
Landing gear strut separation, Boeing 727-200, August 23, 1999

Micro-summary: The left main landing gear strut of this Boeing 727-200 separated during taxi.


Event Date: 1999-08-23 at 1910 EDT

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: IAD99IA059		Aircraft Registration Number: N926TS	
		Occurrence Date: 08/23/1999		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place WASHINGTON		State DC	Zip Code 20001	Local Time 1910	Time Zone EDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 727-200		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 August 23, 1999, at 1910 Eastern Daylight Time, a Boeing 727-200, N926TS, operated by US Airways Shuttle, received minor damage when the main landing gear side strut separated during taxi at the Ronald Reagan National Airport (DCA), Washington, DC. The three certificated flight crewmembers, 5 cabin attendants, and 163 passengers were not injured. Visual meteorological conditions prevailed for the scheduled passenger flight that originated at LaGuardia Airport (LGA), New York, New York, about 1800. An IFR flight plan was filed for the flight conducted under 14 CFR Part 121.</p> <p>In a written statement, the Captain said:</p> <p>"The entire flight was routine until we exited the landing runway at DCA. The aircraft was slowed and a gradual right turn off Runway 18 at "F" taxiway was made. As the aircraft was being reconfigured at my request, an intermittent aural warning sounded. This was accompanied by alternate flashing right main gear green and red warning lights. Additionally, there was a pulsating thump occurring simultaneously with the green and red lights. The aircraft was stopped. Air Traffic and Company personnel were notified that the aircraft would not be moved until it was inspected. Maintenance personnel advised me that there was a broken side strut on the right main landing gear."</p> <p>The flight crew stopped the airplane and de-planed passengers on the taxiway.</p> <p>Examination of the right main landing gear revealed that the side strut assembly was separated from the main shock strut and that the gear door was open. The threaded portion of the main strut attachment clevis was separated from the side strut assembly. The clevis remained attached to the main shock strut.</p> <p>The clevis bolt was dry, corroded, and the threads were broken and stripped. There was no evidence of lubrication on the clevis bolt. The retaining nut and the lock nut inside the lower end of the side strut were also dry, corroded, and displayed corresponding damaged and stripped threads inside the lock nut.</p> <p>The right main landing gear squat switch was broken, two torque tubes were bent, and honeycomb wheel-well fairing material was damaged.</p> <p>Examination of maintenance records revealed that both the left and right side strut assemblies were overhauled in July 1996. At that time, the overhaul facility documented compliance with Boeing Service Bulletin 727-32-0338 Option 3.</p> <p>The side strut and the attachment clevis were removed from the airplane and taken to the Safety Board Materials Laboratory for further examination.</p>					
FACTUAL REPORT - AVIATION					
Page 1					

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: IAD99IA059

Occurrence Date: 08/23/1999

Occurrence Type: Incident

Narrative (Continued)

A Safety Board metallurgist examined the damaged right main landing gear components, and then the corresponding left main landing gear components for comparison. According to his report:

"The threads on the upper end of the clevis and the corresponding threads on the clevis assembly nut were damaged and apparently stripped over each other, allowing the clevis to separate from the remainder of the side strut lower segment."

The report further described severe corrosion damage to the threads of the clevis and the nut, and that corrosion deposits covered any undamaged fracture features. Partially hardened grease was caked around the upper side of the clevis assembly nut.

Disassembly and examination of the left main landing gear strut revealed fresh grease collected around the undamaged threads of the clevis and the clevis assembly nut. However, the clevis was loose inside the retainer nut assembly.


Inventory of the assembly's parts revealed that a spacer depicted in SB 727-32-0338 Option 3, was not installed in the left main landing gear side strut assembly.


In a telephone interview, an engineer with the Boeing Aircraft Company said that while side-strut assembly failures have occurred in the past, none have resulted in either a gear collapse or an accident. He added that, as of July 2000, a re-design of the clevis joint was in development. The Boeing engineer discussed the specifics of preliminary design work with a Safety Board engineer, who then forwarded a summary of Boeing's proposed changes that included the following:

1. Recommend that the [clevis] nut be installed with Mastinox BMS 327 (a corrosion preventative).
2. Add plug at the end of the clevis that would prevent moisture [from getting] inside and under the threads that results in corrosion.
3. Modification to allow an easier grease path for moving parts.

According to USAirways Shuttle maintenance personnel, the normal interval for lubrication of the main landing gear was every 500 hours or 500 cycles.

The flight data recorder (FDR) was removed from the airplane and examined at the Safety Board FDR Laboratory in Washington, DC, on August 24, 1999. Data from the last takeoff from LGA and the landing at DCA revealed only nominal vertical and lateral loads on the airplane.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: IAD99IA059				
		Occurrence Date: 08/23/1999				
		Occurrence Type: Incident				
Landing Facility/Approach Information						
Airport Name		Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
RON REAGAN NATIONAL ARPT		DCA	16 Ft. MSL	18		
Runway Surface Type: Asphalt						
Runway Surface Condition: Dry						
Type Instrument Approach: NONE						
VFR Approach/Landing: Traffic Pattern						
Aircraft Information						
Aircraft Manufacturer		Model/Series		Serial Number		
Boeing		727-200		20774		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 171	Certified Max Gross Wt. 175500 LBS		Number of Engines: 3	
Engine Type:		Engine Manufacturer:		Model/Series:	Rated Power:	
Turbo Jet		P&W		JT8D-7B	14000 LBS	
- Aircraft Inspection Information						
Type of Last Inspection		Date of Last Inspection	Time Since Last Inspection		Airframe Total Time	
AAIP		08/1999	14 Hours		46587 Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? Yes		ELT Operated? No		ELT Aided in Locating Accident Site?		
Owner/Operator Information						
Registered Aircraft Owner		Street Address				
		P.O. BOX 710616 LAGUARDIA ARPT				
SHUTTLE INC		City		State	Zip Code	
		FLUSHING		NY	11371	
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: US AIRWAYS				Operator Designator Code:		
- 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: IAD99IA059
	Occurrence Date: 08/23/1999
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth	Age 53
-----------------	-----------------	------------------	---------------	-----------

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

Certificate(s): Airline Transport

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--w/ waivers/lim.	Date of Last Medical Exam: 03/1999
------------------------	--	------------------------------------

- 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	16000	6000								
Pilot In Command(PIC)		114								
Instructor										
Last 90 Days	114									
Last 30 Days	62									
Last 24 Hours	4									

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

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point NEW YORK	State NY	Airport Identifier LGA	Departure Time 1800	Time Zone EDT
-----------------------------	-------------	---------------------------	------------------------	------------------

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


Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing:
National Weather Service

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: IAD99IA059
	Occurrence Date: 08/23/1999
	Occurrence Type: Incident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
DCA	1851	EDT	16 Ft. MSL	0 NM	0 Deg. Mag.

Sky/Lowest Cloud Condition: Scattered 5000 Ft. AGL Condition of Light: Day

Lowest Ceiling: Overcast 20000 Ft. AGL Visibility: 10 SM Altimeter: 30.00 "Hg

Temperature: 27 °C Dew Point: 19 °C Wind Direction: 140 Density Altitude: 0 Ft.

Wind Speed: 12 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				1	1
Cabin Attendants				5	5
Other Crew					
Passengers				163	163
- TOTAL ABOARD -				171	171
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	171	171

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: IAD99IA059

Occurrence Date: 08/23/1999

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

BRIAN C. RAYNER

Additional Persons Participating in This Accident/Incident Investigation:

RUSSEL J JONES
FAA FSDO #19
PITTSBURGH, PA

CHARLES MARLER
USAIRWAYS
FLUSHING, NY 11371