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## In-flight fire, Boeing 757-222, January 11, 2003

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**Micro-summary:** This Boeing 757-222 experienced a lavatory fire in cruise.

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**Event Date:** 2003-01-11 at 0045 MST


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

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

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		NTSB ID: DEN03IA033		Aircraft Registration Number: N551UA	
		Occurrence Date: 01/11/2003		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
<b>Location/Time</b>					
Nearest City/Place Salt Lake City		State UT	Zip Code 84116	Local Time 0045	Time Zone MST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
<b>Aircraft Information Summary</b>					
Aircraft Manufacturer Boeing		Model/Series 757-222		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
<b>Narrative</b>					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
<p>On January 11, 2002, at 0045 mountain standard time, a Boeing 757-222, N551UA, operating as United Airlines flight 23, sustained minor damage when, during cruise flight, a fire occurred in the aft lavatory. The fire was extinguished, an emergency declared, and an uneventful landing was made at the Salt Lake City International Airport (SLC), Salt Lake City, Utah. Night visual meteorological conditions prevailed during the time of the incident. The scheduled domestic passenger flight was being operated on an instrument flight rules plan under the provisions of Title 14 CFR Part 121. The captain, first officer, 5 flight attendants, and 133 passengers reported no injuries. The flight originated at San Francisco, California, at 2228, and was en route to Boston, Massachusetts.</p>					
<p>The company flight crew reported that flight 23 was at a cruise altitude of 37,000 feet mean sea level and approximately 95 nautical miles south of SLC, when a flight attendant called from the aft cabin and stated there was a fire in the left aft lavatory, and another flight attendant was fighting the active flames with a Halon extinguisher. The captain said he declared an emergency and requested priority handling for landing at SLC. The captain reported performing a category II approach and autoland at maximum landing weight.</p>					
<p>A flight attendant stated that a passenger on exiting the lavatory reported smelling smoke and that the side of the toilet was "bubbling." Another flight attendant entered the lavatory to inspect. On opening the door to the heater, the flight attendant stated that flames were "shooting up" around the base of the heater. The flight attendant was handed a Halon extinguisher. She immediately discharged its contents to the area extinguishing the flames. The flight attendants continued to monitor the lavatory until the airplane landed.</p>					
<p>An examination of the airplane revealed the lavatory toilet water level sensor was charred and melted. The inside aft wall of the toilet shroud, in the area over the sensor, was charred and melted. Vent tubes in the area were also charred and melted. The 5 ampere (amp) circuit breaker to the sensor was examined and found tripped. No other anomalies were found. The water level sensor, shroud, vent assembly, and circuit breaker were retained for further examination.</p>					
<p>The lavatory sensor was examined at Rosemount Aerospace, Burnsville, Minnesota, on March 6, 2002. The examination showed that most of the top cap of the unit was charred, melted, and consumed by fire. A portion of the outer wall of the lavatory sensor housing was also charred, melted and consumed by fire. The remainder of the cap was removed exposing the unit's silicon potting material. The potting material showed a crack spanning the diameter of the sensor located above the top edge of the internal circuit board. There was charring and melting of the potting material along the crack. X-rays of the sensor showed the top left corner of the circuit board melted. This included solder attachments for four wires, two of which were a 115-volt AC input wire and 28-volt DC ground wire. The x-ray examination of the unit also showed portions of the wires melted and consumed.</p>					
FACTUAL REPORT - AVIATION					

National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: DEN03IA033

Occurrence Date: 01/11/2003

Occurrence Type: Incident

## Narrative (Continued)

The circuit breaker was examined and tested at United Airlines, San Francisco, California, on March 6, 2002. The examination revealed the circuit breaker spring as "weak." The circuit breaker was tested at 6.9 amperes, 138 percent of its normal current load for 1 hour as per manufacturer's specifications. According to the specifications, the circuit breaker is required to trip within the 1 hour time period. After 1 hour, the circuit breaker had not tripped. The current was increased to 7.25 amps and maintained for 10 minutes. The circuit breaker still did not trip. The current was then increased to 7.5 amps and maintained for 4 minutes. The circuit breaker still did not trip. The current was increased to 7.7 amps. After 1 minute, the circuit breaker tripped. A new circuit breaker was then tested at 6.9 amps. It tripped within 2 minutes.


The lavatory sensor was examined a second time at Rosemount Aerospace, Burnsville, Minnesota, on April 22, 2003. During the examination, the sensor housing was opened and the silicon potting material was removed from around the circuit board. The top left corner of the circuit board was charred and consumed. The left side of the circuit relay, adjacent to the charred area, was melted and had melted solder on its exterior. The manufacturer determined that solder used on the circuit board was "probably 63/67 with a melting point of 361 degrees Fahrenheit (F). The left hexagon-shaped screw, one of the two screws that mount the relay to the circuit board, was melted.


The manufacturer stated that the screws were probably made from "304 stainless steel" and determined the melting point of the metal to be between 2,550 and 2,650 degrees F. The investigation team determined that for these temperatures to occur, one of the wires in the area of the left screw would have had to arc. Removal of additional silicon potting material showed that portions of three jumper wires were melted and consumed. The manufacturer stated that the Teflon sheathing that surrounded the wires had a melting temperature of 500 degrees F.

The lavatory sensor was manufactured on June 15, 2002. It was installed at Indianapolis, Indiana, during the airplane's heavy maintenance visit on October 28, 2002. The total airframe time at the heavy maintenance visit was 40,792 hours. The airplane was put back in service on November 17, 2002. The airplane was at 41,361 hours when the incident occurred.

An examination of a new lavatory sensor circuit board showed the 115-volt AC input wire and the 28-volt DC ground wire were soldered to the board next to each other, approximately 1/64th-inch apart.

Parties to the investigation were the Federal Aviation Administration, Salt Lake City, Utah, United Airlines, the Boeing Aircraft Company, and Rosemount Aerospace.

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: DEN03IA033				
		Occurrence Date: 01/11/2003				
		Occurrence Type: Incident				
<b>Landing Facility/Approach Information</b>						
Airport Name		Airport ID:	Airport Elevation Ft. MSL	Runway Used	Runway Length	Runway Width
Runway Surface Type: Unknown						
Runway Surface Condition: Unknown						
Type Instrument Approach: Unknown						
VFR Approach/Landing: Unknown						
<b>Aircraft Information</b>						
Aircraft Manufacturer Boeing		Model/Series 757-222		Serial Number 25339		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 190	Certified Max Gross Wt. 240000 LBS		Number of Engines: 2	
Engine Type: Turbo Fan		Engine Manufacturer: Pratt & Whitney		Model/Series: PW 2037	Rated Power: 37000 LBS	
- Aircraft Inspection Information						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 11/2002	Time Since Last Inspection 568 Hours		Airframe Total Time 41261 Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? No		ELT Operated? No		ELT Aided in Locating Accident Site? No		
<b>Owner/Operator Information</b>						
Registered Aircraft Owner Wilmington Trust Company Trust		Street Address Rodney Square NO ATTN C				
		City Wilmington		State DE	Zip Code 19890	
Operator of Aircraft United Airlines		Street Address P. O. Box 66100				
		City Chicago		State IL	Zip Code 60666	
Operator Does Business As: United Airlines, Inc.				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; Domestic; Passenger Only						

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: DEN031A033
	Occurrence Date: 01/11/2003
	Occurrence Type: Incident

**First Pilot Information**

Name On File	City On File	State On File	Date of Birth On File	Age 47
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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; Commercial

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? 06/2002
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Medical Cert.: Class 1	Medical Cert. Status: None	Date of Last Medical Exam: 07/2002
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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	6186	1876								
Pilot In Command(PIC)	4595	1876								
Instructor										
Last 90 Days	168	168		168						
Last 30 Days	48	48		48						
Last 24 Hours	9	9		9						

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 2228	Time Zone MST
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Destination Boston	State MA	Airport Identifier BOS	
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Type of Clearance: IFR

Type of Airspace: Class A

**Weather Information**

Source of Briefing: Company


Method of Briefing: In Person

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: DEN03IA033
	Occurrence Date: 01/11/2003
	Occurrence Type: Incident

<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
SLC	0056	MST	4227 Ft. MSL	95 NM	360 Deg. Mag.
Sky/Lowest Cloud Condition:				Ft. AGL	Condition of Light: Night/Dark
Lowest Ceiling: Broken		7500 Ft. AGL		Visibility: 0.25 SM	Altimeter: 30.11 "Hg
Temperature: 0 °C	Dew Point: 0 °C	Wind Direction:		Density Altitude: 3267 Ft.	
Wind Speed: Calm	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation:			
Restrictions to Visibility: Fog					
Type of Precipitation: None					

<b>Accident Information</b>		
Aircraft Damage: Minor	Aircraft Fire: In-flight	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				5	5
Other Crew					
Passengers				133	133
- TOTAL ABOARD -				140	140
Other Ground					
- GRAND TOTAL -				140	140

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: DEN03IA033	
	Occurrence Date: 01/11/2003	
	Occurrence Type: Incident	

Administrative Information

Investigator-In-Charge (IIC)  
David C. Bowling

Additional Persons Participating in This Accident/Incident Investigation:

Doug Hansen  
Air Safety Inspector  
Federal Aviation Administration  
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