two eight, two six, at zero seven four five</p>					
FACTUAL REPORT - AVIATION					
Page 1					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: NYC011A068
	Occurrence Date: 01/21/2001
	Occurrence Type: Incident

Narrative (Continued)

zulu [0245 est]...."

At 0739:06, the company dispatcher reported:

"okay eighty eight ah they're still landing on four right here at JFK ah and they're gonna stay on that ah at least until about fifteen Z is what their latest estimate so that's gonna be your runway and ah braking action's have been varying with the different types of aircraft I would say generally fair to poor on the braking action and ah the first two thirds of the runway in fairly decent shape as far as ah snow cover and ah the taxiways are going to be the bigger concern ah there's ice under the snow and ah looking at them or find them is a not the easiest thing today so extreme caution in taxiing."

The flight crew then entered into a discussion of runway conditions including the possibility of snow over ice, and braking action reports of fair to poor and medium to poor. However, there was no discussion about conducting an auto-rollout on a snow contaminated runway.

At 0752:22, New York approach reported to the flight crew of flight 88, that braking action for runway 4R, poor, runway 4L, fair to poor.

At 0753:27, the flight crew asked if runway 4L had been plowed. Approach control said they would check on it; however, the question was not answered by approach control, and the flight crew did not ask it again.

At 0801:45, flight 88 was cleared for the ILS runway 4R approach.

At 0803:18, approach control advised the flight crew that company traffic had landed on runway 4L and reported the braking action as poor.

At 0804:01, the flight crew contacted the control tower, and the local controller replied, "JetBlue eighty eight, Kennedy tower, good morning, you are number two following a Learjet on short final, the wind three four zero at one five, braking action reported as poor by all types, continue for runway four right."

At 0805:29, the local controller re-issued the winds as from 340 degrees at 15 knots, and then issued the landing clearance.

At 0805:37, the first officer called the landing checklist complete

At 0805:59, the local controller reported that the preceding Learjet reported the braking action as fair to poor.

At 0806:37, the first officer called the runway in sight, followed by the captain making the same call.


At 0807:19, according to the transcript from the CVR, the cockpit area microphone recorded increased background noise similar to touchdown of the main landing gear.

At 0807:51, the first officer transmitted, "and JetBlue eighty eight, we're off the runway."

The passengers were deplaned, and taken to the terminal by ground transportation.

According to a written statement from the captain:

"Stabilized approach to Runway ILS 4R. Aircraft touched down on runway centerline. Medium brakes used for landing. After touchdown, brakes automatically deployed with fair braking action.

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: NYC01IA068
	Occurrence Date: 01/21/2001
	Occurrence Type: Incident

Narrative (Continued)

Autopilots engaged, dual auto land, normal approach and landing. After touchdown slight drift to left of centerline with normal return by autopilots back to centerline. After approximately 1/3 of runway used, aircraft started left drift again with no sign of recovery. Disconnected autopilot and tried to recover manually back to centerline without success. Tried to keep aircraft straight without side skid condition so as not to induce a great side load on landing gears. Came to rest 15 feet off left edge of runway, about 2/3 of the way down the runway."

Runway Friction Readings

According to the Aeronautical Information Manual, Section 4-3-9; Runway Friction Reports And Advisories:

"...MU (friction) values range from 0 to 100 where zero is the lowest friction value and 100 is the maximum friction value obtainable. For frozen contaminants on runway surfaces, a MU value of 40 or less is the level where the aircraft braking performance starts to deteriorate and directional control begins to be less responsive. The lower the MU value, the less effective braking performance becomes and the more difficult directional control becomes...."

"...When the MU value for any one-third zone of an active is 40 or less, a report should be given to ATC by airport management for dissemination to pilots. The report will identify the runway, the time of measurement, MU values for each zone, and the contaminant conditions, e.g., wet snow, dry snow, slush, deicing chemicals, etc. Measurements for each one-third zone will be given in the direction of takeoff and landing on the runway...."

According to Advisory Circular AC-150/5200-30A - AIRPORT WINTER SAFETY AND OPERATIONS, Section 13, Runway Friction Surveys; after the runway has been cleared:

"...Realistically, a small amount of dry snow, or wet snow/slush will often remain on the surface. It is generally accepted that friction surveys will be reliable as long as the depth of dry snow does not exceed 1 inch (2.5 cm), and/or the depth of wet snow/slush does not exceed 1/8 inch (3 mm)."

Further, the advisory circular reports that runway friction measurements are unreliable when there is more than 0.04 inch (1 mm) of water or more than 1 inch of wet snow and/or slush.

While the advisory circular did not specify a minimum time between runway friction checks, it did list several criteria for taking additional runway friction checks. One of these was whenever pilot reports of runway braking action have changed.

Airport Information

According to archived weather reports of JFK airport from the National Climatic Data Center, precipitation of varying types and intensity had preceded the snow that was first reported at 0020 on January 21. Snow of varying intensity, including periods of heavy snow was recorded. At 0447, the snow accumulation had reached 4.7 inches. The 0751 weather observation recorded light snow.

According to documents from the Port Authority of New York and New Jersey (PANYNJ), which operated JFK airport, runway friction coefficient (MU) readings had been taken on runway 4R. The readings were taken from three locations on the runway, and listed in the order of touchdown zone, mid-runway, and rollout.

According to a printout of the electronic ATIS received by the crew of flight 88, at 0734, the MU readings for runway 4R were given as 28, 28, and 26. The ATIS stated that the MU readings were taken at 0245. The printed ATIS also reported the wind was from 340 degrees at 17 knots, with gusts to 23 knots.

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: NYC01IA068

Occurrence Date: 01/21/2001

Occurrence Type: Incident

Narrative (Continued)

According to weather reports from JFK, and the operations log from the Port Authority of New York and New Jersey, between 0148 and 0313, runway 4R was closed for plowing and treating. The last mu readings obtained at 0310 were 28, 28, and 29, runway reopened at 0313.

Between 0419 and 0506, runway 4R was closed for plowing, sanding, and chemical treatment. At 0458, the mu readings obtained were 21, 23, and 24. The runway was re-opened at 0506.

The runway MU readings on runway 4R were taken after plowing and treatment of the runway with sand and chemicals. At the time of occurrence, the MU reading given to the flight crew was 4 hours, 58 minutes old. The last MU reading taken (not given to the flight crew) was 3 hours, 10 minutes old.

From the time of the last mu readings taken, the braking reports had deteriorated from good for a Boeing 747, to poor for all airplanes.

Between 0506, and the incident, all weather observations reported light snow falling.

Airplane Information

The airplane was approved for autoland and auto roll out. According to the Airbus A320 Flight Crew Operating Manual (FCOM), "During roll out, side stick inputs (either lateral or longitudinal) should be avoided".

According to JetBlue's Director of Flight Standards, movement of the side stick controller during auto land would have disengaged the autopilot.

The FCOM did not contain a direct prohibition from making an auto roll out on a snow-contaminated runway. However, it did state:

"...Automatic roll out performance has been approved on dry and wet runways, but performance has not been demonstrated on snow covered or icy runway."

According to the FCOM, runway friction coefficient readings of 0.40 or greater would have resulted in "good" braking action. Runway friction coefficients between 0.29 and 0.26 would have resulted in "medium to poor" braking action, with a maximum recommended crosswind of 20 knots. Runway friction coefficients of 0.25 or less would have resulted in "poor" braking action, with a maximum recommended crosswind of 15 knots.

The autoland was programmed so that after touchdown, the ailerons would have returned to the neutral position, and the elevator would have assumed a 3-degree "trailing edge down" position. Ground directional control would have been accomplished by tracking the localizer with the rudder. In addition, nose wheel steering would have been available through the rudder movements, starting with 0 degrees at 130 knots and increasing to 6 degrees of steering available at 40 knots or less.

During a manually controlled landing, the pilot would have had full use of all flight controls as needed. In manual control, the elevator could have been displaced to 15 degrees trailing edge down.

The digital flight data recorder (DFDR) was read out at the Safety Board's Vehicle Recorder Division, in Washington, DC. Time references were obtained through subframe reference numbers (SRN), which corresponded to seconds.

According to the specialist's report, rudder movement was observed throughout the approach and rollout. The position varied between neutral and "trailing edge right" with varying degrees of deflection until after the autopilot had been disconnected.

At SRN 624, the left and right main landing gear squat switches transitioned from air to ground.

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: NYC01IA068

Occurrence Date: 01/21/2001

Occurrence Type: Incident

Narrative (Continued)

The airplane was tracking the localizer.

At SRN 626, the nose landing gear squat switch transitioned to ground, and the elevator transitioned from trailing edge up to trailing edge down.

Between SRN 624 and SRN 629, the ailerons returned to the neutral position.

Between SRN 627, and SRN 633, the airplane tracked left of the localizer about 0.2 dots deviation and returned to a sustained localizer left deviation of 0.1 dots.

At SRN 637, the airplane began to deviate further left, at an indicated airspeed of 84 knots, and decelerated in subsequent SRNs. The rudder was stationary, about 20 degrees trailing edge right, from SRN 635 up to SRN 639.

At SRN 639, the localizer deviation increased to 0.4 dots, and continued further left in subsequent SRNs. The autopilot was disconnected. The rudder momentarily increased to 24.5 degrees, and then in the next second, decreased to about 13 degrees.

From landing gear squat switch activation until autopilot disconnect, the elevator and ailerons followed their pre-programmed auto rollout positions.

According to a weight and balance chart from JetBlue, the landing weight was estimated at 138,850 pounds with a center of gravity of 33.9 percent, mean aerodynamic chord (MAC). The forward and aft limits at that weight were 17 percent MAC, and 43 percent MAC, respectively.

Other Information

According to the air traffic specialists in the Federal Aviation Administration (FAA), Eastern Region Quality Assurance Office, the procedure in place at the control tower was to take a verbal report of field conditions over a non-public telephone line and have the information backed up with a fax. Once the field condition report had been received and appropriate action taken on it, the report was discarded. There were no requirements contained within the FAA Air Traffic Handbook 7110.65, or the JFK facility manual to retain the field condition reports.

The FAA air traffic specialists also reported that he discussed his findings with the facility manager, who told him that the facility was operating short handed by one or two people, who could not make it in because of the snow. The facility manager did not have a direct explanation for the discrepancies between the field condition reports and the information transmitted on the ATIS.

Further, the FAA air traffic specialists also noted that at the time of the occurrence, both the workload and staffing level at the control tower would be lower than it would be during the early afternoon to evening time frame, which sees a much high level of operation. In addition, during the time frame of the event, several inbound and outbound flights had cancelled due to the snow, further reducing the tower's workload.

According to documents from the PANYNJ, the revised MU readings were given to the JFK control tower at 0535. The initials of the person who received the information were recorded on the document.

According to transcripts from the JFK control tower. The Clearance Delivery person received a telephone call at 0529 from the PANYNJ. The runway conditions were reported; however, the MU readings were not transmitted on the telephone. The clearance delivery person asked for the data to be faxed to the control tower, and the PANYNJ person said he would do that. According to the transcript, no initials were given or exchanged between the person in the control tower, and the person from PANYNJ.

National Transportation Safety Board

FACTUAL REPORT

AVIATION




NTSB ID: NYC01IA068


Occurrence Date: 01/21/2001

Occurrence Type: Incident

Narrative (Continued)

According to an inspector from the FAA who observed the airplane after it departed the runway, the runway conditions consisted of loose snow over patches of hard pack snow and ice.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: NYC011A068			
		Occurrence Date: 01/21/2001			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
John F. Kennedy	JFK	12 Ft. MSL	4R	11351	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Ice; Snow--compacted; Snow--wet					
Type Instrument Approach: ILS-complete					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Airbus Industrie		A320-232		1270	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 168	Certified Max Gross Wt.	169754 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	International Aero Engines	V2527-A5	27000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	01/2001	42 Hours	1801.9 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
JetBlue Airways, Inc.		82-02 Kew Gardends Road			
		City	State	Zip Code	
		Kew Gardens	NY	11415	
Operator of Aircraft		Street Address			
Same as Reg'd Aircraft Owner		Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: YENA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger/Cargo					
FACTUAL REPORT - AVIATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: NYC011A068
	Occurrence Date: 01/21/2001
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 51
-----------------	-----------------	------------------	--------------------------	-----------

Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
--------	---------------------	--------------------------------------	-----------------------------

Certificate(s): Airline Transport; Flight Instructor; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine; Instrument Airplane

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 10/2000
---	---

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 01/2001
------------------------	--	------------------------------------

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	11500	665	2000	9500	6000	7000				
Pilot In Command(PIC)	7500	665		9500						
Instructor										
Last 90 Days		182								
Last 30 Days		81								
Last 24 Hours		6								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
--------------------	----------------------------	--------------------------	-------------------

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Ontario	State CA	Airport Identifier ONT	Departure Time 0259	Time Zone EST
----------------------------	-------------	---------------------------	------------------------	------------------

Destination Same as Accident/Incident Location	State	Airport Identifier JFK	
---	-------	---------------------------	--


Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing: In Person

 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: NYC011A068
	Occurrence Date: 01/21/2001
	Occurrence Type: Incident

Weather Information


WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
JFK	0751	EST	12 Ft. MSL	1 NM	300 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			1500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		3300 Ft. AGL		Visibility: 2 SM	Altimeter: 29.91 "Hg
Temperature: -5 °C	Dew Point: -7 °C	Wind Direction: 320		Density Altitude: Ft.	
Wind Speed: 16	Gusts:	Weather Conditions at Accident Site: Instrument Conditions			
Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation: Light			
Restrictions to Visibility: Blowing Snow					
Type of Precipitation: Snow					

Accident Information

Aircraft Damage: None	Aircraft Fire: None	Aircraft Explosion: None
-----------------------	---------------------	--------------------------

Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				4	4
Other Crew					
Passengers				139	139
- TOTAL ABOARD -				145	145
Other Ground					
- GRAND TOTAL -				145	145

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: NYC011A068
	Occurrence Date: 01/21/2001
	Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)
Robert L. Hancock

Additional Persons Participating in This Accident/Incident Investigation:

Edward Stroschein
Aviation Safety Inspector
FAA FSDO
Garden City, NY

Brian Coulter
Director of Operations
Jet Blue
Jamaica, NY

Philippe de Hugues
Investigator - Engineering Department
Bureau Enquetes - Accidents
Le Bourget, France,

Rudy Canto
Director - Flight Operations Technical
Airbus
Washington, DC