National Transportation Safety Board
Aviation Incident Final Report

Location:	Wichita, KS	**Incident Number:**	CHI02IA151
Date & Time:	06/04/2002, 1238 CDT	**Registration:**	N823NK
Aircraft:	McDonnell Douglas MD-82	**Aircraft Damage:**	None
Defining Event:		**Injuries:**	111 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

The airplane experienced a roll back of engine power on both engines and subsequently stalled while in cruise flight at flight level 330. The airplane was operating on autopilot with the autothrottles engaged. The flight crew was able to restart the engines and a precautionary landing was made without further incident. Examination of the airplane and its systems revealed no anomalies that could be attributed to the loss of power. The weather conditions were consistent with the presence of ice crystals at the cruise altitude. The engine inlet probes became blocked due to the ice crystals resulting in a false engine pressure ratio (EPR) indication and subsequent retarding of the throttles by the autothrottle system. This is evidenced by the data from the digital flight data recorder (DFDR) which showed that the EPR indication increased while the airspeed decreased, the pitch attitude increased, the altitude remained the same, and the autothrottles had reached the EPR limit. The DFDR data showed that the power reduction, the corresponding reduction in airspeed, and the increase in pitch occurred over the course of about 5 minutes prior to the roll back of the engines. Over this time period, the airspeed dropped from 271.75 to 209.25 knots, and the pitch increased from 0.9 to 4.91 degrees. The DFDR data also shows that during the 24 seconds after the roll back of the engines, the airspeed continued to drop to as low as 187 knots. The only engine performance parameter recorded by the DFDR is EPR. Interviews of the pilots show that their first indication of a problem occurred just before the airplane stalled. The pilots also said in their interviews that engine anti-ice was not used prior to the loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The flightcrew's failure to verify the engine instrument indications and powerplant controls while on autopilot with the autothrottles engaged, and their failure to recognize the drop in airspeed which led to an aerodynamic stall associated with the reduction in engine power. Factors were the presence of ice crystals at altitude, and the icing of the engine inlet probes resulting in a false engine pressure ratio indication.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: CRUISE

Findings
1. (F) WEATHER CONDITION - OTHER
2. (F) MISCELLANEOUS,ENGINE - ICE
3. (C) AIRSPEED - NOT RECOGNIZED - FLIGHTCREW
4. (F) ENGINE INSTRUMENTS,EPR GAGE/SYSTEM - FALSE INDICATION
5. (C) ENGINE INSTRUMENT - NOT VERIFIED - FLIGHTCREW
6. (C) POWERPLANT CONTROLS - NOT VERIFIED - FLIGHTCREW
7. AUTOPILOT - USED - FLIGHTCREW

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
8. AIRSPEED - NOT MAINTAINED - FLIGHTCREW
9. STALL - ENCOUNTERED - FLIGHTCREW

Factual Information

HISTORY OF FLIGHT

On June 4, 2002, at 1238 central daylight time, a McDonnell Douglas MD-82, N823NK, operated as Spirit Airlines Flight 970, experienced a loss of power from both engines while in cruise flight at flight level (FL) 330. The power loss occurred about 20 nautical miles west of Wichita, Kansas. Power from both engines was restored and the airplane diverted to the Wichita Mid-Continent Airport, Wichita, Kansas, without further incident. The 14 CFR Part 121 scheduled passenger flight was operating on an instrument flight rules flight plan. No injuries to the 105 passengers or 6 crewmembers were reported. The flight originated from the Denver International Airport, Denver, Colorado at 1140 and was en route to the Ft. Lauderdale/Hollywood International Airport, Ft. Lauderdale, Florida.

In a telephone interview, the captain stated that the flight was uneventful until he and the first officer simultaneously noticed the low-pressure compressor speed (N1) and EPR indications were low on both engines. He said that they also noticed that the airspeed was deteriorating very rapidly. He stated that he took control of the airplane, disconnected the autopilot, and started an immediate descent. He said that the stick shaker activated briefly. The captain went on to describe the restart of the engines and subsequent descent and landing. He stated that a right engine restart was accomplished about 17,000 feet altitude, and the left engine started on its own a short time later. The captain stated that everything was normal prior to the incident and after the engines were restarted. He said that the autopilot was engaged and the autothrottles were on when the event happened. He stated that he did not recall seeing the throttle levers moving and if they did move, they did they moved very slowly. He said that ice protection was not used and the temperature never got close to plus 6 degrees. The complete summary of the interview is included in the public docket associated with this accident.

In a telephone interview, the first officer stated that one hour into the flight he felt a vibration that came on fast and got worse in a matter of seconds. He said that the captain took control of the airplane and disengaged the autopilot. He said that the stall horn sounded and the stick shaker activated and the captain pushed the nose of the airplane down. He said that both engines were rolled back. When asked about the vibration, the first officer stated that he was not sure if it was a stall, or a pre-stall buffet. He stated that engine anti-ice was off. The first officer reported that the airplane broke out on top of the clouds at 17,000 feet and was in the clear after that. He stated that there were a just a few scattered cirrus clouds. He stated that at the time the stall warning activated, both engines rolled back simultaneously while the throttles stayed in position at the normal cruise setting. He said that the captain pushed the throttles forward but there was no response from the engines. The complete summary of the interview is included in the public docket associated with this incident report.

PERSONNEL INFORMATION

The captain held an airline transport pilot certificate with single and multi-engine airplane ratings. He was type rated in the DC-9. His most recent first class medical certificate was issued on December 20, 2001, and listed the limitation that he wear corrective lenses. The captain reported that he had been employed by the airline since February 1998, and that he had been a captain since February 2000. The report submitted by the airline listed his total flight experience as 7,200 hours. The report listed 1,720 total hours and 1,400 hours as pilot in command in the same make and model as the incident airplane. The pilot reported that he had

received training at the Air Line Pilots Association (ALPA) safety schools, including accident investigation. He reported that at the time of the incident, he was the ALPA alternate for the Aviation Safety Actions Program (ASAP) review committee, and the local Air Safety Chairman for Spirit Airline's Fort Lauderdale, Florida base.

The first officer held an airline transport pilot certificate with single and multi-engine airplane ratings. His most recent first class medical certificate was issued on March 11, 2002. The report submitted by the airline listed his total flight experience as 8,900 hours with 376 hours in the same make and model as the incident airplane. The first officer had no logged pilot in command time in the incident aircraft make and model.

AIRCRAFT INFORMATION

The airplane was a McDonnell Douglas DC-9-82, serial number 48020. The airplane has a maximum gross weight of 149,500 pounds. Two Pratt and Whitney JT8D-219 turbofan engines powered the airplane. Each engine has a normal takeoff thrust rating of 21,000 pounds and a maximum takeoff thrust rating of 21,700 pounds. The left engine serial number was 696364, and the right engine serial number was 696426.

METEOROLOGICAL INFORMATION

A Meteorological Factual Report was prepared in conjunction with the incident investigation. Weather radar data indicates that about 7 minutes prior to the incident, the cloud tops were 30,000 feet at the incident location and 35,000 feet about 10 nautical miles west. The weather radar echo intensity at 33,000 feet altitude was 16 dBZ at the incident location about 8 minutes prior to the incident. The upper air data for Topeka, Kansas, about 99 nautical miles northeast of the incident, shows temperatures of -38.1 and -47.4 degrees Celsius at 31,339.0 and 35,006.6 feet altitude respectively at 0700. The temperatures were -36.5 and -45.7 degrees Celsius at 31,338.4 and 35,006.6 feet altitude respectively at 1900. The complete Meteorological Factual Report is included in the public docket associated with this report.

FLIGHT RECORDERS

The digital flight data recorder (DFDR) was removed from the airplane and the data read out at the National Transportation Safety Board's recorder laboratory in Washington, D.C. The data is recorded with reference to the DFDR subframe reference number (SRN), where each SRN equals 1 second of elapsed time. Examination of the data revealed that the incident flight originated about 1,800 SRN and landed about 5,892 SRN. The DFDR data indicates that the dual engine roll back event began about 48 minutes and 45 seconds into the flight at 4,725 SRN. Graphs of various recorded parameters were plotted. The complete DFDR report, including the parameter plots, is included in the public docket associated with this report.

The cockpit voice recorder (CVR) circuit breaker had not been pulled after the incident. As a consequence, the recording contained on the CVR did not cover the time of the incident and the CVR was not read out.

TESTS AND RESEARCH

The NTSB conducted an on-scene examination of the airplane and engines on June 5, 2002. A Powerplants Group was formed, and the complete Powerplants Group Factual Report is included in the public docket associated with this report. Among the items examined were the engines, fuel tank boost pumps, fuel heater and anti-ice valves. Examination of the right engine revealed several nicks dents and tears to the 7th stage compressor blades. No other

damage or anomalies were found that could be associated with the incident. A power assurance check of the left engine showed that it could attain take off power without exceeding any performance limits. A power assurance check of the right engine was not performed due to the damage noted to the 7th stage compressor blades. Fuel samples were taken from each of the airplane's fuel tanks, engines, and the fuel truck that serviced the airplane at the departure airport. All of the fuel samples were found to conform to the applicable specification.

Examination of the DFDR data revealed that the roll back of both engines occurred about SRN 4,725. The only engine performance parameter recorded is EPR. The DFDR data shows that the airplane was in level flight at FL330. At SRN 4,183, about 9 minutes and 2 seconds prior to the roll back, the left engine EPR indication was 1.74, the right engine EPR indication was 1.69, the airplane's airspeed was 269.25 knots, and the pitch attitude was 1.79 degrees. By SRN 4,199, 8 minutes and 46 seconds prior to the roll back, the left engine EPR had increased to 2.00, the right engine EPR had increased to 1.95, the airspeed had dropped to 260.5 knots, and the pitch attitude had increased to 2.24 degrees. By SRN 4,285, 7 minutes and 20 seconds prior to the roll back, the left engine EPR had decreased to 1.77, the right engine EPR had decreased to 1.72, the airspeed had increased to 273.5 knots, and the pitch attitude had decreased to 1.79 degrees. This occurred while the airplane remained at FL 330. DFDR data shows that the autothrottles reached the EPR limit during this period.

At SRN 4,416, about 5 minutes and 9 seconds prior to the roll back, the left engine EPR indication was 1.69, the right engine EPR indication was 1.63, the airplane's airspeed was 271.75 knots, and the pitch attitude was 0.9 degrees. By SRN 4,482, 4 minutes and 3 seconds prior to the roll back, the left engine EPR had increased to 2.03, the right engine EPR had increased to 1.91, the airspeed had dropped to 260.25 knots, and the pitch attitude had increased to 1.34 degrees. Over the next 4 minutes and 3 seconds, until SRN 4,725, the EPR indications fluctuated between 2.08 and 1.96 on the left engine, and 2.04 and 1.91 on the right engine. During this same period, the airplane remained at FL 330, the airspeed dropped to 209.25 knots, and the pitch increased to 4.91 degrees. Between SRN 4,725 and 4,735, the EPR indications for the left and right engines dropped to 1.05 and .86 respectively. By SRN 4,749, 24 seconds after the roll back, the airspeed had dropped to 187 knots and the pitch had increased to 8.44 degrees. DFDR data shows that the autothrottles reached the EPR limit during this period. The DFDR plots are included in the public docket material associated with this report.

ADDITIONAL INFORMATION

Spirit Airlines, Pratt and Whitney, Boeing, The Air Line Pilots Association, and the Federal Aviation Administration were parties to the investigation.

Pilot Information

Certificate:	Airline Transport	**Age:**	53, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	12/20/2001
Occupational Pilot:		**Last Flight Review or Equivalent:**	02/13/2002
Flight Time:	7200 hours (Total, all aircraft), 1720 hours (Total, this make and model), 5400 hours (Pilot In Command, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	**Age:**	38, 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):		**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	03/11/2002
Occupational Pilot:		**Last Flight Review or Equivalent:**	03/06/2002
Flight Time:	8900 hours (Total, all aircraft), 376 hours (Total, this make and model), 7800 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	McDonnell Douglas	**Registration:**	N823NK
Model/Series:	MD-82	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	48020
Landing Gear Type:	Retractable - Tricycle	**Seats:**	166
Date/Type of Last Inspection:	Continuous Airworthiness	**Certified Max Gross Wt.:**	149500 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Fan
Airframe Total Time:	53116 Hours at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Not installed	**Engine Model/Series:**	JT8D-219
Registered Owner:	SPIRIT AIRLINES INC.	**Rated Power:**	21700 lbs
Operator:	SPIRIT AIRLINES INC.	**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:		**Operator Designator Code:**	GTIA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	ICT, 1333 ft msl	**Observation Time:**	1248 CDT
Distance from Accident Site:	10 Nautical Miles	**Direction from Accident Site:**	197°
Lowest Cloud Condition:	Scattered / 4000 ft agl	**Temperature/Dew Point:**	23°C / 17°C
Lowest Ceiling:	Overcast / 18000 ft agl	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	12 knots, 60°	**Visibility (RVR):**	
Altimeter Setting:	29.88 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:			
Departure Point:	DENVER, CO (DEN)	**Type of Flight Plan Filed:**	IFR
Destination:	FORT LAUDERDALE, FL (FLL)	**Type of Clearance:**	IFR
Departure Time:	1140 CDT	**Type of Airspace:**	Class A

Wreckage and Impact Information

Crew Injuries:	6 None	**Aircraft Damage:**	None
Passenger Injuries:	105 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	111 None	**Latitude, Longitude:**	38.139444, -97.370556

Administrative Information

Investigator In Charge (IIC):	John M Brannen	**Adopted Date:**	01/28/2005
Additional Participating Persons:	TR Proven; FAA-Office of Accident Investigation, AAI-100; Washington, DC Brent Mauntel; Spirit Airlines; Detroit, MI Stephen Sheely; Pratt & Whitney; East Hartford, CT Sam Nayani; The Boeing Company; Long Beach, CA Eugene Rosenthal; Air Line Pilots Association; New London, NH		
Publish Date:			
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