



National Transportation Safety Board Aviation Accident Final Report

Location:	CHARLESTON, WV	Accident Number:	BFO88FA036
Date & Time:	04/14/1988, 0945 EDT	Registration:	N110UR
Aircraft:	FOKKER F28 MK 4000	Aircraft Damage:	Substantial
Defining Event:		Injuries:	8 Minor, 54 None

Flight Conducted Under: Part 121: Air Carrier - Scheduled

Analysis

THE ACFT WAS AT FLIGHT LEVEL 310, WHEN THE NO. 2 ENGINE FIRST STAGE TURBINE DISC SEPARATED, CAUSING AN UNCONTAINED ENGINE FAILURE. TURBINE DEBRIS PENETRATED THE FUSELAGE STRUCTURE & CAUSED DEPRESSURIZATION. THE PLT MADE AN EMERGENCY DESCENT & LANDED AT CHARLESTON, WV, WHICH WAS ABOUT 50 MILES AWAY. THE INVESTIGATION REVEALED SEVERE RUBBING & MELTING OF THE LOW PRESSURE TURBINE INTERSTAGE SEAL & SEPARATION OF THE DRIVE FLANGES CONNECTING THE LP1 & LP2 TURBINE DISCS. ROLLS-ROYCE REPAIR SCHEME XRS 3505 DESCRIBES A PROCEDURE FOR REPAIR OF THE INTERSTAGE SEALS. HOWEVER, IN REPLACING THE SEALS, THE REPAIR FACILITY USED MACHINING REFERENCE SURFACES WHICH DIFFERED FROM THOSE IN THE REPAIR SCHEME. ROLLS-ROYCE SUBSEQUENTLY AMENDED XRS 3505 TO MAKE IT MORE TOLERABLE TO RUBBING OR MISASSEMBLY OF THE LOW PRESSURE TURBINE SEAL. ALL OF THE FIRST CLASS SECTION & TWO CABIN SECTION PASSENGER OXYGEN MASKS FAILED TO DEPLOY.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: ENGINE AND AIRFRAME FAILURE WERE CAUSED BY THE THE SEPARATION OF THE FIRST STAGE LOW PRESSURE TURBINE DISK. THE DISK INTERSTAGE SEAL WAS INSTALLED INADEQUATELY, RESULTING IN RUBBING BETWEEN THE SEAL AND DISK, CAUSING FAILURE OF THE DISK. INADEQUATE PROCEDURE BY MAINTENANCE PERSONNEL ARE A CONTRIBUTING FACTOR.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE - NORMAL

Findings

1. (C) TURBINE ASSEMBLY,SEAL - MOVEMENT RESTRICTED
2. (C) MAINTENANCE,INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL
3. (F) TURBINE ASSEMBLY,TURBINE WHEEL - CHAFED
4. (F) PROCEDURES/DIRECTIVES - NOT FOLLOWED - OTHER MAINTENANCE PERSONNEL
5. (F) TURBINE ASSEMBLY,TURBINE WHEEL - FAILURE,TOTAL

Occurrence #2: DECOMPRESSION
Phase of Operation: CRUISE - NORMAL

Findings

6. (F) TURBINE ASSEMBLY,TURBINE WHEEL - SEPARATION
7. (F) FUSELAGE,CABIN - PENETRATED
8. OXYGEN SYSTEM,MASK,PASSENGER - JAMMED

Factual Information

Pilot Information

Certificate:	Airline Transport	Age:	45, Male
Airplane Rating(s):	Multi-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--no waivers/lim.	Last Medical Exam:	10/12/1987
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	11009 hours (Total, all aircraft), 325 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	FOKKER	Registration:	N110UR
Model/Series:	F28 MK 4000 F28 MK 400	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	11182
Landing Gear Type:	Retractable - Tricycle	Seats:	72
Date/Type of Last Inspection:	AAIP	Certified Max Gross Wt.:	73000 lbs
Time Since Last Inspection:	129 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	14441 Hours	Engine Manufacturer:	Rolls-Royce
ELT:	Not installed	Engine Model/Series:	555-15P
Registered Owner:	PIEDMONT AVIATION	Rated Power:	9850 lbs
Operator:	PIEDMONT AVIATION	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	PAIA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	CRW, 982 ft msl	Observation Time:	0950 EDT
Distance from Accident Site:	50 Nautical Miles	Direction from Accident Site:	360°
Lowest Cloud Condition:	Unknown / 0 ft agl	Temperature/Dew Point:	14° C / 4° C
Lowest Ceiling:	Overcast / 25000 ft agl	Visibility	7 Miles
Wind Speed/Gusts, Direction:	4 knots, 190°	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	CHARLOTTE, NC (CLT)	Type of Flight Plan Filed:	IFR
Destination:		Type of Clearance:	IFR
Departure Time:	0930 EDT	Type of Airspace:	Class E

Airport Information

Airport:	YEAGER (CRW)	Runway Surface Type:	Asphalt
Airport Elevation:	982 ft	Runway Surface Condition:	Dry
Runway Used:	5	IFR Approach:	None
Runway Length/Width:	6302 ft / 150 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	3 Minor, 3 None	Aircraft Damage:	Substantial
Passenger Injuries:	5 Minor, 51 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	8 Minor, 54 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	DENNIS L JONES	Adopted Date:	10/01/1991
Additional Participating Persons:	DAVID TOWNSEND; CHARLESTON, WV EDWARDS REILLY; WINSTON-SALEM, NC JOHN CHAPLIN; DALLAS, TX		
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 pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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