
Gear failure on landing, Douglas DC-9-32, February 1, 1996

Micro-summary: This Douglas DC-9-32 experienced a failure of the right main landing gear while landing.


Event Date: 1996-02-01 at 1505 CST

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

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

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		NTSB ID: ATL96FA043		Aircraft Registration Number: N903VJ	
		Occurrence Date: 02/01/1996		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place NASHVILLE		State TN	Zip Code 37214	Local Time 1505	Time Zone CST
Airport Proximity: On Airport		Distance From Landing Facility: 1		Direction From Airport: 130	
Aircraft Information Summary					
Aircraft Manufacturer DOUGLAS		Model/Series DC-9-32		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 THE FLIGHT</p> <p>On February 1, 1996, at 1505 central standard time, a Douglas DC-9-32, N903VJ, registered to and operated by ValuJet Airlines, Inc., as a Title 14 CFR Part 121 scheduled domestic passenger flight, had the right main landing gear fail during landing at Nashville International Airport, Nashville, Tennessee. Visual meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed. The aircraft received substantial damage. The airline transport-rated captain, first officer, 3 flight attendants, and 75 passengers were not injured. The flight originated from Atlanta, Georgia, the same day, about 1430.</p> <p>The flightcrew stated this was their third flight leg of the day, all of which were flown in this aircraft. The flight from Atlanta to Nashville was uneventful. The first officer was performing flying duties. On approach to Nashville they decided the captain would deploy the ground spoilers after landing because the automatic ground spoiler system was inoperative. The touchdown was normal in the touchdown area of the runway. As the captain deployed the ground spoilers they began to feel vibration and what appeared to be gyration and skipping of the right main gear as if the brakes were on. The vibration got worse as they slowed and the aircraft veered to the right. The first officer used aileron to keep the right wing up and rudder and brakes to maintain directional control. The aircraft came to a stop with the right wing down and the captain directed that all passengers exit via the left front door slide. Rescue personnel arrived and requested that the over wing exits be opened and that passengers exit over the wing.</p> <p>PERSONNEL INFORMATION</p> <p>Information on the captain and first officer is contained in this report in first pilot information and supplement E to this report.</p> <p>AIRCRAFT INFORMATION</p> <p>On December 24, 1995, 312 flight hours before the accident, the right main landing gear torque links on N903VJ failed during landing roll at Raleigh, North Carolina. The gear strut piston and axle rotated within the shock strut cylinder. The flightcrew was able to taxi off the runway, and the aircraft was towed to the gate. The right torque links, shimmy damper, and wheel assemblies were changed and the aircraft was ferried to Miami, Florida for further repairs. In Miami, the right gear strut piston was replaced and all lines and wires, including the anti-skid brake system wiring, were repaired. The gear strut cylinder was not changed. The aircraft was returned to service.</p> <p>Metallurgical examination of the failed torque link and the removed shimmy damper was performed by McDonnell Douglas Aircraft, Materials Process and Engineering Laboratory. The lower</p>					
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FACTUAL REPORT

AVIATION

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Narrative (Continued)

torque link arm had failed at the apex bolt/shimmy damper as a result of fatigue cracking. The shimmy damper was found sealed, but almost empty of fluid. (See the attached McDonnell Douglas report)

Flight log discrepancy records obtained from ValuJet Airlines showed that from July 1, 1995 until the Raleigh incident there were numerous occurrences of the right main gear tires being changed and discrepancies with the anti-skid brake system. These occurrences stopped after the repairs following the Raleigh incident. (See the attached records)

Additional aircraft information is contained in this report under aircraft information and in attachments to this report.

METEOROLOGICAL INFORMATION

Visual meteorological conditions prevailed at the time of the accident. Additional meteorological information is contained in this report under weather information.

FLIGHT RECORDERS

The cockpit voice recorder and the digital flight data recorder were removed from the aircraft and forwarded to the NTSB Flight Recorder Laboratory, Washington, D. C., for readout. The cockpit voice recorder was not readout.

The readout indicated that at the moment of apparent touchdown the maximum recorded vertical acceleration value was 1.448 G's, at an airspeed of 134.43 knots. The vertical acceleration data from the twelve previous landings showed that the highest recorded value during the landing sequences was 1.448 G's. (See the attached Factual Report-Digital Flight Data Recorder)

WRECKAGE AND IMPACT INFORMATION

Examination of the runway by FAA, ValuJet, and McDonnell Douglas personnel showed the aircraft touched down at about the 1,500 foot point on the runway. The aircraft traveled about 500 to 1,000 feet before debris separated from the failed right main landing gear. The aircraft stopped on the runway center line at about the 6,500 foot point.

Examination of the separated portion of the right main landing gear showed the gear strut cylinder and piston had failed causing the separation of the axle, wheels, and tires.

METALLURGICAL EXAMINATION

Metallurgical examination of the failed right main landing gear cylinder and piston was performed by James F. Wildey II, National Resource Specialist, Metallurgy, NTSB, Washington, D.C. The landing gear cylinder fracture surface had a large majority of the fracture at a 45 degree shear plane, indicative of an overstress separation. No evidence of preexisting fracture areas was found on either of the mating fracture faces. However, two areas of the fracture, located on diametrically opposite sides of the cylinder, were not entirely on a 45 degree plane. The fracture faces had sustained damage as a result of the accident and contained ratchet marks that usually separate initiation sites on slightly offset planes. The landing gear piston fracture faces showed no evidence of preexisting fracture areas. The fracture around the entire circumference of the break was on a 45 degree plane typical of an overstress separation. (See the attached Metallurgist's Factual Report)

ADDITIONAL INFORMATION

The aircraft was released to David L. Gentry, Vice President Maintenance, ValuJet Airlines,

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on February 6, 1996. Components retained by NTSB for further examination were released to Mr. Gentry on December 18, 1996.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ATL96FA043			
		Occurrence Date: 02/01/1996			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
NASHVILLE INTERNATIONAL	BNA	599 Ft. MSL	31	11029	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach: ILS-complete					
VFR Approach/Landing: Straight-in					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
DOUGLAS		DC-9-32		47261	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 118	Certified Max Gross Wt.	108000 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	P&W	JT8D-7B	14500 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	02/1996	6 Hours	3078 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
VALUJET INC.		1800 PHEONIX BLVD SUITE 126			
		City	State	Zip Code	
		ATLANTA	GA	30349	
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: VJ6A		
- 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: ATL96FA043
	Occurrence Date: 02/01/1996
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 39
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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; Flight Engineer

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--no waivers/lim.	Date of Last Medical Exam: 01/1996
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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	6000	1500	150	5450	2000	1000	350			
Pilot In Command(PIC)	2500	700	20	2480						
Instructor				450						
Last 90 Days	258	258								
Last 30 Days	79	79								
Last 24 Hours	6	6								

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 ATLANTA	State GA	Airport Identifier ATL	Departure Time 1420	Time Zone CST
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Destination Same as Accident/Incident Location	State	Airport Identifier BNA	
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Type of Clearance: IFR

Type of Airspace: Class D

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
BNA	1450	CST	599 Ft. MSL	1 NM	13 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			0 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Overcast		3700 Ft. AGL		Visibility: 15 SM	Altimeter: 30.00 "Hg
Temperature: -2 °C	Dew Point: -11 °C	Wind Direction: 360		Density Altitude: 1 Ft.	
Wind Speed: 10	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

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				75	75
- TOTAL ABOARD -				80	80
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	80	80

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FACTUAL REPORT

AVIATION



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Occurrence Date: 02/01/1996

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

ROFF H. SASSER

Additional Persons Participating in This Accident/Incident Investigation:

LEIGHTON E WRIGHT
FAA FSDO
NASHVILLE, TN 37214

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ATLANTA, GA 30349

KURT GOELLNER
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