
Reduced roll capability, Boeing 747-422, April 1, 2003

Micro-summary: This Boeing 747-422 experienced a flight control system failure in the form of a reduced roll capacity.


Event Date: 2003-04-01 at 1115 CST

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

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

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		NTSB ID: CHI03IA097		Aircraft Registration Number: N175UA	
		Occurrence Date: 04/01/2003		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Chicago		State IL	Zip Code 60666	Local Time 1115	Time Zone CST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility: 175		Direction From Airport: 315	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 747-422		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On April 1, 2003, at 1115 central standard time, a Boeing 747-422, N175UA, operated by United Airlines as flight 896, reported lateral control problems while enroute from Hong Kong International Airport (HKG) to Chicago O'Hare International Airport (ORD), Chicago, Illinois. An emergency was declared approximately 175 miles northwest of ORD. The flight landed at ORD without incident at 1146. No injuries were reported by the 20 crew members and 299 passengers. Visual meteorological conditions prevailed at the time of the incident. Flight 896 was conducted on an instrument flight rules (IFR) flight plan under 14 CFR Part 121.</p> <p>According to the flight crew statements, when the aircraft was approximately 5 hours from its intended destination, the cabin crew notified the flight deck there was evidence of a water leak on the floor adjacent to the utility elevator. The source of the leak was not readily apparent.</p> <p>Approximately 3 hours later, 2 hours prior to landing, the cabin crew informed the flight deck that the leak had worsened and water was now dripping from the overhead bins on the main cabin level. Maintenance control was contacted and advised the crew of the location of the shutoff valve. It was located and closed. The leak subsided at that time according to the cabin crew.</p> <p>Approximately 1100 the flight was cleared direct to Janesville, Wisconsin (JVL). The flight was reportedly located approximately 40 miles northwest of Minneapolis, Minnesota, at the time. This command was entered in the Flight Management Computer (FMC). However, instead of a shallow right turn to proceed direct to JVL as expected, the aircraft began a shallow left turn.</p> <p>Initial attempts to disconnect the autopilot were not successful and the autopilot was manually overridden. The autopilot and flight director were recycled. The autopilot was again engaged and the aircraft again started a shallow left turn. The autopilot was once again manually overridden.</p> <p>The relief first officer at the controls stated: "I made a right input in the controls to counter act the left turn. At this time the flight controls felt unusual to me so I reported to the crew that we might have a flight control problem. I attempted a shallow turn to the left but the aircraft controls felt stiff."</p> <p>At this point the captain and flying first officer took control of the aircraft. The captain reported: "Elevator and rudder were normal, but bank angle was limited to approximately 3-5 degrees left and about 7 degrees right."</p> <p>The captain went on to state that they decided to declare an emergency and since the aircraft was positioned near the extended centerline for ORD runway 14R, they decided to land on 14R. The captain noted: "We were in a position that would allow us to intercept 14R with only a 20-30 degree right turn and that we would be able to fly a long final with minimum maneuvering." The landing was accomplished smoothly and safely according to the captain, and the aircraft was taxied to the</p>					
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gate without incident.

After landing, the captain reportedly performed a control check and noted the controls felt normal. Ramp personnel reported a significant amount of water draining from the fuselage and the drain masts at the gate.

A post-incident examination of the aircraft was conducted. The main deck carpeting between doors 2 and 3 was saturated. The cart lift shaft had water along the base on the main deck. The canted pressure deck drainage system was inspected in accordance with Boeing Service Bulletin 747-51A2057. The overboard drains were not obstructed.

A 6-inch long by 0.125-inch wide gap was located along the outboard edge of the canted pressure bulkhead on the right side of the aircraft. The seam was not sealed as required. Immediately aft of the canted pressure bulkhead were aileron and flight spoiler control cables.

Four (4) circuit breakers common to the external drain line heaters were found open. The external drain lines route wastewater from the cabin overboard. According to United, the breakers were pulled in conjunction with routine cleaning of the drain lines in HKG prior to departure. This was normally accomplished every 500 flight hours, according to the airline.

United engineering and maintenance personnel performed further post-incident testing. The potable water tanks were filled and the system was checked. No leaks were found. The external drain masts were plugged and the system was observed. Water subsequently backed up through the upper deck galley refrigeration air chiller unit and flowed into the main cabin through the ceiling panels on the right side of the aircraft. The water subsequently drained into the canted pressure bulkhead below the main cabin floor, immediately forward of the aft wing spar.

Ground functional testing of the aileron controls, the aileron trim and the autopilot did not find any anomalies. A 3-hour flight test was completed to verify in-flight operation of the flight controls and potable water system. No anomalies were noted.

The United Airlines Instruction Sheet and the Boeing Maintenance Manual procedures related to the routine inspection and cleaning of the external drains were reviewed. Both specified resetting of the drain heater circuit breakers as the last item in each procedure.

Boeing Service Bulletin 747-51A2057, issued February 21, 2002, recommended testing, cleaning and inspection of the canted pressure deck drainage system (overboard drains) within 18 months of the date of the bulletin and every 18 months thereafter. A general visual inspection of the deck structure was recommended within, and thereafter, every 36 months and a pressurization test of the canted pressure deck within, and thereafter, every 72 months. Service Bulletin instructions included a visual inspection for loose, missing or cracked sealant with the 36-month requirements.

According to company engineering personnel, United was in the process of incorporating the service bulletin into its maintenance program. As a result, the initial service bulletin procedures had not been completed prior to the incident.

At the time of the incident, Federal Aviation Administration (FAA) Airworthiness Directive (AD) 89-12-07 (Amendment 39-6232) was in effect. This AD required cleaning of "the cavity aft of the wing center section" and verification that all overboard drains were open and clean. According to the airline, the AD was complied with during the most recent C-check maintenance inspection on December 18, 2002. In addition, a review of the airline maintenance job instruction cards for this task revealed that no discrepancies were noted at the time by maintenance personnel.

On May 29, 2003 the FAA issued AD 2003-11-01 (amendment 39-13160), with an effective date of July 3, 2003, which mandated full compliance with the Boeing Service Bulletin. This new AD also

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included the cleaning and verification requirements of AD 89-12-07.

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		Occurrence Date: 04/01/2003			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Chicago O'Hare Intl	ORD	668 Ft. MSL	14R	13000	200
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: ILS-complete; Visual					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Boeing		747-422		24382	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 370	Certified Max Gross Wt.	875000 LBS	Number of Engines: 4	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Jet	Pratt & Whitney	PW4056	56000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	12/2002	1036 Hours	50293 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
		Rodney Square North -- 11th & Market St			
Wilmington Trust Company		City	State	Zip Code	
		Wilmington	DE	19890	
Operator of Aircraft		Street Address			
		1200 Algonquin Road			
United Airlines Inc		City	State	Zip Code	
		Arlington Heights	IL	60005	
Operator Does Business As: United Airlines			Operator Designator Code: UALA		
- 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; International; Passenger Only					
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	Occurrence Date: 04/01/2003
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 55
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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: Helicopter

Instrument Rating(s): Airplane; Helicopter

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 10/2002
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 01/2003
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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	7747	848								
Pilot In Command(PIC)	7747	848								
Instructor										
Last 90 Days	140	140								
Last 30 Days	45	45								
Last 24 Hours	12	12								

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	State	Airport Identifier	Departure Time	Time Zone
Hong Kong		HKG	0440	UTC
Destination	State	Airport Identifier		
Chicago		ORD		


Type of Clearance: IFR

Type of Airspace: Class A

Weather Information

Source of Briefing:
Company


Method of Briefing: Telephone

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Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
ORD	1156	CST	668 Ft. MSL	175 NM	135 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			15000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		25000 Ft. AGL		Visibility: 10 SM	Altimeter: 29.69 "Hg
Temperature: 21 °C	Dew Point: 6 °C	Wind Direction: 240		Density Altitude: Ft.	
Wind Speed: 10	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation:			
Restrictions to Visibility: None					
Type of Precipitation: None					

Accident Information		
Aircraft Damage: None	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				3	3
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				16	16
Other Crew					
Passengers				299	299
- TOTAL ABOARD -				319	319
Other Ground					
- GRAND TOTAL -				319	319

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	Occurrence Date: 04/01/2003
	Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)
Tim Sorensen

Additional Persons Participating in This Accident/Incident Investigation:

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