



# Aviation Investigation Final Report

<b>Location:</b>	DFW AIRPORT, Texas	<b>Incident Number:</b>	FTW92IA055
<b>Date &amp; Time:</b>	January 7, 1992, 13:32 Local	<b>Registration:</b>	N322DL
<b>Aircraft:</b>	BOEING 737-232	<b>Aircraft Damage:</b>	Minor
<b>Defining Event:</b>		<b>Injuries:</b>	49 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

THE RIGHT ENGINE SEPARATED FROM THE WING AS THE AIRPLANE WAS CLIMBING THROUGH 200 FEET AFTER TAKEOFF. FOLLOWING THE ENGINE SEPARATION, THE CREW CONTINUED THE CLIMB AND WERE VECTORED FOR AN UNEVENTFUL LANDING WITHOUT FURTHER INCIDENT. ENGINE SEPARATION WAS THE RESULT OF THE FAILURE OF THE AFT CONE BOLT AND THE ENGINE SECONDARY SUPPORT ASSEMBLY. THE AFT CONE BOLT FAILED AS RESULT OF A PREEXISTING FATIGUE CRACK, WHILE THE ENGINE SECONDARY SUPPORT ASSEMBLY FAILED AS RESULT OF THE DYNAMIC LOADS THAT EXCEEDED THE DESIGNED CAPACITY OF THE MOUNTING BOLTS. THE TWO FORWARD CONE BOLTS FAILED IN OVERLOAD AS THE ENGINE SWUNG FORWARD DURING THE SEPARATION SEQUENCE. METALLURGICAL TESTING REVEALED THAT THE FATIGUE OF THE AFT CONE BOLT WAS A RESULT OF LUBRICANT INADVERTENTLY INTRODUCED INTO THE CONICAL SURFACE OF THE CONE BOLT.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: THE FAILURE OF THE AFT CONE BOLT AS RESULT OF PREEXISTING FATIGUE CRACKING DUE TO IMPROPER MAINTENANCE, AND THE FAILURE OF THE SECONDARY SUPPORT STRUCTURE AS A RESULT OF LOADS THAT EXCEEDED THE CAPACITY OF THE ATTACHING HARDWARE AND THE CRUSHABLE HONEYCOMB CORE.

## Findings

Occurrence #1: ENGINE TEARAWAY

Phase of Operation: TAKEOFF - INITIAL CLIMB

### Findings

1. (C) ENGINE INSTALLATION,MOUNTING BOLT - FATIGUE
2. (C) INSTALLATION - IMPROPER - COMPANY MAINTENANCE PERSONNEL
3. (C) ENGINE INSTALLATION,MOUNTING BOLT - FAILURE,TOTAL
4. (C) ENGINE INSTALLATION,SUSPENSION MOUNTS - DISCONNECTED
5. POWERPLANT - SEPARATION
6. ENGINE INSTALLATION,SUSPENSION MOUNTS - OVERLOAD

## Factual Information

### Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	49,Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	December 15, 1991
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	12000 hours (Total, all aircraft), 8200 hours (Pilot In Command, all aircraft), 209 hours (Last 90 days, all aircraft), 55 hours (Last 30 days, all aircraft)		

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	BOEING	<b>Registration:</b>	N322DL
<b>Model/Series:</b>	737-232 737-232	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	23094
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	130
<b>Date/Type of Last Inspection:</b>	December 23, 1991 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	115000 lbs
<b>Time Since Last Inspection:</b>	82 Hrs	<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>	20468 Hrs	<b>Engine Manufacturer:</b>	P&W
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	JT-8D-15
<b>Registered Owner:</b>	DELTA AIR LINES, INC.	<b>Rated Power:</b>	15500 Lbs thrust
<b>Operator:</b>	DELTA AIR LINES, INC.	<b>Operating Certificate(s) Held:</b>	Flag carrier (121)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	DAL

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	DFW ,603 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	13:00 Local	<b>Direction from Accident Site:</b>	360°
<b>Lowest Cloud Condition:</b>	Scattered / 1600 ft AGL	<b>Visibility</b>	15 miles
<b>Lowest Ceiling:</b>	Overcast / 7500 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	180°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29 inches Hg	<b>Temperature/Dew Point:</b>	16°C / 9°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	(DFW )	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	HOUSTON (IAH )	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	13:31 Local	<b>Type of Airspace:</b>	Class B;Class D;Class E

## Airport Information

<b>Airport:</b>	DFW AIRPORT DFW	<b>Runway Surface Type:</b>	Concrete
<b>Airport Elevation:</b>	603 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	18	<b>IFR Approach:</b>	
<b>Runway Length/Width:</b>	11387 ft / 200 ft	<b>VFR Approach/Landing:</b>	Precautionary landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	5 None	<b>Aircraft Damage:</b>	Minor
<b>Passenger Injuries:</b>	44 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	49 None	<b>Latitude, Longitude:</b>	

## Administrative Information

Investigator In Charge (IIC):	Casanova, Hector
Additional Participating Persons:	VINCENT L COLLAMORE; DFW AIRPORT , TX
Original Publish Date:	June 30, 1993
Last Revision Date:	
Investigation Class:	<a href="#">Class</a>
Note:	
Investigation Docket:	<a href="https://data.nts.gov/Docket?ProjectID=18386">https://data.nts.gov/Docket?ProjectID=18386</a>

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