



National Transportation Safety Board Aviation Accident Final Report

Location:	MIAMI, FL	Accident Number:	MIA96FA013
Date & Time:	10/23/1995, 0350 EDT	Registration:	N613FF
Aircraft:	Boeing 747-121	Aircraft Damage:	Substantial
Defining Event:		Injuries:	5 None

Flight Conducted Under: Part 121: Air Carrier - Non-scheduled

Analysis

The flight had an uncontained failure of the No. 4 engine during the takeoff roll. The takeoff was rejected and the aircraft stopped on the remaining runway. Airport emergency personnel extinguished a fire that erupted in the engine after failure. Examination of the aircraft showed the engine, pylon, right wing, flaps, and aileron, right horizontal stabilizer, and fuselage sustained damage from engine debris released during failure of the engine. Examination of the engine indicated the low pressure turbine fifth stage hub had ruptured. About 180 degrees of the hub rim had separated along with the blade attachment slots and blades. The hub ruptured from an area of a well oxidized, intergranular fracture that originated at a tierrod hole. There was no apparent defect observed along the edge of the tierrod hole that would cause a crack to initiate and propagate to critical length.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the No. 4 engine fifth stage turbine hub due to a cyclic stress rupture for undetermined reasons, which resulted in an uncontained failure of the engine.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - ROLL/RUN

Findings

1. ENGINE
2. (C) TURBINE ASSEMBLY, TURBINE WHEEL - CRACKED
3. (C) TURBINE ASSEMBLY, TURBINE WHEEL - RUPTURED
4. (C) TURBINE ASSEMBLY, TURBINE WHEEL - UNDETERMINED

Factual Information

On October 23, 1995, about 0350 eastern daylight time, a Boeing 747-121, N613FF, registered to and operated by Tower Air, Inc., as flight 803, a 14 CFR Part 121 international cargo flight from Miami, Florida, to Port of Spain, Trinidad, sustained substantial damage when the No. 4 engine had an uncontained failure during takeoff from Miami. Visual meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed. The airline transport-rated captain, first officer, flight engineer, and two extra crewmembers were not injured. The flight was originating at the time of the accident.

The captain stated the first officer was performing the takeoff on runway 9L. Takeoff engine thrust was set at 1.42 EPR. All engines operated normally and the aircraft accelerated normally with no unusual vibration felt. Upon reaching the V₁ speed, they heard a loud bang and observed a flash on the right side of the aircraft. The aircraft veered slightly to the right. He, the captain, took control and rejected the takeoff. The flight engineer reported an engine failure. The aircraft was stopped on the runway about 1,000 feet from the departure end. The ATC local controller reported that the No. 4 engine was on fire. They performed the engine fire procedures and fired the engine fire bottles for the No. 4 engine. Airport emergency equipment arrived and extinguished the fire.

Readout of the digital flight data recorder (DFDR) from N613FF was performed by Jeremy Akel, Aerospace Engineer, NTSB, Washington, D.C. The data shows engine power was set at 1.42 EPR on all engines and the aircraft accelerated. Upon reaching an indicated airspeed of 155 knots the No. 4 engine EPR dropped to .98. Upon reaching 162 knots the EPR on the remaining engines decreases to about 1.0 and the aircraft begins to decelerate. (See the Aerospace Engineer Memorandum.)

Postaccident examination of the aircraft by NTSB personnel showed an uncontained failure occurred in the turbine area of the No. 4 engine. The engine, engine cowling, engine pylon, right wing, aileron, and flaps, fuselage, and right horizontal stabilizer sustained damage from debris released during engine failure. A 5 x 7 inch triangular shaped hole was cut into the right side of the fuselage, just aft of station 2,000 and 6 feet above the main cabin floor. A rib and longeron were severed behind the hole and the pressurized area of the airplane was compromised.

Teardown examination of the No. 4 engine showed the low pressure turbine fifth stage turbine hub was missing about a 180 degree continuous arc of the rim, which includes the blade attachment slots. Five pieces of the rim were found on or to the side of runway 9L. The No. 5 hub was found to have ruptured from an area of a well oxidized, intergranular fracture that originated at a tierod hole. There was no apparent defect observed along the edge of the tierod hole that would cause a crack to initiate and propagate to a critical length. (See the Powerplant Group Chairman Factual Report and Metallurgist's Factual Report.)

Pilot Information

Certificate:	Airline Transport	Age:	51, 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):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last Medical Exam:	07/10/1995
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	18000 hours (Total, all aircraft), 6000 hours (Total, this make and model), 9000 hours (Pilot In Command, all aircraft), 181 hours (Last 90 days, all aircraft), 57 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Boeing	Registration:	N613FF
Model/Series:	747-121 747-121	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	19647
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	10/23/1996, Continuous Airworthiness	Certified Max Gross Wt.:	734000 lbs
Time Since Last Inspection:	0 Hours	Engines:	4 Turbo Fan
Airframe Total Time:	22911 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	JT9D-7AH
Registered Owner:	TOWER AIR INC	Rated Power:	46150 lbs
Operator:	TOWER AIR INC	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	TWRA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	MIA, 11 ft msl	Observation Time:	0450 EDT
Distance from Accident Site:	1 Nautical Miles	Direction from Accident Site:	270°
Lowest Cloud Condition:	Scattered / 12000 ft agl	Temperature/Dew Point:	23° C / 22° C
Lowest Ceiling:	None / 0 ft agl	Visibility	7 Miles
Wind Speed/Gusts, Direction:	3 knots, 20°	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	(MIA)	Type of Flight Plan Filed:	IFR
Destination:	PORT OF SPAIN, OF (TTPP)	Type of Clearance:	IFR
Departure Time:	0350 EDT	Type of Airspace:	Class D

Airport Information

Airport:	MIAMI INTERNATIONAL (MIA)	Runway Surface Type:	Asphalt
Airport Elevation:	11 ft	Runway Surface Condition:	Dry
Runway Used:	9L	IFR Approach:	None
Runway Length/Width:	10502 ft / 200 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	JEFFREY L KENNEDY	Adopted Date:	09/09/1996
Additional Participating Persons:	LAWRENCE G SMITH; WASHINGTON, DC ROLAND HANNULA; NEW YORK, NY BRUCE A SAMBORSKI; HARTFORD, CT		
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/ .		

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