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## Foreign object ingestion and dual power loss, McDonnell Douglas DC-9-87, March 14, 1997

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**Micro-summary:** This McDonnell Douglas DC-9-87 experienced a partial loss of power on both engines due to ice ingestion.

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**Event Date:** 1997-03-14 at 0647 EST

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


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

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		NTSB ID: CHI97FA083		Aircraft Registration Number: N753RA	
		Occurrence Date: 03/14/1997		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place DETROIT		State MI	Zip Code 48111	Local Time 0647	Time Zone EST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series DC-9-87		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 March 14, 1997, at 0647 eastern standard time (est), a McDonnell Douglas DC-9-87, N753RA, operated as Reno Air flight 153 from Detroit, Michigan, to Reno, Nevada, experienced a partial loss of power on both engines during takeoff. The flight returned to Detroit and landed at 0658 est without further incident. Neither the 5 crewmembers nor the 106 passengers were injured. The 14 CFR Part 121 scheduled passenger flight was conducted in instrument meteorological conditions and an IFR flight plan was filed.</p>					
<p>The captain stated that he was aware that there had been an ice storm during the night prior to the accident. He reported that ice was visible on trees on the morning of the accident. He and the first officer discussed the likelihood of having the airplane de-iced prior to leaving for the airport. He reported that during the ride to the airport, he noticed that the streets were wet, not ice covered, and the precipitation was in the form of rain which was not freezing. He and the first officer once again discussed deicing the airplane and they agreed to "check the airplane very closely for ice."</p>					
<p>The first officer reported that upon arriving at the airplane he initiated his exterior preflight. He reported that during the preflight he noted a layer of frost on the bottom of the right wing. He also reported that he used a ladder to inspect the top of both wings using the "stick" and his hand. He did not find any ice. In addition, after entering the cockpit he went outside once again and inspected the right wing for ice, using the stick and his hand. Once again, he did not detect any ice. According to the captain, he went into the cabin area and looked out the windows at the wings as the first officer was outside. He said the wings were wet, but there was no ice. At 0600 est, the captain informed the ground crew that the airplane would not need to be deiced.</p>					
<p>The captain reported they were pushed back from the gate at 0635 est, were delayed, and began taxiing at 0637 est. At 0645 est the airplane taxied onto runway 03L for takeoff. The captain reported he held the brakes and ran the engines to 1.4 engine pressure ratio (EPR) which was about 70% N1. He reported all engine indications were normal so he stabilized the engines at 1.6 EPR. The captain then called for autothrottles ON and the power increased to 2.02 EPR. The first officer stated that the airspeed seemed to stagnate for "a second" at 100 knots during the takeoff roll. He said he called V1 a little slower than normal and the captain rotated slightly slower than normal.</p>					
<p>Both pilots reported the first indication of a problem occurred immediately after liftoff at an altitude of 50 to 100 feet above the ground (agl). The captain reported the "right engine popped" and the No.1 engine EPR gauge fluctuated. The first officer reported hearing a loud popping sound and the airplane shuddered.</p>					
<p>The pilots reported that they received clearance from the tower to land on any runway. The captain said he disengaged the autothrottles and pulled the left throttle back a half knob behind the right</p>					
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National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: CHI97FA083

Occurrence Date: 03/14/1997

Occurrence Type: Accident

## Narrative (Continued)

throttle because the left engine seemed more erratic. The captain then called for gear retraction.

The captain reported that at an altitude of about 200 agl the airspeed decreased to approximately V2 and the airplane had very little climb performance. They advanced the left throttle so it was even with the right and once the gear was retracted the rate of climb increased. The captain reported the EPRs were fluctuating above 2.02.

The crew reported they initially turned the airplane for a landing on runway 21L. The flaps remained extended 11 degrees and both engines were experiencing compressor stalls. The captain reported they climbed to an altitude of 3,400 feet mean sea level (msl). The crew completed the appropriate checklists and were cleared to descend to 3,000 feet msl. The first officer suggested they turn on the airfoil anti-ice system as the captain reduced the power to descend. The captain reported that when power on the engines was reduced through an EPR setting of 1.60 to 1.70 and the airspeed decreased to approximately 180 knots, the compressor stalls stopped. The crew elected to change runways to land on runway 3L due to weight conditions and runway length. The airplane landed without incident. Tests and Research


The airplane was equipped with Pratt & Whitney (P&W) JT8D-219 engines. Initial on scene examination of the engines showed that the fan blades on both engines were damaged. Both engines were removed and shipped to the American Airlines Maintenance & Engineering Center for teardown. The teardown began on April 8, 1997, under the direction of the NTSB. Inspection of the left engine, s/n 725674, revealed that 19 of the 34 compressor fan blades had soft body impact damage. In addition, five of the blades either had tip rub or leading edge nicks. Ten of the blades were not damaged. Inspection of the right engine, s/n 708177, revealed that 27 of the 34 compressor fan blades had soft body impact damage. In addition, two of the blades either had leading edge nicks and the remaining five blades were not damaged.


The eighth and ninth stage compressor blades from both engines received a fluorescent penetrant inspection. The left engine compressor blades did not show any indication of cracking. Seventeen eighth stage blades and one ninth stage blade on the right engine showed indications of cracks. These blades were examined further using a binocular microscope. This examination revealed that all of the blades had transverse cracks on the convex side of the airfoil either in or just above the blade root platform fillet radius. See attached Powerplants Group Chairman's Factual Report of Investigation for further details.

## Additional Information

The accident airplane departed Reno, Nevada, at 0035 est and arrived in Detroit at 0419 est on the morning of the accident. During this flight from Reno the crew logged instrument reading which indicated that at FL330 the static air temperature was -47 degree celsius and the ram air temperature was -22 degrees celsius. The airplane was on the ground in Detroit for approximately two hours prior to it being refueled. According to the refueling record the airplane landed with both the left and right wing tanks approximately full.

Parties participating in the investigation were the Federal Aviation Administration, Reno Air, United Technologies Pratt & Whitney, American Airlines, and Douglas Aircraft.

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: CHI97FA083				
		Occurrence Date: 03/14/1997				
		Occurrence Type: Accident				
<b>Landing Facility/Approach Information</b>						
Airport Name METRO-WAYNE COUNTY		Airport ID: DTW	Airport Elevation Ft. MSL	Runway Used 0	Runway Length	Runway Width
Runway Surface Type:						
Runway Surface Condition:						
Type Instrument Approach:						
VFR Approach/Landing: Forced Landing						
<b>Aircraft Information</b>						
Aircraft Manufacturer McDonnell Douglas		Model/Series DC-9-87		Serial Number 49587		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 174	Certified Max Gross Wt. 140000 LBS		Number of Engines: 2	
Engine Type: Turbo Fan		Engine Manufacturer: P&W		Model/Series: JT8D-219	Rated Power: 21700 LBS	
- Aircraft Inspection Information						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection	Time Since Last Inspection Hours		Airframe Total Time Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? Yes		ELT Operated? No		ELT Aided in Locating Accident Site?		
<b>Owner/Operator Information</b>						
Registered Aircraft Owner INVESTORS ASSET HOLDING CORP		Street Address 98 N. WASHINGTON ST.				
		City BOSTON		State MA	Zip Code 02114	
Operator of Aircraft RENO AIR		Street Address P. O. BOX 300559				
		City RENO		State NV	Zip Code 89520	
Operator Does Business As:				Operator Designator Code: ORJA		
- 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: CHI97FA083	
	Occurrence Date: 03/14/1997	
	Occurrence Type: Accident	

<b>First Pilot Information</b>				
Name On File	City On File	State On File	Date of Birth On File	Age 51

Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s):      Airline Transport; Commercial; Flight Engineer

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?      Current Biennial Flight Review?

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 11/1996
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
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Total Time	14000	9700								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	200	200								
Last 30 Days										
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	
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Departure Point Same as Accident/Incident Location	State	Airport Identifier	Departure Time 0645	Time Zone EST
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Destination RENO	State NV	Airport Identifier RNO	
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Type of Clearance: IFR

Type of Airspace: Class B

**Weather Information**

Source of Briefing:  
Company

Method of Briefing:

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: CHI97FA083
	Occurrence Date: 03/14/1997
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<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
DTW	0640	EST	640 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			600 Ft. AGL	Condition of Light: Dawn	
Lowest Ceiling: Overcast		4000 Ft. AGL		Visibility: 4 SM	Altimeter: 29.00 "Hg
Temperature: 1 °C	Dew Point: -1 °C	Wind Direction: 100		Density Altitude: Ft.	
Wind Speed: 13	Gusts:	Weather Conditions at Accident Site: Instrument Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility: None					
Type of Precipitation: None					

<b>Accident Information</b>		
Aircraft Damage: Substantial	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				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				3	3
Other Crew					
Passengers				106	106
- TOTAL ABOARD -				111	111
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	111	111

National Transportation Safety Board

**FACTUAL REPORT**

**AVIATION**



NTSB ID: CHI97FA083

Occurrence Date: 03/14/1997

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

WESLEY M. ROBBINS

Additional Persons Participating in This Accident/Incident Investigation:

RICHARD MERRILL  
FAA, 800 BECK ROAD  
BELLEVILLE, MI 48111

STEVEN LUND  
DOUGLAS AIRCRAFT

JEFFREY BUKIO  
RENO AIR, P.O. BOX 30059  
RENO, NV 89520

ALAN WEAVER  
P&W, 400 MAIN ST. M/S 162-24  
E. HARTFORD, CT 06108