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## Flight control difficulties, McDonnell Douglas MD-11-C, I-DUPA, January 14, 2003

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**Micro-summary:** This MD-11 allegedly landed with no lateral (roll) control.

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**Event Date:** 2003-01-14 at 1407 EST

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


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

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  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!***
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		NTSB ID: NYC03IA042		Aircraft Registration Number: I-DUPA	
		Occurrence Date: 01/14/2003		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Jamaica		State NY	Zip Code 11430	Local Time 1407	Time Zone EST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series MD-11-C		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 FLIGHT					
<p>On January 14, 2003, at 1407 eastern standard time, a McDonnell Douglas MD-11-C, Italian registration I-DUPA, operated by Alitalia Airlines as flight 604, was reported to have landed with no lateral roll control at John F. Kennedy International Airport (JFK), Jamaica, New York. There were no injuries to the 3 Italian certificated pilots, 8 flight attendants, or 131 passengers. Visual meteorological conditions prevailed. Flight 604 was conducted on an instrument flight rules (IFR) flight plan under 14 CFR Part 129.</p> <p>The flight departed from Milano, Italy at 0446. There were no reported problems with the departure or initial en route phases of the flight.</p> <p>According to a written statement from the captain, and a follow-up telephone interview, the flight was about 70 to 80 nautical miles east northeast of JFK, at FL 380 (38,000 feet), when he first noticed a problem. He had received a radar vector and attempted to use the auto-pilot to make the heading change. When the turn command was applied, the autopilot performed an uncommanded disconnect. The captain then elected to hand fly the airplane and observed that the control wheel would not move in the lateral or roll axis (ailerons) of the airplane. However, the control wheel was free to move in the longitudinal axis (elevator), and the rudder pedals were free to move about the yaw axis. The captain declared an emergency and requested a long approach to runway 31L at JFK.</p> <p>In preparation for landing, the flight crew extended the leading edge wing slats without incident. As the flap handle was positioned to extend trailing edge wing flaps, a warning light illuminated which indicated a difference between the selected flap position and the actual flap position. The flight crew elected to continue with a no-flap approach to runway 31L. The wind was aligned with the runway, and the pilot landed without further incident. After landing, the airplane taxied to the gate where the passengers deplaned through the jetway.</p> <p>The incident occurred during the hours of daylight at 40 degrees, 38 minutes, 23 seconds north latitude, and 73 degrees, 46 minutes, 44 seconds west longitude.</p>					
PERSONNEL INFORMATION					
The flight crew was certified in accordance with the Italian government.					
AIRCRAFT INFORMATION					
The airplane was a combi configuration, with passengers in the front, and cargo in the aft portion of the cabin.					

National Transportation Safety Board

## FACTUAL REPORT

AVIATION

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Occurrence Date: 01/14/2003

Occurrence Type: Incident

## Narrative (Continued)

## Potable Water System

The potable water system on the airplane consisted of 4-63 gallon tanks, with 2 mounted on each side of the airplane. The number-1 system was on the left side of the airplane and number-2 system was on the right side of the airplane. The water tanks were tied together by a common manifold, and were pressurized to 40 psi with bleed air. The water tanks were located under the main cabin floorboards, adjacent to the L1 and R1 doors. The water was used at the flight attendant stations and lavatories.

The distribution plumbing for the potable water was routed below the passenger cabin floor along the length of the cabin. A water leak was traced to a failed hose in the vicinity of the 3R door. The failed hose was secured at its terminating end to the underside of the floorboard. Other water lines terminated similarly.

## Floorboards

The main cabin floor was covered by removable floorboards. Floorboards that had water lines attached to their underside were identified by a silver colored cover plate about 5 inches in diameter, taped over 4-inch access holes. Removal of the cover plate allowed maintenance personnel to check what was immediately below the floorboard, and to disconnect any water lines or other items that may be attached to the underside of the floorboards.

## Maintenance Manuals

Removal and installation of floorboards was covered in the MD-11 Aircraft Maintenance Manual (AMM), Section 53-21-04, Pages 401 through 407. The last revision was dated July 1, 2002. Although procedures for removal and installation of the floorboards was described, there was no information to alert maintenance personnel to look for the silver colored plates, and remove them to disconnect the underneath water lines prior to the removal of the floorboards.

## FLIGHT RECORDERS

The airplane was equipped with a quick access recorder (QAR), which was similar to a flight data recorder; however, it contained more information and was not crash protected. The information contained in the QAR was used in place of the flight data recorder. Examination of the data revealed that during the approach with the auto-pilot connected, aileron movement was visible on all four ailerons. The auto-pilot was disconnected at about 120 feet, and movement was observed on all ailerons through touchdown.

## AIRPLANE EXAMINATION

Post-flight examination of the airplane revealed ice had encased multiple control cables in the wheel well area, including both aileron and flap control cables.

Maintenance support was supplied to Alitalia Airlines by Delta Air Lines (DAL) maintenance personnel at JFK. According to interviews conducted with the DAL mechanics who initially observed the airplane on January 14, ice was observed in all three wheel wells. One mechanic thought the amounts were about equal in each wheel well, and the other mechanic thought there was more ice in the right wheel well. The center landing gear doors were frozen shut with ice. When opened, water was observed running from a control cable exit in the center landing gear well, overhead panel.

On January 15, 2003, two other DAL maintenance personnel worked on the airplane. Interviews disclosed that ice was still visible in all the wheel wells. In the right MLG wheel well, the aileron tension regulator was covered with ice. In the center wheel well, water was observed

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## Narrative (Continued)

coming through a control cable hole.

The DAL mechanics identified the source of the water leak, and prepared the floorboards for removal. When the floorboard overlaying the water leak was initially lifted, its upward movement was restrained by the rubber hose that was connected to the underside of the floorboard. Water could be seen misting from where the hose attached to the fitting. The robber hose was not disconnected from the floorboard, and the floorboard was then lifted higher. The rubber hose pulled loose from the fitting and water came out the line with sufficient force to extend for about 6 inches. The water system was then depressurized.

A Boeing Field Service Representative (FSR) reported in part:

"...When I got to the airplane, there were two Delta mechanics already on board the airplane working to find the source of the leak. Seats, carpet and several floor panels from the aisle had already been removed (aft of the RH lavatory at door 3) and the two mechanics were in the process of removing the fasteners to the floor panel just aft of the RH lav. There was a visible flow of water draining out from under the RH floor panel aft of the lav floor panel into the bays underneath the aisle and cable runs. There was also significant pools of water present in several of the bays along the aisle (underneath the cable runs)."

"There were two holes on top of the floor panel (one near the capped water line and the other near the vacuum line), but they were small holes and difficult to view the water line through. Prior to lifting the floor panel, the two mechanics looked underneath the floor panel for a source of the leak. They were confident from the visible water flow, that the leak was coming from somewhere underneath that floor panel."

"The line was not disconnected prior to lifting the floor panel."

"Once the floor panel was lifted, the capped potable water line became fully dislodged. One mechanic covered the end of the line with his hand while the other mechanic went to turn off the water on the airplane to stop the water flow...."

Further examination revealed that a potable water line, aft of the lavatory, adjacent to door 3R, had become disconnected and the bay beneath the disconnected line, and adjacent bays were filled with water. When examined, the number-1 potable water system was at 12 percent capacity, and the number-2 potable water system was empty. Alitalia's policy was to depart with both water systems full.

## TESTS AND RESEARCH

Alitalia Airlines forwarded the failed water line, along with other components to the Safety Board for examination. The parts were forwarded to the Long Beach Division of Boeing Commercial Airplanes for further examination.

According to the report from Boeing, the failed hose had been kinked in more than one place. Creases in the hose were consistent with lifting of the floor panel with the hose attached.

Their report stated further:

"...The cause of failure...was excessive load applied to the crimped join between the flexible hose and its end fitting. When lifting the floor panel to which one end of the hose was attached, the hose was pulled out of the socket sufficiently to cause a leak...."

The parts were released to Alitalia Airlines on May 5, 2004.

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Occurrence Type: Incident


## Narrative (Continued)

## ADDITIONAL INFORMATION

Boeing supplied the following description of the MD-11 autoflight/lateral control system interface:

"There are four ailerons on the MD-11, two on each wing. When the flaps, slats, and landing gear are retracted, a lockout mechanism keeps the outboard ailerons locked. When the wing flaps are extended to 15 degrees, or the slats are extended, or the landing gear is down and locked, the outboard ailerons are unlocked...The aileron system is designed so that if a control cable jam occurs on one side, it is possible to break away the other side, and still have aileron control on the non-jammed side. It was confirmed that the ice found in the right wheel well of I-DUPA was located in a position that prevented movement of the right side ailerons. The condition of the left aileron control cable system was not documented. At the time of the event, the MD-11 abnormal checklist did not include a section for jammed flight control. It was found that the break away force needed to split the aileron system was approximately 90 pounds on the control wheel."

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		Occurrence Date: 01/14/2003			
		Occurrence Type: Incident			
<b>Landing Facility/Approach Information</b>					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
John F, Kennedy, Intl	JFK	13 Ft. MSL	31L	14572	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach: ILS-complete					
VFR Approach/Landing: None					
<b>Aircraft Information</b>					
Aircraft Manufacturer		Model/Series		Serial Number	
McDonnell Douglas		MD-11-C		48426	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 220	Certified Max Gross Wt.	625000 LBS	Number of Engines: 3	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	General Electric	CF6-80C2D1F	60690 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
		Hours	Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
<b>Owner/Operator Information</b>					
Registered Aircraft Owner		Street Address			
Alitalia Linee Aeree Italiane SPA		Via A. E. Cammarota-Palazzina NPU			
		City	State	Zip Code	
		Fiumicino Aeroporto		00050	
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: Alitalia Airlines			Operator Designator Code: AAPF		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Foreign Operation					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 129: Foreign					
Type of Flight Operation Conducted: Scheduled; International; Passenger/Cargo					
FACTUAL REPORT - AVIATION					

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: NYC031A042
	Occurrence Date: 01/14/2003
	Occurrence Type: Incident

**First Pilot Information**

Name On File	City On File	State	Date of Birth On File	Age 44
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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): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 05/2002
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 09/2002
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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	9606	2148	510	9096						
Pilot In Command(PIC)	5236	2023								
Instructor										
Last 90 Days	106									
Last 30 Days	29									
Last 24 Hours										

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 Milano	State	Airport Identifier LIMC	Departure Time 0946	Time Zone UTC
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Destination Same as Accident/Incident Location	State	Airport Identifier JFK	
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Type of Clearance: IFR

Type of Airspace: Class B

**Weather Information**

Source of Briefing: Company

Method of Briefing: In Person

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**Weather Information**

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
JFK	1351	EST	13 Ft. MSL	NM	Deg. Mag.
Sky/Lowest Cloud Condition: Few			6500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None			Ft. AGL	Visibility: 10 SM	Altimeter: 30.08 "Hg
Temperature: -2 °C	Dew Point: -16 °C	Wind Direction: 300		Density Altitude: -2147 Ft.	
Wind Speed: 11	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
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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				2	2
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				8	8
Other Crew					
Passengers				131	131
- TOTAL ABOARD -				142	142
Other Ground					
- GRAND TOTAL -				142	142



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Administrative Information

Investigator-In-Charge (IIC)  
Robert L. Hancock

Additional Persons Participating in This Accident/Incident Investigation:

Tony F James  
Aviation Safety Inspector - AAI-100  
Federal Aviation Administration  
Washington, DC

William C Steelhammer  
Air Safety Investigator  
Boeing - Long Beach Division  
Long Beach, CA

Capt Andriano Zini  
Air Safety Investigator  
Agenzia Nazionale Per La Sicurezza Del Volo (ANSV)  
Rome, Italy,

Capt Fulvio DeMasi  
Alitalia Airlines  
Rome, Italy,