
Runway overrun following brake failure, Boeing 737-247, January 19, 1995

Micro-summary: This 737-247 overran the runway on landing following a loss of wheel brakes.


Event Date: 1995-01-19 at 0940 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.
-

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ATL95IA043		Aircraft Registration Number: N4515W	
		Occurrence Date: 01/19/1995		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place ATLANTA		State GA	Zip Code 30320	Local Time 0940	Time Zone EST
Airport Proximity: On Airport		Distance From Landing Facility: 1		Direction From Airport: 40	
Aircraft Information Summary					
Aircraft Manufacturer BOEING		Model/Series 737-247		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:					
<p>HISTORY OF FLIGHT</p> <p>On January 19, 1995, at 0940 eastern standard time, a Boeing 737-247, N4515W, overran runway 9R at the Hartsfield Atlanta International Airport, in Atlanta, Georgia. There were no injuries to the airline transport captain and first officer, the three flight attendants, and the 23 passengers. The aircraft had minor damage. Flight 312 was operated under the provisions of 14 CFR Part 121 by Air South, Inc. Instrument meteorological conditions existed at the time, and an instrument flight rules flight plan was in effect for the scheduled, domestic, passenger flight. The flight originated in Columbia, South Carolina at 0850.</p> <p>The captain stated the following: the engine start, taxi, and takeoff from Columbia were "ops normal." There were no unusual aircraft logbook entries; nothing pertaining to the brakes, anti-skid system, hydraulics, etc. The brakes seemed to perform normally on the ground in Columbia. There were no abnormal gauge indications, nor any warning or caution lights during the entire flight. The instrument landing system (ILS) approach and touchdown to runway 9R were normal. The first officer was the flying pilot. The ILS was manually flown, and the aircraft broke out of the weather at about 500 feet above ground level. The computed approach speed was in the mid-130 knot range. Following a normal approach (no glide path deviations were noted), the aircraft touched down about 1,500 to 2,000 feet down the runway, about 120 knots. The first officer reported that he began to apply wheel brakes about 80 to 90 knots. He remarked to the captain that the anti-skid system seemed to be "releasing." Thrust reverser operation was normal in all respects. The captain took control of the airplane, and checked the brakes. Brake pedal pressure was initially felt, then the brake pedals could be pressed all the way to the floor, and no braking action was observed. The aircraft departed the paved surface at the departure end of the runway. The aircraft came to a stop on the grass, about 200 feet beyond the edge of the departure end threshold.</p> <p>The captain stated that there were never any cockpit indications indicating brake or hydraulic system problems during the landing roll. The captain did not feel that the aircraft had been hydroplaning, and in his opinion, the runway was dry. The first officer described the runway as having "damp spots."</p>					
PERSONNEL INFORMATION					
Information of the captain is contained in this report at the section titled "First Pilot Information." Copies of his training records are included as an attachment to this report.					
Information on the first officer is contained in this report at Supplement E. Copies of his training records are included as an attachment to this report.					
AIRCRAFT INFORMATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: ATL95IA043
	Occurrence Date: 01/19/1995
	Occurrence Type: Incident

Narrative (Continued)

According to Air South personnel, the aircraft had been recently acquired, and had been in operation for about 35 hours (44 cycles) since Air South's acquisition.

The aircraft underwent maintenance work at AAR Oklahoma, Inc. prior to its acceptance by Air South. According to non-routine forms provided by the operator, on January 5, 1995, a ground test of the anti-skid control system was performed in accordance with the Boeing 737 Maintenance Manual Chapter 32-42-0. On January 6, 1995, the left hand inboard and outboard anti-skid control valves were found to be inoperative. They were replaced and operationally checked. According to maintenance records, the only subsequent work performed on the anti-skid system occurred on January 11, 1995. On that day, the left main landing gear anti-skid harness was resecured, following a writeup indicating that it needed to be secured. This work was performed by the operator.

METEOROLOGICAL INFORMATION

Instrument meteorological conditions existed at the time of the incident. Additional information is located at the section titled "Weather Information."

FLIGHT RECORDERS

The cockpit voice recorder (CVR) and digital flight data recorder (DFDR) were secured following the incident, and forwarded to the NTSB Headquarters in Washington, DC for examination.

An initial readout of the CVR revealed that the unit had not been disabled by the flight crew, thus it continued operating after the aircraft had come to a stop. No useful information was obtained from the recording.

The DFDR data for this incident indicate that the airplane touched down at 132 knots indicated airspeed (IAS), at a pressure altitude of 931 feet, and a magnetic heading of 95 degrees. The data indicate two possible times where the aircraft overran the runway. Assuming a runway length of 9,000 feet, the DFDR data indicated that the airplane touched down either 2,501 or 2,273 feet from the runway 9R approach end. For additional information, refer to the "Digital Flight Data Recorder Study", attached to this report.

WRECKAGE AND IMPACT INFORMATION

The only verified damage to the aircraft was a blown main tire on the left, outboard position. The other three main tires remained intact and inflated, except there was evidence of skidding on the right, outboard tire. The tread of the right, outboard tire showed evidence of rubber reversion. There were skid marks on the runway surface, leading to the tracks in the mud made by the aircraft. An examination of the track which led to the right, outboard tire showed that it had a "steam cleaned" appearance, i.e. it was lighter in color than the surrounding runway surface.

TESTS AND RESEARCH

Following the incident, several tests and examinations were performed. An inspection of the aircraft after the incident revealed that the left, inboard anti-skid valve brake and return lines were crossed. Also, after the aircraft had been returned to service, abnormal main tire wear was observed at the left, outboard position. Further inspection revealed that the wiring to the left, inboard and left, outboard wheel speed transducers were crossed. This discrepancy was corrected, and no further reports of abnormal tire wear were received, or observed.

All four main tires, as well as their respective wheel and brake assemblies, were shipped to Thompson Aerospace, Inc., in Miami, Florida. A functional test of each brake assembly was conducted; all operated normally. Brake wear was not greater than 50 percent on any brake assembly.

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: ATL95IA043

Occurrence Date: 01/19/1995

Occurrence Type: Incident

Narrative (Continued)

The anti-skid control unit, and the number two anti-skid control valve were removed from the incident aircraft. These units were shipped to Aircraft Braking Systems Corporation for testing and examination. Functional testing of the anti-skid valve revealed that it was functional. Testing of the anti-skid control unit (box) revealed that the left, inboard skid detect circuit was inoperative, due to an open Q24 transistor.

According to the Boeing Commercial Airplane Group, the discrepancies discovered would result in the following:

(1) If the left, outboard wheel started to skid, the wheel speed transducer signal would go to the left, inboard wheel skid detector circuit, which was inoperative. This would have allowed tire damage to occur to the left, outboard tire, since there would be no brake release.

(2) If the left, outboard wheel locked up, the wheel speed transducer signal would go to the left, inboard wheel detector, providing a release of the left, inboard wheel, if the inboard locked wheel protection circuit was armed. Arming of the locked wheel protection circuit occurs when either the inboard wheel spin up to more than 30 mph, or the air/ground sensor switch is in the "air" position, to provide touchdown protection.


(3) With the left inboard valve hydraulic lines crossed, sluggish braking would occur on the left, inboard wheel.


The component examinations did not reveal evidence of malfunction of the right, main gear anti-skid or braking systems. The investigation was not able to determine if the crossed brake and return lines on the left, inboard anti-skid valve had any effect on right side braking.

Boeing Commercial Airplane Group was asked to provide information to determine if the aircraft inspections performed by AAR Oklahoma, Inc. should have uncovered the discrepancies found in N4515W. Regarding the inoperative Q24 transistor, the ground test of the anti-skid system may have been affected by the crossed wheel speed transducer wiring. Without additional testing, it could not be determined if the inoperative Q24 transistor would have been discovered. Regarding the crossed wheel speed transducer wiring, the appropriate test for this was not referenced in the non-routine work cards, however that test is required if the landing gear is replaced. Regarding the crossed anti-skid valve brake and return lines, Boeing reported that this condition would result in sluggish braking on the left, inboard wheel.

ADDITIONAL INFORMATION

The tested aircraft system components were released to the operator, Air South. Inc.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ATL95IA043			
		Occurrence Date: 01/19/1995			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
HARTSFIELD ATLANTA INTL.	ATL	150 Ft. MSL	9R	9000	150
Runway Surface Type: Concrete					
Runway Surface Condition:					
Type Instrument Approach: ILS-complete					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
BOEING		737-247		19612	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 130	Certified Max Gross Wt.	103500 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Jet	P&W	JT8D-9A	14500 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	01/1995	2 Hours	37421 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
		600 SUNSET RIDGE			
MIMI LEASING CORP.		City	State	Zip Code	
		DUBUQUE	IA	52003	
Operator of Aircraft		Street Address			
		P.O. BOX 11129			
AIR SOUTH, INC.		City	State	Zip Code	
		COLUMBIA	SC	29211	
Operator Does Business As:			Operator Designator Code: A6XA		
- 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 Only					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: ATL95IA043
	Occurrence Date: 01/19/1995
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 34
-----------------	-----------------	------------------	--------------------------	-----------

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

Certificate(s): Airline Transport; Flight Engineer

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

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

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 01/1995
------------------------	--	------------------------------------

- 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	3634	761								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	161	161								
Last 30 Days	48	48								
Last 24 Hours	8	8								

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

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point COLUMBIA	State SC	Airport Identifier CAE	Departure Time 0850	Time Zone EST
-----------------------------	-------------	---------------------------	------------------------	------------------

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


Type of Clearance: IFR

Type of Airspace:

Weather Information

Source of Briefing: Company

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: ATL95IA043
	Occurrence Date: 01/19/1995
	Occurrence Type: Incident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
ATL	1028	EST	1026 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			0 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Overcast		300 Ft. AGL		Visibility: 2 SM	Altimeter: 29.00 "Hg
Temperature: °C	Dew Point: °C	Wind Direction: 120		Density Altitude: Ft.	
Wind Speed: 13	Gusts:	Weather Conditions at Accident Site: Instrument Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility: Fog					
Type of Precipitation: None					

Accident Information

Aircraft Damage: Minor	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				3	3
Other Crew					
Passengers				23	23
- TOTAL ABOARD -				28	28
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	28	28

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: ATL95IA043

Occurrence Date: 01/19/1995

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

RALPH E. HICKS

Additional Persons Participating in This Accident/Incident Investigation:

DAVID A DEES
FAA/GEORGIA FSDO
COLLEGE PARK, GA 30337

CASSANDRA L JOHNSON
NTSB/RE-20
WASHINGTON, DC 20594