



National Transportation Safety Board Aviation Accident Final Report

Location:	Chicago, IL	Accident Number:	CHI06FA158
Date & Time:	06/20/2006, 0630 CDT	Registration:	N961TW
Aircraft:	McDonnell Douglas DC-9-83	Aircraft Damage:	Substantial
Defining Event:		Injuries:	136 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

The airplane was damaged during landing with the nose landing gear in the up position. According to statements from the flight crew and communications transcripts, the flight crew attempted to lower the landing gear and did not receive a gear down indication for the nose landing gear. The flight crew requested and performed a low-approach at which time the air traffic control tower personnel confirmed that the nose landing gear was not extended. The flight crew executed a climb to 6,000 feet and contacted American Airlines maintenance in an attempt to troubleshoot the problem. After performing the steps in the appropriate emergency checklists, including an attempted manual extension of the nose landing gear, proved unsuccessful, the flight crew executed a landing on runway 14R with the main landing gear extended and the nose landing gear in the up position. Examination of the airplane revealed that the nose landing gear spray deflector center link had fractured and the right hand urethane deflector was displaced. The deflector was rotated aft and was not in the track within the wheel well that contains the deflector when in the retracted position. When attempting to lower the nose landing gear, the deflector was observed to impinge on the nose landing gear wheel well structure preventing the nose landing gear from extending. The nose landing gear spray deflector components were sent to the NTSB Materials Laboratory for examination. The center deflector assembly was fractured along three separate lines where the right side deflector is attached. The aft right side of the center deflector was fractured through the bolt holes and the vertical and horizontal plate members. Magnified optical examinations of the three fracture faces revealed rough, crystalline matte gray surfaces consistent with overstress separations in cast aluminum alloys at each location. No evidence of porosity, corrosion or preexisting cracking was noted on any of the fracture faces. The engineering drawing specified the center deflector, p/n 5952241, as cast aluminum alloy C355 per federal specification QQ-A-596, solution heat treated and aged to T61 temper. A Brinell hardness impression on a piece of the center deflector measured 101 HB, which was consistent with the specified alloy and heat treatment.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The jammed nose landing gear due to a failure of the nose landing gear spray deflector for undetermined reasons.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: APPROACH

Findings

1. (C) LANDING GEAR,NOSE GEAR - FAILURE
2. (C) LANDING GEAR,NOSE GEAR - JAMMED

Occurrence #2: WHEELS UP LANDING
Phase of Operation: EMERGENCY LANDING

Findings

3. TERRAIN CONDITION - RUNWAY

Factual Information

HISTORY OF FLIGHT

On June 20, 2006, about 0630 central daylight time, a McDonnell Douglas DC-9-83, N961TW, piloted by an airline transport pilot, sustained substantial damage during a nose-wheel up landing on runway 14R (13,000 feet by 200 feet, asphalt/concrete), at the O'Hare International Airport (ORD), Chicago, Illinois. The 14 CFR Part 121 domestic passenger flight was being operated by American Airlines as flight 1740. There were no injuries to the 131 passenger and 5 crewmembers. The flight originated from the Los Angeles International Airport (LAX), Los Angeles, California, about 2350 pacific daylight time.

According to statements from the flight crew and communications transcripts, the flight crew attempted to lower the landing gear and did not receive a gear down indication for the nose landing gear. The flight crew requested and performed a low-approach at which time the air traffic control tower personnel confirmed that the nose landing gear was not extended. The flight crew executed a climb to 6,000 feet and contacted American Airlines maintenance in an attempt to troubleshoot the problem. After performing the steps in the appropriate emergency checklists, including an attempted manual extension of the nose landing gear, proved unsuccessful, the flight crew executed a landing on runway 14R with the main landing gear extended and the nose landing gear in the up position.

PERSONNEL INFORMATION

The captain held an airline transport pilot certificate with a multi-engine airplane rating. The certificate listed a type rating for DC-9 airplanes. The certificate also listed commercial pilot privileges for single engine airplanes. The captain's most recent first class medical certificate was issued on April 12, 2006.

The first officer held an airline transport pilot certificate with single and multi-engine airplane ratings. The certificate listed a type rating for second in command privileges in DC-9 airplanes. The first officer's most recent second class medical certificate was issued on December 18, 2005.

AIRCRAFT INFORMATION

The airplane was a McDonnell Douglas DC-9-83 transport category airplane. Two Pratt and Whitney JT8D series engines producing 20,850 pounds of thrust each powered the airplane. The airplane was configured to seat 136 occupants including 131 passengers, 3 cabin crewmembers and 2 flight crewmembers. The airplane had a retractable tricycle landing gear configuration.

METEOROLOGICAL INFORMATION

The reported weather conditions at ORD at 0553 were: Winds variable at 4 knots; Visibility 10 statute miles; Scattered clouds at 25,000 feet; Temperature 18 degrees C.; Dew point 14 degrees C.; Altimeter setting 30.03 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane revealed that the nose landing gear spray deflector center link had fractured and the right hand urethane deflector was displaced. The deflector was rotated aft and was not in the track within the wheel well that contains the deflector when in the retracted

position. When attempting to lower the nose landing gear, the deflector was observed to impinge on the nose landing gear wheel well structure preventing the nose landing gear from extending.

TESTS AND RESEARCH

The nose landing gear spray deflector components were sent to the NTSB Materials Laboratory for examination. The center deflector assembly was fractured along three separate lines where the right side deflector is attached. The aft right side of the center deflector was fractured through the bolt holes and the vertical and horizontal plate members. Magnified optical examinations of the three fracture faces revealed rough, crystalline matte gray surfaces consistent with overstress separations in cast aluminum alloys at each location. No evidence of porosity, corrosion or preexisting cracking was noted on any of the fracture faces. The engineering drawing specified the center deflector, p/n 5952241, as cast aluminum alloy C355 per federal specification QQ-A-596, solution heat treated and aged to T61 temper. A Brinell hardness impression on a piece of the center deflector measured 101 HB, which was consistent with the specified alloy and heat treatment.

During the investigation it was discovered that another DC-9 type airplane had arrived at ORD with a broken spray deflector. This airplane's landing gear did extend and the airplane made an uneventful landing. The spray deflector from this airplane had fractures in the same general location as those of the accident airplane's deflector.

During the investigation, it was found that airline personnel have access to and use a type of towbarless tug on various aircraft. Tests by the airline confirmed that the tug can apply an upward force to the spray deflector of DC-9 type airplanes. No determination could be made as to whether either the accident airplane or the other DC-9 with the broken spray deflector had been moved using one of the towbarless tugs during the preceding several days.

ADDITIONAL INFORMATION

The Federal Aviation Administration, Boeing, American Airlines, and the Allied Pilots Association were parties to the investigation.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial; Flight Engineer	Age:	46, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1 With Waivers/Limitations	Last Medical Exam:	04/01/2006
Occupational Pilot:		Last Flight Review or Equivalent:	12/01/2005
Flight Time:	17000 hours (Total, all aircraft), 9000 hours (Total, this make and model), 9500 hours (Pilot In Command, all aircraft), 180 hours (Last 90 days, all aircraft), 55 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport; Flight Instructor	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	12/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	02/01/2006
Flight Time:	6573 hours (Total, all aircraft), 270 hours (Total, this make and model), 2622 hours (Pilot In Command, all aircraft), 161 hours (Last 90 days, all aircraft), 61 hours (Last 30 days, all aircraft), 10 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport; Flight Instructor; Flight Engineer	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1	Last Medical Exam:	12/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	12/01/2005
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	McDonnell Douglas	Registration:	N961TW
Model/Series:	DC-9-83	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	53611
Landing Gear Type:	Retractable - Tricycle	Seats:	136
Date/Type of Last Inspection:	11/01/2005, Continuous Airworthiness	Certified Max Gross Wt.:	161000 lbs
Time Since Last Inspection:		Engines:	2 Turbo Fan
Airframe Total Time:	20836 Hours	Engine Manufacturer:	Pratt & Whitney
ELT:	Not installed	Engine Model/Series:	JT8D-217A
Registered Owner:	American Airlines	Rated Power:	20850 lbs
Operator:	American Airlines	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	AALA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	ORD, 668 ft msl	Observation Time:	0553 CDT
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Scattered / 25000 ft agl	Temperature/Dew Point:	18° C / 14° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	4 knots, Variable	Visibility (RVR):	
Altimeter Setting:	30.03 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LOS ANGELES, CA (LAX)	Type of Flight Plan Filed:	IFR
Destination:	Chicago, IL (ORD)	Type of Clearance:	IFR
Departure Time:	2350 PDT	Type of Airspace:	

Airport Information

Airport:	CHICAGO O'HARE INTL (ORD)	Runway Surface Type:	Asphalt; Concrete
Airport Elevation:	668 ft	Runway Surface Condition:	Dry
Runway Used:	14R	IFR Approach:	Unknown
Runway Length/Width:	13000 ft / 200 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Substantial
Passenger Injuries:	131 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	136 None	Latitude, Longitude:	41.978611, -87.904722

Administrative Information

Investigator In Charge (IIC):	John M Brannen	Adopted Date:	11/29/2007
Additional Participating Persons:	Steve Gutter; FAA; Chicago, IL Richard Cunningham; American Airlines; Fort Worth, TX William Crawford; Allied Pilots Association; Fort Worth, TX Lance Kuhn; Boeing; Chicago, IL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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