Contained engine failure, Douglas DC-9-82, June 25, 1999

Micro-summary: **Contained engine failure cocomitant with rotation for this DC-9-82.**

Event Date: **1999-06-25 at 1440 PDT**

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

Investigative Body's Web Site: **http://www.ntsb.gov/**

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

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!***

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

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National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: LAX99IA230	Aircraft Registration Number: N450AA
Occurrence Date: 06/25/1999	Most Critical Injury: None
Occurrence Type: Incident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
SAN DIEGO	CA	92145	1440	PDT	

Airport Proximity: On Airport	Distance From Landing Facility:	Direction From Airport:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Boeing	DC-9-82	Airplane

Sightseeing Flight: No Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

On June 25, 1999, about 1440 hours Pacific daylight time, American Airlines Flight 2090, a Boeing DC-9-82 (MD-82), N450AA, experienced a contained engine failure during departure from Lindbergh Field, San Diego, California. American Airlines operated the airplane as a scheduled domestic passenger flight to Dallas-Fort Worth, Texas, under the provisions of 14 CFR Part 121. The airline transport pilot licensed captain, first officer, 4 cabin attendants, and 135 passengers were not injured. The airplane was on an instrument flight rules (IFR) flight plan and was not damaged. Visual meteorological conditions prevailed.

The flight crew reported that they heard a pop after the nose wheel lifted up during rotation on takeoff. The airplane pulled to the right as they lost power on the right engine. They did not notice any alarms or caution lights. They stated they performed required checklists and secured the engine. An emergency was declared and an uneventful landing was completed at the Miramar Marine Corps Air Station, San Diego. All passengers deplaned normally by the airplane's stairs. A preliminary visual inspection determined that all of the blades were missing from the last stage of the turbine. Damage was also observed on the next stage forward. No damage was apparent to the compressor section.

A detailed examination of the engine was performed at American Airlines maintenance facility in Tulsa, Oklahoma, and observed by a Federal Aviation Administration (FAA) inspector. The FAA inspector noted the engine was a Pratt & Whitney JT8D-217C, serial number 725576. He reported that a review of records disclosed that the time on the engine since its installation on this airplane, which coincided with time since its last shop visit, was 3,980 hours.

Teardown of the engine revealed that all third and fourth stage turbine blades fractured at the root and no fatigue marks were noted. The second-stage turbine blades fractured at 1/2 to 2/3 span. All low-pressure turbine nozzle guide vanes exhibited leading edge rub and meshed with adjacent turbine blade trailing edges. The turbine case bulged in several areas. The inspector noted the turbine exhaust case and number 6 bearing support exhibited damage consistent with aft movement of the low-pressure turbine. The high-pressure compressor drive shaft exhibited minor damage and all three antirotational pins were present. The low-pressure compressor drive turbine shaft fractured approximately 25 inches aft of the low-pressure compressor end. This was at a point relative to the plane of the 12th stage high-pressure compressor disk and the forward portion of the rear compressor seal tube. This fracture twisted and contained a large area of displaced and galled metal; coke/carbon was observed under the galled metal.

The number 4 1/2 bearing oil supply manifold assembly was in good condition with all three oil packings in place and intact. The number three bearing was damaged. All balls were worn with flat spots that were up to 1/2 the ball circumference. Spalling was evident on the inner and outer race, but no race spinning was evident. The cage was intact, but worn. No evidence of oil starvation or overheating was observed.

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Narrative (Continued)

A flow check of the oil supply system to the number three bearing was completed with no blockage or flow anomalies detected.

Metallurgical examination by an independent laboratory could not determine a cause for the bearing failure.

The FAA inspector noted that the number three bearing had accumulated 12,487 hours and the low-pressure compressor drive shaft accumulated 27,230 hours since new. An American Airlines representative reported that compressor washes were not specified in the maintenance manual for this engine series. A representative for the engine manufacturer noted that the coke/carbon buildup was not in the gas path, therefore, compressor washes would not remove this buildup. He opined this buildup was from burning oil that leaked into a hot area after the bearing failure.

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FACTUAL REPORT AVIATION

NTSB ID: LAX99IA230

Occurrence Date: 06/25/1999

Occurrence Type: Incident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
LINDBERG FIELD	SAN	14 Ft. MSL	27	9400	200

Runway Surface Type: Concrete

Runway Surface Condition: Dry

Type Instrument Approach: NONE

VFR Approach/Landing: Precautionary Landing

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Boeing	DC-9-82	49476

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	145	149500 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Jet	P&W	JT8D-217C	21000 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness		Hours	34641 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?
Yes	No	

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
AMERICAN AIRLINES	4333 AMON CARTER BLVD	FORT WORTH	TX	76155

Operator of Aircraft	Street Address	City	State	Zip Code
WILMINGTON TRUST C0	RODNEY SQUARE NORTH	WILMINGTON	DE	19890

Operator Does Business As:

Operator Designator Code: AALA

- 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

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: LAX99IA230

Occurrence Date: 06/25/1999

Occurrence Type: Incident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	42

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number: On File

Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land; Single-engine Sea

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Single-engine

Type Rating/Endorsement for Accident/Incident Aircraft? Yes | Current Biennial Flight Review?

Medical Cert.: Class 1 | Medical Cert. Status: Valid Medical--no waivers/lim. | Date of Last Medical Exam: 03/1999

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	8000									
Pilot In Command(PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
SAN DIEGO	CA	SAN	1410	PDT

Destination	State	Airport Identifier
DALLAS	TX	DFW

Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing:

National Transportation Safety Board

FACTUAL REPORT AVIATION

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Occurrence Date: 06/25/1999

Occurrence Type: Incident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
NKX	1456	PDT	478 Ft. MSL	0 NM	0 Deg. Mag.

Sky/Lowest Cloud Condition: Clear 0 Ft. AGL

Condition of Light: Day

Lowest Ceiling: None 0 Ft. AGL

Visibility: 10 SM

Altimeter: 29.00 "Hg

Temperature: 22 °C

Dew Point: 14 °C

Wind Direction: 330

Density Altitude: Ft.

Wind Speed: 7

Gusts:

Weather Condtions at Accident Site: Visual Conditions

Visibility (RVR): 0 Ft.

Visibility (RVV) 0 SM

Intensity of Precipitation: Unknown

Restrictions to Visibility: None

Type of Precipitation: None

Accident Information

Aircraft Damage: None

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				4	4
Other Crew					
Passengers				135	135
- TOTAL ABOARD -				141	141
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	141	141

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FACTUAL REPORT AVIATION

NTSB ID: LAX99IA230

Occurrence Date: 06/25/1999

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

HOWARD D. PLAGENS

Additional Persons Participating in This Accident/Incident Investigation:

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