
Electrical fire during cruise, Douglas DC-9-15, February 20, 1997

Micro-summary: This Douglas DC-9-15 experienced an electrical fire during cruise flight.


Event Date: 1997-02-20 at 0645 CST

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

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

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		NTSB ID: CHI97IA072		Aircraft Registration Number: N93S	
		Occurrence Date: 02/20/1997		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place DES MOINES		State IA	Zip Code 50301	Local Time 0645	Time Zone CST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series DC-9-15		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 February 20, 1997, at 0645 central standard time, a McDonnell Douglas DC-9-15, N93S, operated as Northwest Airlines Flight 219, from Minneapolis, Minnesota, to Kansas City, Missouri, experienced an electrical fire during cruise. None of the four crewmembers nor the 32 passengers were injured. The airplane sustained minor damage. The 14 CFR Part 121 flight diverted to the Des Moines International Airport, Des Moines, Iowa, without further incident. The flight had departed from Minneapolis, Minnesota, at 0556. Visual meteorological conditions prevailed and an IFR flight plan was filed.</p> <p>The pilot reported that takeoff and climb were "normal." The flight crew leveled the airplane at flight level 310. They noted the "instrument lights flicker twice followed by a loud pop. The first officer noticed flames coming from the jumpseat area just above the locking device. Smoke and fumes filled the cockpit." The crew donned their oxygen masks and turned off both generators and the battery switch. "The flames went out and the smoke did not get any worse." They flew with a flashlight for one minute and then turned the emergency power switch on. A flight attendant reported that the smoke was limited to the cockpit and first class galley with only minor smoke in the main cabin. The flight crew declared an emergency and diverted to Des Moines. The smoke cleared during the descent. The flight crew flew an ILS approach with ASR backup. Fire and rescue crews met the airplane at the runway and escorted it to the gate. Passengers deplaned via the jetway.</p> <p>Examination of the airplane revealed soot tracks from the aft, interior side of the left main equipment rack near the left forward cabin door. The interior of the rack was soot covered. The cross tie relay, four other relays installed in the equipment bay below the cross tie relay, and associated wire bundles were charred. The most severe, black soot patterns were located near the cross tie relay. Visual examination of all charred and soot covered wire bundles revealed no evidence of chaffing, heat concentration, or prefire insulation failures. The cross tie relay, fuse links, generator controllers, and four charred relays were retained for subsequent examination and the airplane was released to Northwest Airlines.</p> <p>Retained components were examined on February 26, 1997 at the Northwest Airlines maintenance facilities, Minneapolis, Minnesota. Both generator controls functioned normally during a standard bench test. Examination of the other four relays revealed superficial exterior charring. The fuse links on the cross tie relay were charred and melted. The left A phase and the right C phase links measured continuity with an ohm meter. The other four links were melted and open.</p> <p>The cross tie relay, part number 914F567-4 exhibited severe charring and burning around the arc box assembly. Both coils measured open with an ohm meter. The arc box contained charred debris and a silver track was melted between all three phases on the right side of the relay contactor. The inter-phase barriers were fragmented. The viton seals were installed. The relay was latched in the closed position.</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

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Narrative (Continued)


Northwest Airlines' records indicated the relay had 35,160 hours total time and 7,775 hours since overhaul. Northwest Airlines' allowable time between overhaul (TBO) is 14,000 hours for the relay installed in a vertical or horizontal orientation, based on an OPSPEC Reconciliation from December 2, 1981 after a merger.


Westinghouse service bulletin 75-703 revised June 1977 suggests a 14,000 hour TBO for the relay when it is mounted in a vertical orientation as a generator, auxiliary power, or external power relay and a 7,000 hour TBO when it is mounted in a horizontal orientation as a cross tie relay. The service bulletin states "the cross tie relays must be cleaned and overhauled at 7,000 hours maximum." In addition, the service bulletin specifies the addition of viton seals on the inter-phase barriers "for the purpose of preventing migration of the metallic dust through the barriers, thereby establishing a low dielectric path between the phases."

McDonnell Douglas All Operator Letter AOL 9-1120B specifies a recommended TBO of 7,000 hours for relay. The letter does not specify vertical or horizontal orientation.

Examination of the relay overhaul/component maintenance manual revealed no specification for inspection of the arc box during overhaul.

Parties to the investigation were the Federal Aviation Administration, Northwest Airlines, Air Line Pilots Association, Douglas Aircraft Company, and Sundstrand Aerospace.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: CHI97IA072			
		Occurrence Date: 02/20/1997			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used 0	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Type Instrument Approach:					
VFR Approach/Landing: Precautionary Landing					
Aircraft Information					
Aircraft Manufacturer McDonnell Douglas		Model/Series DC-9-15		Serial Number 47078	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 83	Certified Max Gross Wt.	90700 LBS	Number of Engines: 2	
Engine Type: Turbo Jet	Engine Manufacturer: P&W	Model/Series: JT8D-7B	Rated Power: 14000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time 5454 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner NORTHWEST AIRLINES		Street Address 5101 NORTHWEST DRIVE			
		City ST. PAUL	State MN	Zip Code 55111	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: NWAA		
- 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: CHI97IA072
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	Occurrence Type: Incident

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

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Instrument Airplane

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: 09/1996
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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	4749	1760								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	124	124								
Last 30 Days										
Last 24 Hours	11	11								

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 MINNEAPOLIS	State MN	Airport Identifier MSP	Departure Time 0600	Time Zone CDT
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Destination KANSAS CITY	State MN	Airport Identifier MCI	
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Type of Clearance: IFR

Type of Airspace: Class A

Weather Information

Source of Briefing:

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
DSM	0654	CDT	957 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			0 Ft. AGL	Condition of Light: Dawn	
Lowest Ceiling: Overcast		1100 Ft. AGL		Visibility: 7 SM	Altimeter: 29.00 "Hg
Temperature: -16 °C	Dew Point: -18 °C	Wind Direction: 140		Density Altitude: Ft.	
Wind Speed: 7	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility:					
Type of Precipitation:					

Accident Information		
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				2	2
Other Crew					
Passengers				32	32
- TOTAL ABOARD -				36	36
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	36	36

National Transportation Safety Board

FACTUAL REPORT

AVIATION



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Occurrence Date: 02/20/1997

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

WESLEY M. ROBBINS

Additional Persons Participating in This Accident/Incident Investigation:

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