
Runway excursion, hydraulic failure, Boeing 737-200RS, September 24, 1997

Micro-summary: This Boeing 737-200RS left the runway during landing with an inoperative hydraulic system and loss of the left thrust reverser.


Event Date: 1997-09-24 at 1127 MDT

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

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

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		NTSB ID: FTW97IA363		Aircraft Registration Number: N205AU	
		Occurrence Date: 09/24/1997		Most Critical Injury: Minor	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place SALT LAKE CITY		State UT	Zip Code 84121	Local Time 1127	Time Zone MDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 737-200RS		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>On September 24, 1997, approximately 1127 mountain daylight time, a Boeing 737-200RS, N205AU, sustained minor damage when it departed runway 16L during landing rollout at Salt Lake City International Airport, Salt Lake City, Utah. The airline transport rated captain and first officer, 2 flight attendants, 2 nonpaying company employees, and 62 passengers, were not injured; however, 1 flight attendant received minor injuries. The airplane was being operated by Frontier Airlines, Inc., of Denver, Colorado, under Title 14 CFR Part 121. Visual meteorological conditions prevailed for the scheduled passenger flight which originated from Salt Lake City, Utah, approximately 10 minutes before the incident. An IFR flight plan had been filed with the destination of Denver, Colorado.</p> <p>According to the flight crew, when they raised the landing gear handle after takeoff from Salt Lake City International Airport, the master caution light illuminated as the result of the loss of "A" system hydraulics. They noticed that the main landing gear did not retract, whereas the nose wheel landing gear did. Simultaneously, the control tower informed them that smoke was observed coming from the vicinity of the right engine. The captain declared an emergency, and the Salt Lake City Airport Rescue Fire Fighting (ARFF) equipment was sent to runway 16L pending the return landing of Frontier Flight 776.</p> <p>The first officer had performed the takeoff, and the captain decided that the first officer would also make the landing. During the approach to runway 16L (12,004 feet long, by 150 feet wide), the nose gear was extended and locked using manual extension procedures, and the flaps were extended to 15 degrees using alternate flap extension procedures. The first officer landed approximately 700 feet down the runway at 140 knots. The spoilers were activated, but only the outboard flight spoilers operated due to the loss of "A" system hydraulics. Both thrust reversers were deployed; however, the left thrust reverser malfunctioned and did not deploy. The flight crew reported that the utilization of one thrust reverser resulted in asymmetrical braking thrust.</p> <p>The airplane's takeoff gross weight was 89,600 pounds. The emergency and abnormal procedures in the airplane's operations manual dictates the use of 15 degrees of flaps for landing without the "A" hydraulic system. The operations manual further states that landing with the above scenario requires a landing speed of Vref or 141 knots.</p> <p>Frontier Airlines' procedures for "normal landing roll" provides two sets of instructions for thrust reverser termination/stowing: first, "At 60 knots, reduce reverse thrust to be at IDLE reverse when reaching taxi speed;" and, second, "At 80 knots, reduce reverse thrust to be at idle reverse when reaching 60 knots." The flight crew reported that the right thrust reverser did not "stow" when the reverse thrust levers were put in the full down position. The Boeing 737 Operations Manual states that the failure of the "A" hydraulic system will result in the nose wheel steering being inoperable and the nose wheel would become free casting. Directional control during the landing roll would have been accomplished using rudder and differential braking,</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: FTW97IA363

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Occurrence Type: Incident

Narrative (Continued)


according to Frontier Airline officials.


The captain reported to the FAA inspector and Frontier Airlines officials that during the landing roll, he took control of the airplane. Photographs taken at the incident scene indicate the following: at the 4,000 foot runway remaining marker, the airplane was off-set to the right from the runway centerline by approximately 25 feet. At approximately 3,800 feet remaining, the photographs indicate that the black tire marks, which were left on the runway, became darker/blacker and began curving to the right. The right two black marks appear darker than the left two, with the outboard left mark appearing the lightest of all four marks. With approximately 3,725 feet to 3,700 feet remaining, the right outboard black mark appeared to be intermittent "chatter marks" for approximately 50 feet. At this point, all four black marks appear more uniform in color, but the right outboard black mark is still slightly darker. The four black marks continue for another 300 to 400 feet before the right two black marks exit the right side of the runway and the left two black marks terminate approximately 3 feet before reaching the right side of the runway. The photographs further indicate that the tires left approximately 8 to 10 inch deep indentations in the soil for the remaining estimated 50 feet of its travel.

The captain ordered an emergency evacuation after the airplane came to rest. The L1, R1, and R2 evacuation slides were used. All passengers and crew members evacuated the airplane safely, with the exception of one flight attendant who received minor injuries.

Postincident examination of the "A" hydraulic system revealed a failure in a hydraulic line near the strut on the right engine. The Boeing Commercial Airplane Company had issued a Service Bulletin No. 737-29-1023, dated June 29, 1973, for the modification of the hydraulic line clamping, rerouting, and clearance. According to Frontier Airlines personnel, compliance with this Service Bulletin had not been performed on N205AU.

The failure of the left thrust reverser to deploy was due to a left engine oil pressure switch failure.

		NTSB ID: FTW97IA363			
		Occurrence Date: 09/24/1997			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
SALT LAKE CITY INT'L	SLC	4222 Ft. MSL	16L	12004	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach: Contact; ILS-complete					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Boeing		737-200RS		19421	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 116	Certified Max Gross Wt.	109000 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	09/1997	3 Hours	7252 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
FIRST SECURITY BANK		79 SOUTH MAIN ST.			
		City	State	Zip Code	
		SALT LAKE CITY	UT	84111	
Operator of Aircraft		Street Address			
FRONTIER AIRLINES, INC.		12015 E. 46TH AVE, SUITE 200			
		City	State	Zip Code	
		DENVER	CO	80239	
Operator Does Business As:			Operator Designator Code: F3LA		
- 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					
FACTUAL REPORT - AVIATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: FTW971A363
	Occurrence Date: 09/24/1997
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 59
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-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?
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 09/1997
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- 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	18836	6000	1200	17636	2000	850	300			
Pilot In Command(PIC)	11899									
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed?	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier SLC	Departure Time 1108	Time Zone MDT
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Destination DENVER	State CO	Airport Identifier DEN	
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Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing:

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Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
SLC	1136	MDT	4222 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			5000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		0 Ft. AGL	Visibility: 15	SM	Altimeter: 30.00 "Hg
Temperature: 22 °C	Dew Point: 8 °C	Wind Direction: 100		Density Altitude: 4585 Ft.	
Wind Speed: 4	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0	SM	Intensity of Precipitation: Unknown		
Restrictions to Visibility: None					
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			1	2	3
Other Crew				2	2
Passengers				62	62
- TOTAL ABOARD -			1	68	69
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	1	68	69

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: FTW971A363

Occurrence Date: 09/24/1997

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

JAMES F. STRUHSAKER

Additional Persons Participating in This Accident/Incident Investigation:

JOHN M MOONEY

FAA FSDO

SALT LAKE CITY, UT 84116