
Windshield failure on a MD-11F at Seattle, May 31, 2002

Micro-summary: A windscreen was shattered due to a window heat malfunction on this MD-11

Event Date: 2002-05-31 at 755 PDT


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


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

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		NTSB ID: SEA02IA092		Aircraft Registration Number: N608FE	
		Occurrence Date: 05/31/2002		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place SEATAC		State WA	Zip Code 98188	Local Time 0755	Time Zone PDT
Airport Proximity: On Airport		Distance From Landing Facility: 1		Direction From Airport: 5	
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series MD-11F		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:					
HISTORY OF EVENT					
<p>On May 31, 2002, approximately 0755 Pacific daylight time, a McDonnell Douglas MD-11F, N608FE, registered to Wilmington Trust Company, operated by Federal Express Corp., and crewed by two airline transport rated pilots, incurred minor damage during a windshield fire while standing prior to pushback at the north cargo ramp of Seattle-Tacoma (SEATAC) International Airport, SeaTac, Washington. Both pilots were uninjured. Visual meteorological conditions existed and an IFR flight plan had been filed for the impending flight. The intended flight, which was a regularly scheduled, domestic cargo flight, was to be operated under 14 CFR 121, and the aircraft was destined for Oakland, California, following its planned departure from Seattle. The aircraft had arrived from Memphis, Tennessee, earlier in the day.</p>					
<p>The crew reported that prior to pushback, maintenance personnel were engaged in the repair of a small (1 x 3 inch) hole on the underside of the left horizontal stabilizer. The Captain reported that following his preflight he executed the standard cockpit "flow" checks during which he determined that the windshield Anti-Ice was OFF and the windshield De-Fog was ON. Although the engines were not running the aircraft was powered up electrically. During this time the flight crew observed the co-pilot's forward windshield panel (R1) crack and observed what they described as flames emanating from the lower portion of the windshield. The captain perceived that the flames were on the exterior of the windshield and the first officer opened his right window (R2) and used a hand held halon fire extinguisher to attempt to extinguish the fire. The captain radioed SEATAC ground control advising them of the fire condition. The aircraft was then de-powered and the fire went out.</p>					
<p>The R1 windshield panel was removed and replaced along with its associated anti-ice controller. The windshield was examined by the investigator in charge and then shipped to the manufacturer for further examination (refer to photographs 1 and 2). The anti-ice controller was also examined and then shipped to the Federal Express avionics department and then to the manufacturer for additional examination.</p>					
AIRCRAFT INFORMATION					
<p>The R1 windshield panel was reported to have been manufactured on July 28, 1998. The R1 windshield heat controller (part number: SYLZ-51737, serial number: 64F) was manufactured in November of 1991. Its total time since new was reported as 22,756 hours and the unit had undergone 5,306 cycles (refer to Attachment SA-I).</p>					
TESTS AND RESEARCH					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA02IA092
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Narrative (Continued)

The R1 (copilot's forward) windshield panel, serial number 98287H0515 was removed and shipped to the manufacturer (PPG Industries, Inc.) for a more detailed examination and evaluation. A visual examination revealed several delamination islands (voids) along the upper edge of the windshield. The delaminations were irregular in shape and lacked any coloration and, they occurred at the interface of the outer ply inner surface (anti-ice heating film layer).

The fracture was observed to originate at the lower edge of the windshield just forward of the aft right - lower corner and was characteristic of a thermally related fracture. There was no evidence of moisture ingress or other discrepancies in the vicinity of the fracture origin. Additionally, there was no evidence of fire (refer to Attachment PPG-I).

The windshield heat controller was shipped to the facilities of Smiths Aerospace for testing and examination. The controller was examined and tested on July 30, 2002. The unit failed the initial bench test and when an overheat condition was simulated it was found that the unit did not automatically trip off line. The unit was evaluated and found to have numerous failed components (refer to Attachment SA-I).

In a telephone conversation between the Investigator in Charge and the Smiths Aerospace representative present at the windshield heat controller unit testing the following information was provided:

1. When electrical power was initially applied to the controller in the "OFF" mode it was observed that the controller commanded the windshield anti-ice system to begin heating (uncontrolled outflow of 336 volts).


2. The circuitry within the controller had failed thus preventing the auto-heat control system from functioning and regulating the heating to the anti-ice panel.


3. The unregulated output commanded the anti-ice panel to increase in temperature ultimately to failure of the panel.

4. A short within the controller prevented the system from being de-powered as long as power was available to the aircraft systems (contacts C2 and C3 shorted, Q1 shorted and Q2 open), and

5. When aircraft power was removed (crew shutdown of external/APU power) power was then terminated to the windshield controller, which could no longer command full heat to the windshield.

6. The manufacturer reported that they had never seen this combination of failures within the heat controller during its previous history.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: SEA02IA092				
		Occurrence Date: 05/31/2002				
		Occurrence Type: Incident				
Landing Facility/Approach Information						
Airport Name Seattle-Tacoma International		Airport ID: SEA	Airport Elevation 429 Ft. MSL	Runway Used	Runway Length	Runway Width
Runway Surface Type: Unknown						
Runway Surface Condition: Unknown						
Type Instrument Approach: Unknown						
VFR Approach/Landing: Unknown						
Aircraft Information						
Aircraft Manufacturer McDonnell Douglas		Model/Series MD-11F		Serial Number 48491		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 3	Certified Max Gross Wt. 630500 LBS	Number of Engines: 3		
Engine Type: Turbo Fan		Engine Manufacturer: General Electric	Model/Series: CF6-80	Rated Power: 47600 LBS		
- Aircraft Inspection Information						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 04/2002	Time Since Last Inspection Hours	Airframe Total Time 33131 Hours		
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? No		ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information						
Registered Aircraft Owner Wilmington Trust Company		Street Address 1100 N. Market St., Rodney Square N.				
		City Wilmington	State DE	Zip Code 19890		
Operator of Aircraft Federal Express Corp.		Street Address 2005 Corporate Avenue, 3rd Floor				
		City Memphis	State TN	Zip Code 38132		
Operator Does Business As:			Operator Designator Code: FDEA			
- 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; Cargo						
FACTUAL REPORT - AVIATION						

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA02IA092
	Occurrence Date: 05/31/2002
	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 Instructor; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Multi-engine

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: 04/2002
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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	26050									
Pilot In Command(PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

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

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier SEA	Departure Time	Time Zone PDT
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Destination Oakland	State CA	Airport Identifier OAK	
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Type of Clearance: Unknown

Type of Airspace: Class A

Weather Information

Source of Briefing: Unknown

Method of Briefing: Unknown

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
SEA	0756	PDT	429 Ft. MSL	1 NM	160 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			1200 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		20000 Ft. AGL		Visibility: 10 SM	Altimeter: 30.16 "Hg
Temperature: 12 °C	Dew Point: 8 °C	Wind Direction: 360		Density Altitude: Ft.	
Wind Speed: 5	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: Minor	Aircraft Fire: Ground	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					
Other Crew					
Passengers					
- TOTAL ABOARD -				2	2
Other Ground					
- GRAND TOTAL -				2	2

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: SEA02IA092

Occurrence Date: 05/31/2002

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

Steven A. McCreary

Additional Persons Participating in This Accident/Incident Investigation:

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Aviation Safety Inspector
FAA Seattle Flight Standards District Office
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