
Landing gear collapse on landing, McDonnell Douglas DC-9-82, April 27, 1993

Micro-summary: This McDonnell Douglas DC-9-82, experienced a collapse of the right main landing gear.


Event Date: 1993-04-27 at 1728 MDT

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

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

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		NTSB ID: DEN93FA049		Aircraft Registration Number: N72822	
		Occurrence Date: 04/27/1993		Most Critical Injury: Minor	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place DENVER	State CO	Zip Code 80207	Local Time 1728	Time Zone MDT	
Airport Proximity: On Airport		Distance From Landing Facility: 0		Direction From Airport: 0	
Aircraft Information Summary					
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series DC-9-82		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 April 27, 1993, at 1728 mountain daylight time, a McDonnell Douglas DC-9-82, N72822, operating as Continental Airlines Flight 588, had the right main landing gear collapse during landing roll at Stapleton International Airport, Denver, Colorado. There were two minor injuries reported from the emergency evacuation, and the aircraft sustained substantial damage. The aircraft was being operated under 14 CFR Part 121 when the accident occurred. Visual meteorological conditions prevailed and an IFR flight plan was filed for this scheduled flight from San Francisco, California, which originated at 1515 mountain daylight time.</p> <p>According to the flight deck crew, the takeoff, en route, and approach were normal. Upon touch down on runway 26R, a severe vibration occurred and the right main gear collapsed at what the copilot recalled to be 60 knots. The aircraft remained on the runway and skidded to a stop.</p> <p>PERSONNEL INFORMATION</p> <p>Flight experience and flight deck crew qualifications are depicted in this document. The pilots' had a reported, combined, flight experience in this type of aircraft of 11,600 hours. Both were properly qualified and current to conduct the flight.</p> <p>FLIGHT RECORDERS</p> <p>The flight data and voice recorder were analyzed at the National Transportation Safety Board Laboratory. The voice recorder contained no information pertinent to the accident. The flight recorder information is attached and provides information that the approach was within normal parameters and that touchdown occurred at 134 knots indicated airspeed. According to the recorded data, the right main gear collapsed at approximately 117 knots at which time the heading changed approximately 5 degrees to the left. There is no indication via the recorded information that the ground spoilers deployed following landing.</p> <p>WRECKAGE AND IMPACT INFORMATION</p> <p>Runway witness marks provided no information that an abnormal touchdown occurred, and the actual point of touchdown could not be determined. Witness marks on the runway are computed from the approach end and indicate that at 3,500 feet, the left main landing gear tires left marks associated with a shimmy. At 3,600 feet, the right inboard tire left heavy marks, and at 3,750 feet, metal deposits from the right wing structure began. Also at 3,750 feet, the right main tire marks indicate that the right wheel assembly turned 90 degrees to the direction of travel and remained fixed in that position throughout the remainder of the aircraft travel. The aircraft came to a stop 8,600 feet from the</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: DEN93FA049

Occurrence Date: 04/27/1993

Occurrence Type: Accident

Narrative (Continued)

approach end of the runway at the beginning of the overrun approximately 30 feet right of centerline. A detailed wreckage diagram and photographs are attached.

TESTS AND RESEARCH

Applicable components from the right main landing gear assembly, brakes, anti-skid, and spoilers were shipped to the facilities of

McDonnell Douglas and/or Continental Airlines for further examination. The results of the examinations are attached and provide no definitive data as to the initiation of the vibration


which lead to the gear collapse. The tests did reveal that the threads on the right gear apex bolt failed causing the nut to depart and allowed the right main gear to rotate 90 degrees, bending the lower torque link and damaging the flange bushings and spacers on the left torque link. Ultimately, the gear collapsed as a result of overload on the side brace of the right main landing gear. Research and tests are continuing; however, as a result of the work done to date, McDonnell Douglas issued an ALL OPERATORS LETTER (AOL), with recommended alterations to operating procedures.


A copy of that AOL is attached. It also addresses the fact that there have been three other similar in-service events. In all three cases the spoiler non extension was a common denominator.

As a result of the flight data recorder information, it was determined that the aircraft ground spoilers did not activate and the crew stated that they armed the spoilers. Tests on those components revealed no discrepancies which would have prevented deployment.

ADDITIONAL DATA/INFORMATION

The aircraft was verbally released to Continental Airlines on April 28, 1993, following examination and identification of components to be retained. The retained components are being returned to Continental upon completion of additional testing.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: DEN93FA049				
		Occurrence Date: 04/27/1993				
		Occurrence Type: Accident				
Landing Facility/Approach Information						
Airport Name STAPLETON INTERNATIONAL		Airport ID: DEN	Airport Elevation 5333 Ft. MSL	Runway Used 26R	Runway Length 8599	Runway Width 150
Runway Surface Type: Concrete						
Runway Surface Condition: Dry						
Type Instrument Approach: ILS-complete; Visual						
VFR Approach/Landing:						
Aircraft Information						
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series DC-9-82		Serial Number 49482		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 150	Certified Max Gross Wt. 142000 LBS		Number of Engines: 2	
Engine Type: Turbo Jet		Engine Manufacturer: P&W		Model/Series: JT8D-217	Rated Power: 20750 LBS	
- Aircraft Inspection Information						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 04/1993	Time Since Last Inspection 252 Hours		Airframe Total Time 21572 Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? No		ELT Operated?		ELT Aided in Locating Accident Site?		
Owner/Operator Information						
Registered Aircraft Owner CONTINENTAL AIRLINES		Street Address 2929 ALLEN PARKWAY				
		City HOUSTON		State TX	Zip Code 77210	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner				
		City		State	Zip Code	
Operator Does Business As:				Operator Designator Code: CALA		
- 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: DEN93FA049
	Occurrence Date: 04/27/1993
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 49
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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

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: 03/1993
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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	25000	5600	600	24400						
Pilot In Command(PIC)	7000	5600								
Instructor										
Last 90 Days	210	210								
Last 30 Days	70	70								
Last 24 Hours	2	2								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point SAN FRANCISCO	State CA	Airport Identifier SFO	Departure Time 1515	Time Zone MDT
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Destination Same as Accident/Incident Location	State	Airport Identifier	
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Type of Clearance: IFR

Type of Airspace: Class E

Weather Information

Source of Briefing: Commercial Weather Service

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: DEN93FA049
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Weather Information

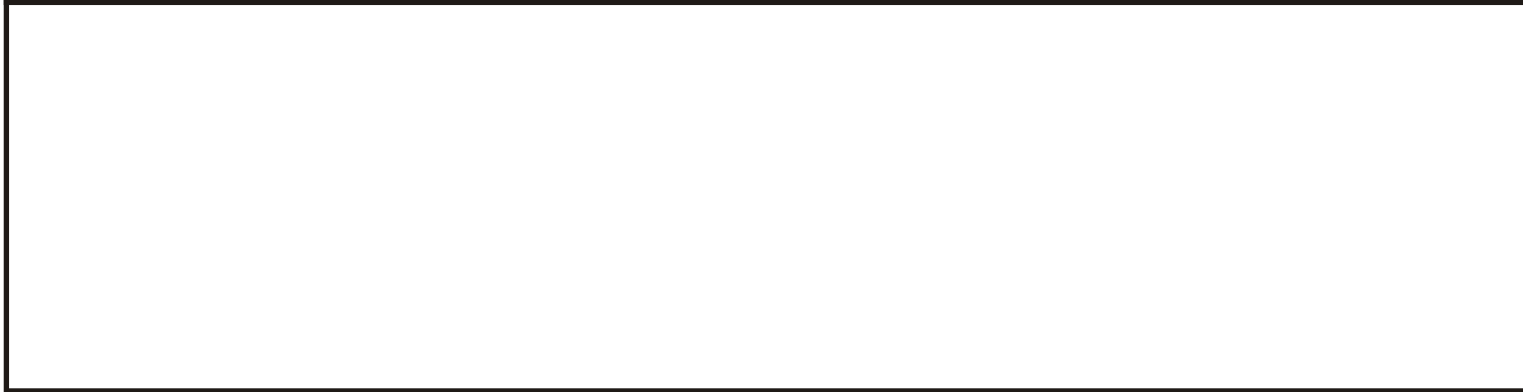
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
DEN	1731	MDT	5333 Ft. MSL	1 NM	30 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			6500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		6500 Ft. AGL		Visibility: 50 SM	Altimeter: 30.00 "Hg
Temperature: 17 °C	Dew Point: 2 °C	Wind Direction: 120		Density Altitude: 6300 Ft.	
Wind Speed: 16	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: Substantial	Aircraft Fire: None	Aircraft Explosion: None
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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			2	113	115
- TOTAL ABOARD -			2	119	121
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	2	119	121



National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: DEN93FA049

Occurrence Date: 04/27/1993

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

NORMAN F. WIEMEYER

Additional Persons Participating in This Accident/Incident Investigation:

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5440 ROSLYN STREET
DENVER, CO 80216