
Failure of left main landing gear outboard axle, Boeing 737-200, October 4, 1997

Micro-summary: This Boeing 737-200 experienced a failure of the left main landing gear outboard axle after landing.


Event Date: 1997-10-04 at 810 CDT

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: CHI98IA007		Aircraft Registration Number: N129SW	
		Occurrence Date: 10/04/1997		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place CHICAGO		State IL	Zip Code 60638	Local Time 0810	Time Zone CDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 737-200		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 October 4, 1997, at 0810 central daylight time, a Boeing 737- 200, N129SW, operated by the Southwest Airlines Company, as Southwest Airlines flight 418 experienced a failure of the left main landing gear outboard axle after landing on runway 31C at Midway Airport, Chicago, Illinois. The scheduled passenger flight was operating under 14 CFR Part 121. Visual meteorological conditions prevailed and an IFR flight plan was filed. There were no injuries reported by the Captain, First Officer, 3 Flight Attendants, or 45 passengers. The airplane received minor damage which was confined to the failed axle and the number one engine cowling. The flight originated at Kansas City, Missouri, at 0710 cdt.</p> <p>The Captain reported they touched down smoothly on the "numbers" with 40 degrees of flaps in a "very slight" crab. He reported the airplane was on the centerline as they applied reverse thrust and "moderate" braking. The Captain reported that due to his perception that another airplane was close behind him on final approach he began braking sooner than normal, but in any case "max braking" was not used. He reported that at 80 knots, as they were coming out of reverse thrust, the airplane "...lurched as it would with the anti-skid cycling and began to track right." He reported that since they were turning off the runway to the right, he let the airplane continue and he used nose steering to aim toward the turnoff. He reported they cleared the runway and proceeded to the gate.</p> <p>According to the Captain, once they were parked at the gate the "C" flight attendant told the flight crew that a passenger reported seeing a wheel rolling away from the airplane before they turned off the runway. A mechanic told the flight crew that the number one tire, wheel, and brake assembly was missing. The Captain reported that after he visually inspected the wheel, he returned to the airplane and called ground control. He was informed that they already had found the wheel assembly near the point where the airplane turned off the runway.</p> <p>Inspection of the left main landing gear revealed the outboard axle fractured just inboard of the brake assembly mounting flange. The tire, wheel, and brake assembly separated as one unit from the main landing gear inner cylinder. The tire pressure was checked and found to be normal. No evidence of hydroplaning was found on the tire. The brake assembly was free and with the exception of the hydraulic line, emergency air line, and anti- skid wiring, no damage was noted. A slight dent was found in the inboard side cowl panel ahead of the reverser actuator fairing on the number one engine.</p> <p>The failed cylinder/axle assembly was sent to the National Transportation Safety Board Materials Laboratory in Washington, D.C., for inspection. Inspection of the assembly revealed three fatigue cracks were present in the inboard portion of the brake flange. One of the cracks originated at the surface of one of the brake flange holes. Examination of this crack revealed that the "...region immediately adjacent to the crack possessed a different surface texture from the rest of the hole. Energy- dispersive spectrometry (EDS) of this region showed high levels of both nickel</p>					
FACTUAL REPORT - AVIATION					
Page 1					

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: CHI98IA007


Occurrence Date: 10/04/1997


Occurrence Type: Incident

Narrative (Continued)

and chromium, along with low levels of the elements present in the underlying base material." Further inspection of the crack revealed two additional layers between the plating and the base material. The second layer was "...consistent with untempered martensite." The third layer "...has the appearance of overtempered martensite." The report concluded that "This combination of layers in a repaired area is consistent with the surface having been heated to a temperature above the austenitic transformation temperature of the material (approximately 1600 degrees F)." See attached Materials laboratory Factual Report for further details.

According to Southwest Airlines N129SW was purchased from America West Airlines in May, 1993. Southwest Airlines reported that they had not done any maintenance/repair work to the landing gear inner cylinder/axle assembly, p/n 65-46116-20. According to maintenance records, the landing gear was last overhauled by Hawker Pacifica, Inc., on July 29, 1988, and it was installed on the airplane on January 28, 1989. The cylinder/axle assembly had 25,619:39 hours since overhaul at the time of this incident. The next overhaul was scheduled for December 24, 1997.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: CHI98IA007			
		Occurrence Date: 10/04/1997			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name MIDWAY	Airport ID: MDW	Airport Elevation 620 Ft. MSL	Runway Used 31C	Runway Length 6522	Runway Width 150
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: ILS-complete					
VFR Approach/Landing: Full Stop					
Aircraft Information					
Aircraft Manufacturer Boeing		Model/Series 737-200		Serial Number 22340	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 130	Certified Max Gross Wt. 115500 LBS	Number of Engines: 2		
Engine Type: Turbo Fan	Engine Manufacturer: P&W	Model/Series: JT8D-9	Rated Power: 14500 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 08/1997	Time Since Last Inspection 386 Hours	Airframe Total Time 49400 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner FIRST SECURITY BANK		Street Address 79 SOUTH MAIN ST.			
		City SALT LAKE CITY	State UT	Zip Code 84111	
Operator of Aircraft SOUTHWEST AIRLINES		Street Address 2702 LOVE FIELD DRIVE			
		City DALLAS	State TX	Zip Code 75235	
Operator Does Business As: SOUTHWEST AIRLINES			Operator Designator Code: SWAA		
- 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: CHI98IA007
	Occurrence Date: 10/04/1997
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 55
-----------------	-----------------	------------------	--------------------------	-----------

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

Certificate(s): Airline Transport; Flight Instructor

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?
---	---------------------------------

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 09/1997
------------------------	--	------------------------------------

- 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	16100	5600	136	16000						
Pilot In Command(PIC)	7250	2550	48	7200						
Instructor										
Last 90 Days	226	226		226						
Last 30 Days	85	85		85						
Last 24 Hours	7	7		7						

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

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR	
--------------------------------	--

Departure Point KANSAS CITY	State MO	Airport Identifier MCI	Departure Time 0710	Time Zone CDT
--------------------------------	-------------	---------------------------	------------------------	------------------

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


Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing:
Company

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: CHI98IA007
	Occurrence Date: 10/04/1997
	Occurrence Type: Incident

Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
MDW	0753	CDT	620 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			6000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Overcast		8500 Ft. AGL	Visibility: 6 SM	Altimeter: 29.00	"Hg
Temperature: 21 °C	Dew Point: 18 °C	Wind Direction: 240		Density Altitude: Ft.	
Wind Speed: 10	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Light			
Restrictions to Visibility:					
Type of Precipitation: Rain					

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				45	45
- TOTAL ABOARD -				50	50
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	50	50

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: CHI98IA007

Occurrence Date: 10/04/1997

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

PAMELA S. SULLIVAN

Additional Persons Participating in This Accident/Incident Investigation:

JOHN J FRANCISSEN
9950 W. LAWRENCE, SUITE 400
SCHILLER PARK, IL 60176